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Revision of *Hygrochilus* (Orchidaceae: Epidendroideae: Aeridinae) and a molecular phylogenetic analysis

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Abstract

Hygrochilus and *Sedirea* are genera of orchids with only three species endemic to Asia. An analysis of ITS and five plastid regions using parsimony, maximum likelihood, and Bayesian methods obtain clear evidence that *Sedirea* is nested within and should be considered synonymous with *Hygrochilus.* We adopt a broadly defined *Hygrochilus* characterized by possession of four pollinia. A new combination, namely, *Hygrochilus japonica*, and a new species, namely, *Hygrochilus tsii* (Orchidaceae: Epidedroideae: Aeridinae), are proposed.

Key words: *Aerides*, Asian orchids, orchid phylogenetics, *Ornithochilus*, *Phalaenopsis*, *Sedirea*, Vandeae

Introduction

Aeridinae (Orchidaceae) are characterized by monopodial growth with highly developed velamen, and numerous genera in this subtribe possess a column foot and a spurred lip (Hidayat *et al.* 2005, Hidayat 2006, Stpiczyńska *et al.* 2011). Understanding relationships within Aeridinae is difficult because of morphological diversification and possible parallelism of vegetative and reproductive features (Kocyan *et al.* 2008). Although molecular analyses (Hidayat *et al.* 2005, Kocyan *et al.* 2008, Gardiner *et al.* 2013) have been performed and pollinarium morphology (Hidayat 2006) and nectary spur anatomy (Stpiczyńska *et al.* 2011) of Aeridinae have been studied, positions of a few genera, e.g., *Hygrochilus* Pfitzer in Engler & Prantl (1897: 112) and *Sedirea* Garay & Sweet (1974: 149), are unclear.

Hygrochilus was based on *Vanda parishii* Reichenbach (1868: 138) due to the complete division of each pollinium into two unequal halves, and it has been recently maintained as distinct by most orchidologists (Hidayat *et al.* 2005, Chen *et al.* 2009). It was monotypic for most of its history and endemic to India, Laos, Myanmar, Thailand, Vietnam, and Yunnan Province of China (Chen *et al.* 2009). Previously, *Hygrochilus parishii* (Rchb.f.) Pfitzer in Engler & Prantl (1897: 112) was the only species recognized in the genus until Tsi published *H. subparishii* Tsi (1982: 267), which is distributed from central to southern China (Chen *et al.* 2009). However, Christenson (1985) transferred *H. subparishii* to *Sedirea* based on differences between these two species, which differ in terms habit and column and spur length, resulting in *Hygrochilus* again being monotypic.

Sedirea is a controversial genus originally based upon *Aerides japonica* Reichenbach (1863: 210), which differs from *Aerides* Loureira (1790: 525) in its long column and short column foot. *Sedirea* had been monotypic and endemic to Japan, Korea and Yunnan and Zhejiang Provinces of China, but not to any other parts of China (Chen & Tsi 1992, Chen *et al.* 2009) until Christenson (1985) transferred *Hygrochilus subparishii* to it. Hidayat *et al.* (2005) suggested that the number of pollinia does not reflect major relationships within Aeridinae, but it might be useful at the generic level. *Sedirea japonica* (Rchb.f.) Garay & Sweet (1974: 149) and *Hygrochilus subparishii* were described as having two pollinia (Reichenbach 1868, Tsi 1982, Hidayat 2006, Chen *et al.* 2009). *Hygrochilus* and *Sedirea* are morphologically similar, but these hypotheses still need to be evaluated using molecular data.

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New combination

Hygrochilus japonica (Rchb.f.) M.H.Li, Z.J.Liu & S.R.Lan**, *comb. nov.*** (萼脊湿唇兰); basionym *Aerides japonica* Reichenbach (1863: 210).
Homotypic synonym: *Sedirea japonica* (Rchb.f.) Garay & Sweet (1974: 149).

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