



The world upside down: the first *Kefersteinia* (Orchidaceae: Zygopetalinae) with non-resupinate flowers

GERMÁN CARNEVALI^{1,2}, WILLIAM CETZAL-IX^{1,3}, JOSÉ L. TAPIA-MUÑOZ¹ & GUSTAVO A. ROMERO-GONZÁLEZ^{1,2}

¹Herbarium CICY, Centro de Investigación Científica de Yucatán, A. C. (CICY), Calle 43. No. 130. Col. Chuburná de Hidalgo, Mérida 97200, Yucatán, México, e-mail: carneval@cicy.mx

²Orchid Herbarium of Oakes Ames, Harvard University Herbaria, 22 Divinity Avenue, Cambridge, Massachusetts 02138, U.S.A.

³Instituto Tecnológico de Chiná, Calle 11 entre 22 y 28, Colonia Centro Chiná 24050, Campeche, México.

Abstract

A new species of *Kefersteinia* (Orchidaceae, Zygopetalinae), *K. carolorum*, from the state of Táchira, Venezuela, is herein described, illustrated, and characterized based on morphological features. *Kefersteinia carolorum* is similar to *K. lactea* from Costa Rica, but it differs in the non-resupinate flowers and the longer callus. The labellum in the upper-most position that distinguishes this species is unique in the genus but has evolved independently in Zygopetalinae at least three times. Evolutionary, ecological, and functional implications of this character are explored. The conservation status of the new taxon is assessed as DD according to IUCN (International Union for Conservation of Nature) criteria. We also provide a key to identify the genera of the Zygopetalinae with labellum in an upper-most position. In addition, we offer a key for the *Kefersteinia* species from Venezuela, a figure, and a map showing their geographical distributions.

Key words: resupination, pollination, Orchidaceae, Táchira, Venezuela

Introduction

Kefersteinia Reichenbach (1852: 633) encompasses about 60–70 species found from southern Mexico to Bolivia (Harding 2008; Pupulin 2009; Plant List 2013). The genus is most diverse in humid forests at low and intermediate elevations along the Andes of Ecuador (21 species known), Peru (17 species recorded), and in the mountains of Panama and Costa Rica, where eleven species have been recorded (Pupulin & Merino 2008). Species diversity rapidly diminishes toward the north, where a single species (*K. tinschertiana* Pupulin (2004: 166)) is known from Guatemala to southern Mexico (Pupulin & Merino 2008). The Amazonian lowlands and the Guayana region are also poorly represented (Carnevali *et al.* 2007).

Based on labellum and callus morphology, two groups of species may be identified, albeit still excluding several aberrant species, e.g. *Kefersteinia endresii* Pupulin (2001: 543–545). An Andean group of taxa, centered around *Kefersteinia graminea* (Lindley 1844: 101) Reichenbach (1852: 634, the type of the genus) is characterized by a labellum the lamina of which folds back abruptly at the middle, also having a sessile, low-laminar callus (Pupulin 2009). A second morphological group, mainly occurring in Panama and Costa Rica but with species along the Pacific watershed of Colombia and Ecuador and in western Venezuela, is similar to *K. wercklei* Schlechter (1923: 53) and the flowers feature a labellum with a straight lamina; the thickly fleshy callus is supported by a distinct stalk (Pupulin 2009). These two groups of taxa are not monophyletic entities (Whitten *et al.* 2005), thus precluding them to be formally recognized, as attempted by Senghas & Gerlach (1992: 1641), as *Kefersteinia* sect. *Umbonatae*, and later by Szlachetko (2003: 335), who proposed the genus *Senghasia*.

Subtribe Zygopetalinae Schlechter (1926: 577), consists of 35 Neotropical genera. All, with the exception of *Chaubardiella* Garay (1969: 146) (ca. 8–9 species) and a single species of *Benzingia* Dodson ex Dodson in Romero-González & Dodson (2010: 526) (*B. hirtzii* Dodson in Romero-González & Dodson (2010: 527)) are characterized by resupinate flowers. Furthermore, the flowers of *Aetheorhyncha andreetae* (Jenny 1989: 92) Dressler (in Whitten *et al.* 2005: 95) are described as “resupinate, almost erect in natural position” (Pupulin (2009: 460), also see