



## *Dendrobium roseiodorum* (Orchidaceae): a new species from Vietnam

A. Sathapattayanon<sup>1, 2</sup>, T. Yukawa<sup>3</sup>, T. Seelanan<sup>1, 2</sup>

### Key words

*Dendrobium roseiodorum*  
new species  
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**Abstract** In the course of revisionary work of *Dendrobium* section *Formosae*, we found some misinterpretations of *Dendrobium kontumense*. *Dendrobium schildhaueri* is placed as a synonym of *D. kontumense* and *D. roseiodorum*, a new species from Vietnam, is described.

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### INTRODUCTION

*Dendrobium* Sw. sect. *Formosae* (Benth. & Hook.f.) Hook.f. (Orchidaceae), widely known by its synonymous name, sect. *Nigrohirsutae* (Lindl.) Schltr., comprises about 55 species and occurs from the Himalaya east to the Philippines and Sulawesi (Sathapattayanon, Yukawa & Seelanan, unpubl.). It is believed that sect. *Formosae* can be distinguished from the other *Dendrobium* sections by the presence of blackish hairs on leaf blades and leaf sheaths. However, several species from the Philippines and Borneo do not present this character. In fact, only the hard-textured flowers with white, greenish or yellow perianth lobes characterize the section (Yukawa 2004). A phylogenetic analysis of *Dendrobium* based on macromolecular data indicated the polyphyly of sect. *Formosae* (Wongsawad et al. 2005). These data suggest the necessity of re-examination of this section.

In the course of revisionary work of sect. *Formosae*, we have found misinterpretations of several species. *Dendrobium kontumense* Gagnep. is one of such obscure entities and has been variously interpreted in previous taxonomic treatments. For example, Kerr (1969) and Seidenfaden (1973, 1975) overlooked this species in their inventory works of Indochinese orchids. Subsequently, Seidenfaden (1985, 1992) placed *D. kontumense* as a synonym of *D. virgineum* Rchb.f. On the other hand, Schildhauer (2002) and Ormerod & Pedersen (2003) rejected this view and applied the name *D. kontumense* to another plant. In this study, we review these treatments and clarify the status of *D. kontumense*.

### SYSTEMATICS

In 1930, Poilane collected *Dendrobium* material from Kon Tum Province, Vietnam. Gagnepain (1932) recognized its new status and described it as *D. kontumense*. Kerr (1969) and Seidenfaden (1973, 1975), however, overlooked this species and identified Laotian materials assignable to this species as

*D. sculptum* Rchb.f., a Bornean species, because both species are similar in having white flowers with an orange blotch on the lip and a narrowly conical mentum. Later, Seidenfaden (1985) recognized his misidentification and reduced it to a synonym of *D. virgineum*, a species described from Myanmar (Reichenbach 1884).

On the other hand, Schildhauer (2002) demonstrated differences between *D. kontumense* and *D. virgineum* from sketches of the type material and from the original descriptions. He thus concluded that *D. kontumense* was not a synonym of *D. virgineum* but he misapplied the name *D. kontumense* to another entity, which is described here as a new species. Moreover, he did not recognize the differences between *D. virgineum* and the Indochinese material of *D. virgineum* sensu Seidenfaden.

Subsequently, Ormerod & Pedersen (2003) recognized the misinterpretation of *D. virgineum* by Schildhauer (2002) and described the Indochinese material of *D. virgineum* sensu Seidenfaden as a new species, *D. schildhaueri* Ormerod & H.A. Pedersen. As indicated by the history of interpretations of *D. kontumense* and *D. virgineum*, it is apparent that re-examinations of these species are needed.

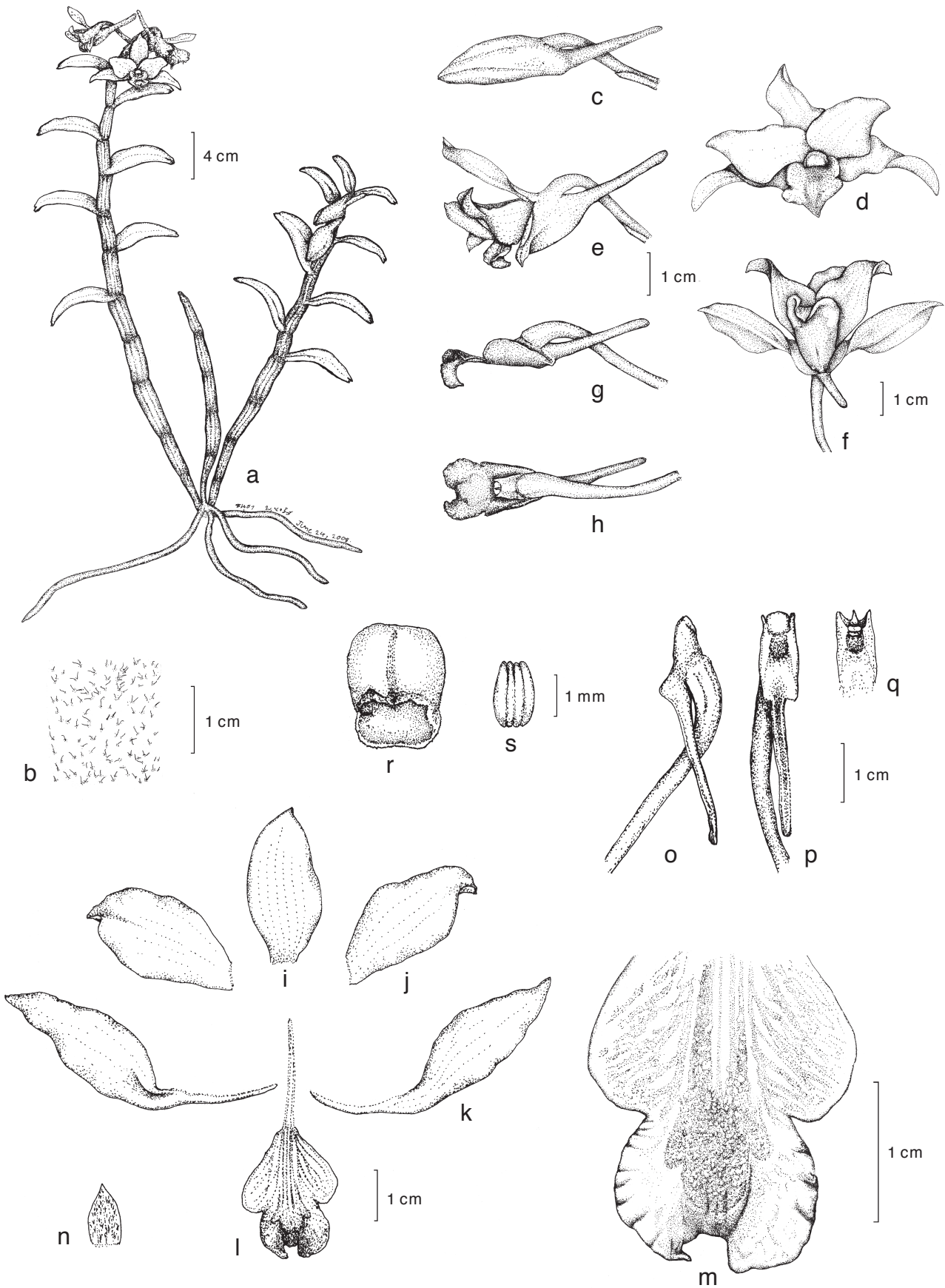
First, we rechecked the holotype of *D. virgineum* (W) and found that it definitely belongs to *D. infundibulum* Lindl. complex (Sathapattayanon, Yukawa & Seelanan, unpubl.) and is not closely related to *D. kontumense*. We also found that the protologue and holotype of *D. kontumense* (Fig. 2e, f) completely agree with those of *D. schildhaueri* (Ormerod & Pedersen 2003). Vegetative parts of them are identical and they share floral features such as lanceolate-oblong sepals, elliptic petals, a narrowly conical mentum, a red central blotch on the glabrous lip and a transversely elliptic mid-lobe of the lip (Fig. 2c, d). From these evidences, we conclude that *D. kontumense* and *D. schildhaueri* represent the same taxon and that *D. schildhaueri* should be reduced to a synonym of *D. kontumense*.

Furthermore, we examined the plant identified as *D. kontumense* by Schildhauer (2002), Vestweber (2004) and Yukawa (2004) and compared it with the holotype of *D. kontumense*. We found that the flower of the former had densely verrucose calli on the lip, the golden yellow to orange side lobes and central part of a mid-lobe of the lip, a widely obovate mid-lobe narrower than side lobes of the lip, whereas the flower of the holotype of *D. kontumense* showed a glabrous lip, having only 3–5 slightly raised veins on the disc, a shape of mid-lobe more

<sup>1</sup> Biological Science Program, Faculty of Science, Chulalongkorn University, Bangkok 10330, Thailand;  
corresponding author e-mail: dao23rd@yahoo.com.

<sup>2</sup> Department of Botany, Faculty of Science, Chulalongkorn University, Bangkok 10330, Thailand.

<sup>3</sup> Tsukuba Botanical Garden, National Museum of Nature and Science, 1-1, Amakubo 4, Tsukuba 305-0005, Japan.



**Fig. 1** *Dendrobium roseiodorum* A.Sathapattayanon, T.Yukawa & T.Seelanan. a. Habit; b. hairs on leaf; c. flower bud, side view; d. flower, front view; e. flower, side view; f. flower, from below; g. lip and mentum, side view, sepals and petals removed; h. lip and mentum, from above, sepals and petals removed; i. dorsal sepal; j. petal; k. lateral sepal; l. lip; m. lip, note the verrucose calli on the disc; n. floral bract; o. column and column foot, side view; p. column and column foot, from below; q. column, from below, operculum removed; r. operculum; s. pollinia (all from *Hort. Tsukuba Botanical Garden* accession number 188269 (holotype)). — Drawing by Mr. Tanucha Boonjaras.

or less the same size as the side lobes of the lip. Moreover, an apical part of the lip of the former is more recurved and thicker than that of *D. kontumense*. We therefore recognized this plant as a new species, *D. roseiodorum* A.Sathapattayanon, T.Yukawa & T.Seelanan.

*Dendrobium kontumense* and the new species constitute a monophyletic group with *D. draconis* Rchb.f., *D. ochraceum* De Wild. and *D. trankimianum* T.Yukawa as demonstrated by a molecular phylogenetic analysis of *Dendrobium* sect. *Formosae* (Sathapattayanon, Yukawa & Seelanan, unpubl.). They share the following floral characters: a slender, narrowly conical mentum, a dilated base of the column and a raised margin of the column foot. The results of phylogenetic analyses further show that *D. roseiodorum* is most closely related to *D. ochraceum*. In fact, a synapomorphic morphological character, verrucose calli on the lip, also indicates their sister group relationship. However, several floral features of *D. roseiodorum* distinctly differ from *D. ochraceum*. The new species has a substantially golden yellow to orange lip (Fig. 2a), whereas *D. ochraceum* has a creamy yellow flower with scarlet veins on the lip (Fig. 2g). Further, they are distinguishable by the shape of the petals (elliptical-rhombic in *D. roseiodorum*; narrowly elliptical in *D. ochraceum*), the shape of side lobes of the lip (obliquely ovate in *D. roseiodorum*; obliquely elliptical in *D. ochraceum*, shown in Fig. 2h) and the verrucose calli of the lip (on the disc and veins in *D. roseiodorum*, shown in Fig. 2b; only on the veins in *D. ochraceum*, shown in Fig. 2h).

**1. *Dendrobium roseiodorum*** A.Sathapattayanon, T.Yukawa & T.Seelanan, *sp. nov.*— Fig. 1, 2a, b

*Dendrobium ochraceum* de Wild. affine, sed petalis ellipticis-rhombicis, labello aureo-aurantiaco, et disco labelli verrucoso diversum. — Typus: Hort. Tsukuba Botanical Garden accession number 118269 (holo TNS; iso BCU), Vietnam, sine loc., 15 September 2008.

*Dendrobium kontumense* auct. non. Gagnep.; Schildhauer (2002) 369; Vestweber (2004) 38; Yukawa (2004) 23, f. 3–4.

Plant erect, 30–40 cm high. *Roots* elongate, 1.8–2.1 mm diam, branched, white to grey. *Pseudobulbs* clustered, narrowly fusiform, 30–37 cm long, 1.1–1.4 cm diam, slightly flexuose, weakly sulcate in age, leafy throughout, almost entirely covered by persistent leaf sheaths, with 7–18 internodes. *Leaves* distichous; blade patent, slightly recurved, coriaceous, lanceolate, 4.7–9.1 cm long, 0.9–1.9 cm wide, apex unequally bilobed, entire, dark green, both surfaces covered with dense hirsute hairs rubbing off with age, adaxial hairs brownish, abaxial hairs blackish; sheaths 3–3.4 cm long, brownish green, abaxial hairs blackish and rubbing off with age. *Inflorescences* abbreviated raceme, terminal or axillary on apical part of pseudobulbs, (1–)2–5-flowered; peduncle inconspicuous, 3–4 mm long, entirely enclosed by bracts; rachis 5–7 mm long; floral bracts ovate-triangular or lanceolate-triangular, 10.3–10.5 mm long, 4–7 mm wide, acuminate, concave, brownish, abaxial surface with brown hairs, adaxial surface glabrous. *Flowers* glossy, sweetly scented, 4.3–4.8 cm diam; sepals and petals white; lip golden yellow, apical part white, veins on side lobes and disc orange; column and operculum golden yellow to orange; column foot reddish orange; pollinia bright yellow; pedicellate ovary white. *Median sepal* spreading recurved at apical part, ovate-lanceolate, 2.4–3 cm long, 0.9–1.3 cm wide, abruptly acute, abaxial surface 1-keeled, 5–7-nerved. *Lateral sepals* twisted and recurved, obliquely lanceolate-triangular, abruptly acute to mucronate, abaxial surface 1-keeled, 5–7-nerved, anterior margin 2.6–3.5 cm long, posterior margin 5.5–6.7 cm long, 1–1.3 cm wide at base; mentum narrowly conical, ovipositor-shaped, 2.5–2.8 cm long, straight to upcurved. *Petals* slightly twisted and recurved at apex, elliptical-rhombic,

2.6–3.2 cm long, 1.4–1.6 cm wide, obtuse, undulate, 5–9-nerved. *Lip* 3-lobed, 4.7–5.1 cm long, 1.7–1.8 cm wide across side lobes; claw narrowly triangular, 1.5–2 cm long; side lobes upcurved, obliquely ovate, puberulent at base, rounded, entire, adaxial surface with 4–5 veins running along each side and sparsely verrucose; mid-lobe thick, widely obovate, 1–1.2 cm long, 1.1–1.5 cm wide, obtuse when flattened, conduplicated and recurved at apical part, undulate, adaxial surface densely verrucose at median ridge. *Column* glabrous, dilate at base, 7–8 mm long, 5.5–6 mm wide at base; stelia short, triangular-falcate, obtuse; connective narrowly triangular, column foot 4.5–5.1 mm long, grooved, papillose; operculum cucullate, very widely obovate, 3–3.2 mm long, 3–3.1 mm wide, obtuse, base ciliate, dorsally sulcate, densely papillose; pollinia 4, in 2 pairs, 1.8–2 mm long. *Pedicellate ovary* clavate, 3.2–4.1 cm long, curved, slightly sulcate, glabrous. *Fruit* not seen.

**Distribution** — Vietnam (Khanh Hoa Province and Lâm Dong Province).

**Habitat & Ecology** — Recorded on boulders or tree branches; 1000–1200 m altitude. Flowering: September to November (in natural habitat), July to December (in cultivation).

**Etymology** — The specific epithet refers to the rose-like floral scent of the new species.

Other specimens studied. VIETNAM. *Poilane* 46633 (P) Khanh Hoa Province, Nha Trang, 1075 m alt., 17 Sept. 1922; *S. Khruekerd* KV-0012 (TNS), Lâm Dong Province, Lang Bian Mountain; *Oct.a.2005/12385* (Photograph seen) Lâm Dong Province, Oct. 2005; *Hort. Tsukuba Botanical Garden accession number 144309* (TNS), sine loc., 26 July 2007; *Hort. Tsukuba Botanical Garden accession number 144422* (TNS), sine loc.

**2. *Dendrobium kontumense*** Gagnep. — Fig. 2c–f

*Dendrobium kontumense* Gagnep. (1932) 165; (1934) 239; Seidenf. (1975) 46. — Type: *Poilane* 18280 (holo P; iso C), Vietnam, Kon Tum Province, Giang Lo to Dac To, 500 m alt., 8 September 1930.

*Dendrobium schildhaueri* Ormerod & H.A.Pedersen (2003) 341; Vestweber (2004) 35; H.P.Wood (2006) 691, pl. 140, *syn. nov.* — Type: sine coll. *GT 9301* (holo C), Thailand, Nong Khai Province, Seka, October 1983.

*Dendrobium sculptum* auct. non. Rchb.f.; A.D.Kerr (1969) 193; Seidenf. (1973) 123; (1975) 51.

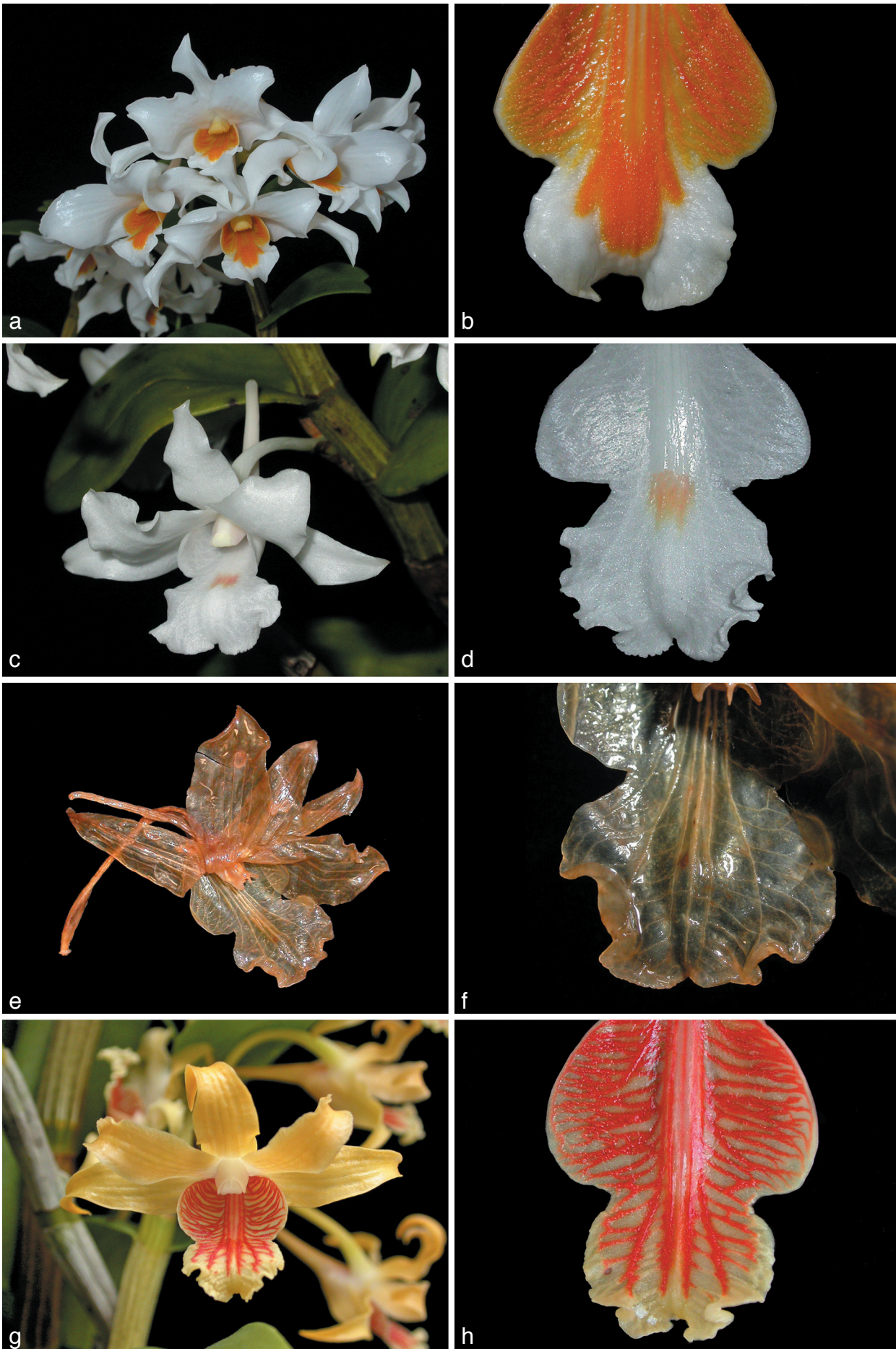
*Dendrobium virgineum* auct. non. Rchb.f.; Seidenf. (1985) 112, f. 68; (1992) 211, f. 134; Aver. (1990) 83; (1994) 182; Rakpaibulsombat (1992) pl. 30; M.L.Baker & C.O.Baker (1996) 758; Thaitong (1999) 127; (2000) 231; Dàn Tôc (2000) 102; Lavarack (2001) 13; Alsagoff & Hong (2001) 73, including photo 5 on p. 70; Schildh. (2002) photo on p. 371; Aver. & Averyanova (2003) 31; (2005) 60; Vaddhanaphuti (2005) 131.

**Distribution** — Thailand (Nakorn Phanom Province, Nong Khai Province, Ubon Ratchathani Province), Laos (Vientiane Province), Vietnam (Lâm Dong Province).

**Habitat & Ecology** — Epiphyte in dry evergreen forests; 500–1000 m altitude. Flowering: July to October.

**Note** — The flower is white with a small central blotch on the lip, which varies in colour from very pale to reddish orange.

Other specimens studied. THAILAND: *Sakdi* 4500 (C), Nong Khai Province, Phu Wua, Aug.–Sept. 1983; sine coll. *GT 9307* (C), Ubon Ratchathani Province, 13 Sept. 1983; *Sakdi* *GT 8952* (C), Nong Khai Province, Phu Wua, 17 July 1984; sine coll. *GT 9301* (C), Nong Khai Province, Seka, 14 Aug. 1984; *Saki* *GT 8967* (C), sine loc., 16 July 1985; *O. Thaitong* 737 (BCU) sine loc., 26 Aug. 1989; *A. Sathapattayanon* 408 (BCU) Nong Khai Province, Phu Wua, 1 Aug. 2005; *A. Sathapattayanon* 435 (BCU) Nong Khai Province, Phu Wua, 17 Aug. 2006; *O. Thaitong* *s.n.* (BCU), sine loc.; *Sukhakul* *GT 8993* (C), Nakorn Phanom Province. — LAOS: *Delacoeur* 177 (P), sine loc., 1928; *A.D. Kerr* *s.n.* (K), Vientiane Province, Phou Khaokhoay, 16 Aug. 1966; *A.D. Kerr* 984 (K), sine loc., 10 Oct. 1966; *Vidal* 5585 (P), Vientiane Province, Phou Khaokhoay, 900 m alt., 29 Oct. 1971; *A.D. Kerr* 988 (C), Vientiane Province, Phou Khaokhoay. — VIETNAM: *Darlac* *cult. Vadderst* *s.n.* (P), sine loc., Apr. 1940; *Oct.a. 2005/12418* (photograph seen), Lâm Dong Province, Oct. 2005; *HAL* 8632/13249 (photograph seen), Lâm Dong Province. — LOCALITY UNKNOWN: *Hort. Tsukuba Botanical Garden accession number 126642* (TNS); *Hort. Tsukuba Botanical Garden accession number 119105* (TNS); *Hort. Tsukuba Botanical Garden accession number 118828* (TNS).



**Fig. 2** a, b. *Dendrobium roseiodorum* A. Sathapattayanon, T. Yukawa & T. Seelanan (holotype). a. flowers; b. lip, note the verrucose calli on the disc. — c, d. *Dendrobium kontumense* Gagnep. c. flower; d. lip. — e, f. *Dendrobium kontumense* Gagnep. (holotype). e. flower, boiled; f. lip, boiled. — g, h. *Dendrobium ochraceum* de Wild. g. flower; h. lip, note the obliquely elliptic side lobes of the lip and the verrucose calli on the veins (a, b: Hort. Tsukuba Botanical Garden accession number 144309; c, d: A. Sathapattayanon 408; e, f: Poilane 18280; g, h: Hort. Tsukuba Botanical Garden accession number 122822).

Additional specimen studied. *Dendrobium draconis* Rchb.f.; MYANMAR: *Parish 1365* (holo W), Mawlamyine (formerly called Moulmein); THAILAND: *A. Sathapattayanon 371* (BCU), Ubon Ratchathani Province, Pha Taem National Park, 800 m alt., 29. Nov. 2004, *A. Sathapattayanon 388* (BCU), Tak Province, Umphang Wildlife Sanctuary, 970 m alt., 28 Feb. 2005. – *Dendrobium ochraceum* De Wild.; VIETNAM: *G. Bronckart s.n.* (holo BR; iso C), Tonkin, 500 m alt., 1905; *Hort. Tsukuba Botanical Garden accession number 122822* (TNS), sine loc., 11 May 2007. – *Dendrobium trankimianum* T.Yukawa; VIETNAM: *Hort. Tsukuba Botanical Garden accession number 127511* (holo TNS), Borders of Lâm Dong, Khanh Hoa and Ninh Hoa Province, 800–1000 m alt., Apr. 2000. – *Dendrobium virgineum* Rchb.f.; MYANMAR: *Low cult. s.n.* (holo W), sine loc., Oct. 1884.

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## REFERENCES

- Alsagoff SY, Hong WS. 2001. Utilizing section Formosae, new trends in *Dendrobium* breeding. *Malayan Orchid Review* 35: 70–73.
- Averyanov L. 1990. In: Tzvelev NN (ed), *Vascular plants synopsis of Vietnamese flora 1*. Nauka, Leningrad, Russia.
- Averyanov L. 1994. *Identification guide Vietnamese orchids [in Russian]*. V.L. Komarov Botanical Institute, Russian Academy of Sciences, St. Petersburg, Russia.
- Averyanov L, Averyanova A. 2003. *Updated checklist orchids Vietnam*. Vietnam National University Publishing House, Hanoi, Vietnam.
- Averyanov L, Averyanova A. 2005. Rare species of orchids (Orchidaceae) in the flora of Vietnam. *Turczaninowia* 8, 1: 39–97.
- Baker ML, Baker CO. 1996. *Orchid species culture*, *Dendrobium*. Timber Press, Inc., USA.
- Dân Tộc NXBVH. 2000. *Phong Lan Việt Nam*. Ts Trần Hóp, Saigon Orchidex, Vietnam.
- Gagnepain F. 1932. *Orchidacées nouvelles de l' Indo-Chine*. *Bulletin de la Société Botanique de France* 79: 165.
- Gagnepain F. 1934. *Orchidaceae*. In: Lecomte H (ed), *Flore générale de l' Indo-Chine 6*. Masson & Cie, Paris, France.
- Kerr AD. 1969. On a collection of orchids from Laos. *Natural History Bulletin of the Siam Society* 23: 185–211.
- Lavarack PS. 2001. *Dendrobium virgineum* Rchb.f. *Australian Orchid Review* 66, 3: 13.
- Ormerod P, Pedersen HA. 2003. A showy new *Dendrobium* from Thailand and Laos. *Orchid Review* 111: 341–343.
- Reichenbach HG. 1884. *Dendrobium virgineum* sp. nov. *Gardeners' Chronicle* 22: 520.
- Rakpaibulsombat S. 1992. *Thai orchid species*. Suriwong Book Centre, Bangkok, Thailand.
- Schildhauer H. 2002. *Dendrobium kontumense* and *Dendrobium virgineum*, synonym oder eigene art? *Journal für den Orchideenfreund* 9: 368–372.
- Seidenfaden G. 1973. An enumeration of Laotian orchids. *Bulletin du Muséum National d'Histoire Naturelle, Ser. 3, 71, Botanique* 5: 101–152.
- Seidenfaden G. 1975. Contributions to a revision of the orchid flora of Cambodia, Laos and Vietnam 1. *Fredensborg*.
- Seidenfaden G. 1985. *Orchid genera in Thailand XII, Dendrobium Sw*. *Opera Botanica a Societate Botanica Lundensi* 83: 1–295.
- Seidenfaden G. 1992. *The orchids of Indochina. Opera Botanica a Societate Botanica Lundensi* 114: 1–460.
- Thaithong O. 1999. *Orchids of Thailand*. Office of Environmental Policy and Planning, Bangkok, Thailand.
- Thaithong O. 2000. *Thai orchid [in Thai]*. Amarin Printing & Publishing Public Company Limited, Bangkok, Thailand.
- Vaddhanaphuti N. 2005. *A field guide to the wild orchids of Thailand*. Fourth and expanded edition. Silkworm Books, Chiang Mai, Thailand.
- Vestweber KH. 2004. *Dendrobium schildhaueri* Paul Ormerod und Henrik Ærenlund Pedersen beschrieben eine neue *Dendrobium* art. *Journal für den Orchideenfreund* 11: 35–39.
- Wongsawad P, Handa T, Yukawa T. 2005. In: Nair H, Arditti J (eds), *Molecular phylogeny of Dendrobium Callista-Dendrobium complex*. Proceedings of the 17th World orchid conference, Shah Alam, Malaysia: 131–133.
- Wood HP. 2006. In: Schettler R. (ed), *The Dendrobiums*. Gartner Verlag, Germany.
- Yukawa T. 2004. Two species of *Dendrobium* section Formosae (Orchidaceae) from Vietnam. *Annals of the Tsukuba Botanical Garden* 23: 21–27.