



***Vanda malipoensis*, a new species of *Vanda* (Orchidaceae: Epidendroideae; Vandeeae) from China: evidence from morphological and molecular phylogenetic analyses**

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Abstract

A new species of *Vanda*, *V. malipoensis*, from Yunnan, China, is described and illustrated in this study based on morphological and molecular evidence. Detailed morphological comparisons between the newly discovered orchid and other members of *Vanda* s.l. indicate that *V. malipoensis* is similar to *V. christensoniana* and *V. nana*. The new plant differs from the former species by the presence of inflorescences with sparse and smaller flowers, a shorter column and caudiculate pollinia, and it differs from the latter by the presence of longer inflorescences with fully open flowers and erect sidelobes of the lip. Molecular phylogenetic analyses based on nrITS and plastid datasets (*atpI-atpH*, *matK*, *trnH-psbA*, and *trnL-F*) also support the conclusion that *V. malipoensis* is a new species in section *Ascocentropsis* of *Vanda* s.l. and is sister to *V. nana* and this pair to *V. christensoniana*. Given the observed discrepancy between the plastid and nrITS results, hybridization may have been involved in the evolution of this set of species.

Key words: *Ascocentropsis*, *Ascocentrum*, Aeridinae, hybridization, orchid flora of China

Introduction

Vanda Brown (1820: 506) includes 73 species (Gardiner & Cribb 2013) and is widely distributed in the temperate zone from China to Japan and the tropical zone from Nepal to Australia (Queensland), with some species extending to Marianas Islands in the northwestern Pacific. Historically, *Vanda* has been considered a ‘taxonomic black hole’ (Christenson 1987) and is one of the most taxonomically complicated groups in Aeridinae (Orchidaceae: Epidendroideae). Relationships among *Vanda* and related genera such as *Ascocentrum* Schlechter (1913: 975), *Euanthe* Schlechter (1914: 567), *Trudelia* Garay (1986: 73) and *Christensonia* Haager (1993: 40) have been debated for many years. Fortunately, based on several phylogenetic analyses using DNA data (e.g. Carlsward *et al.* 2006, Fan *et al.* 2009, Gardiner *et al.* 2013, Kocyan *et al.* 2008, Kocyan *et al.* 2014, Padolina *et al.* 2005, Topik *et al.* 2005), Gardiner (2012) proposed a broader concept of *Vanda* with the inclusion of *Ascocentrum*, *Ascocentropsis* Senghas & Schildhauer (2000: 289), *Christensonia*, *Eparmatostigma* Garay (1972: 178) and *Neofinetia* Hu (1925: 107). A classification for *Vanda* s.l. has been published by Gardiner & Cribb (2013).

Recently, during our fieldwork in Malipo, southeastern Yunnan, China, an orchid species similar to *V. christensoniana* and *V. nana* was collected. After careful observation of individuals in the nursery of The National Orchid Conservation Center of China (NOCC), morphological studies, literature comparisons to the species of section *Ascocentropsis* (Senghas & Schildhauer 2000: 289) L.M.Gardiner (Gardiner & Cribb 2013: 8) and section *Ascocentrum* (Schlechter 1913: 975) L.M.Gardiner (Gardiner & Cribb 2013: 8) in *Vanda* and molecular phylogenetic analyses, we came to the conclusion that this material is a new species of *Vanda*.

Epiphytic herbs with erect stems to 50–150 mm, 3–5 mm in diameter. Leaves distichous, slightly V-shaped in cross section, green, 100–200 × 5–7 mm, apex truncate and unequally 3–4-dentate, base sheathing and jointed. Inflorescences axillary, ascending, 40–60 mm long with 7–12 flowers per inflorescence; floral bracts ovate-triangular, 1.0–1.5 mm. Flowers white, tinged with pink, opening widely; pedicel and ovary 10–12 mm. Dorsal sepal elliptic, 8.0–9.0 × 3.5–4.0 mm, obtuse; lateral sepals obliquely elliptic, 7.5–8.5 × 4.0–4.5 mm, apex acute; petals obovate-elliptic, 8.0–9.0 × 3.0–3.5 mm, acute; lip spurred, trilobed, spotted with purple on the entrance of spur; lateral lobes subtriangular, erect, 1.5–1.8 × 0.8–1.0 mm; midlobe ligulate, 3.0–3.5 × 1.2–1.5 mm, obtuse, with an emarginate basal callus; spur clavate-cylindrical, 7.0–7.5 mm, contracted at middle, apex dilated. Column 2.5–3.0 mm, foot absent; rostellum emarginate, lobes sharp; anther cap dark purple; pollina 2, globose, waxy, caudiculate, each cleft on the apex, attached by the stipe to a viscidium.

Flowering period:—June.

Distribution and habitat:—*Vanda malipoensis* is epiphytic on tree trunks in forests, known so far only from Malipo, Yunnan Province, China.

Etymology:—The species epithet refers to the locality where this new species has been found so far.

Conservation status:—Within 10 km-radius around the type locality, our survey crew searched 18 locations for *V. malipoensis*. Only two of the 18 locations were found to contain the new species. Including the type locality, nine, seven and six individuals were found, respectively. The three sites were more than 2 km apart from each other. Using the World Conservation Union Red List Categories and Criteria (IUCN, 2012), *V. malipoensis* should be preliminarily treated as critically endangered (CR B2ab).

TABLE 4. Statistics from the phylogenetic analyses.

Information	nrITS	plastid	combined
No. taxa	40	40	40
Aligned length	710	4887	5597
No. variable characters	245	776	1021
No. parsimony-informative characters	173	402	575
Tree length	545	1106	1684
Consistency index (CI)	0.58	0.78	0.70
Retention index (RI)	0.73	0.77	0.77

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