



## The new monotypic genus *Bardotia* (Orobanchaceae) from Madagascar and remarks on the phylogenetic relationships of the African and Madagascan genera *Parastriga*, *Radamaea*, *Rhamphicarpa* and *Sieversandreas*

EBERHARD FISCHER<sup>1</sup>, BASTIAN SCHÄFERHOFF<sup>2</sup> & KAI F. MÜLLER<sup>2</sup>

<sup>1</sup> Institut für Integrierte Naturwissenschaften – Biologie, Universität Koblenz-Landau, Universitätsstraße 1, 56070 Koblenz, Germany; e-mail: efischer@uni-koblenz.de

<sup>2</sup> Institut für Evolution and Biodiversität, Universität Münster, Hüfferstraße 1, 48149 Münster, Germany; e-mail: schaeferhoff@uni-muenster.de; kaimueller@uni-muenster.de

### Abstract

The newly described monotypic genus *Bardotia*, with the new species *B. ankaranensis* from limestone tsingy in Northern Madagascar, and its differences from *Radamaea* and *Sieversandreas* are discussed. The phylogenetic positions of the genera *Radamaea*, *Rhamphicarpa* and *Sieversandreas* are investigated. *Bardotia*, *Radamaea*, *Rhamphicarpa*, and *Sieversandreas* form a clade. The monotypic *Parastriga alectroides* nests within *Harveya*. The new combination *Harveya alectroides* is made.

**Key words:** new genus, *Bardotia*, Tsingy, Madagascar, *Parastriga*, *Harveya*, tropical Africa, Orobanchaceae

### Introduction

The family Orobanchaceae is widely accepted as distinct and monophyletic comprising parasitic members of former Scrophulariaceae s.l. and Orobanchaceae (Olmstead & Reeves 1995; dePamphilis & Young 1995; Olmstead *et al.* 2001; Oxelman *et al.* 2005; Young *et al.* 1999). A first overview based on nuclear phytochrome A (PHYA) (Bennett & Mathews 2006) revealed six clades, with the non-parasitic *Lindenbergia* as clade I at the base of the family in the parsimony analysis. Clade II covers the holarctic genera *Bungea*, *Cymbaria*, *Monochasma*, *Schwalbea* and *Siphonostegia* called tribe Cymbarieae D.Don by Fischer (2004). Clade III comprises the Orobanchaceae in the traditional sense (tribe Orobancheae Lam. & DC. but excluding *Harveya* and *Hyobanche* and including *Conopholis*, Fischer 2004), clade IV includes the tribes Gerardieae and Castillejeae as well as the large genus *Pedicularis*, and clade V covers the tribe Rhinanthae (excluding *Pedicularis*). Clade VI is composed of mainly tropical taxa with the species-rich genera *Buchnera*, *Striga*, *Sopubia* and *Alectra*. The Malagasy endemic genus *Radamaea* (*R. montana* Benth.) was placed in this clade and is supported as sister to *Nesogenes* (Bennett & Mathews 2006). *Nesogenes* was formerly considered to represent a family of its own, Nesogenaceae (Marais 1980). The phylogeny of *Alectra* and *Melasma* was studied by Morawetz & Wolfe (2009) and they showed that *Alectra* is monophyletic excluding *Alectra alba* (Hepper) Burt (basionym: *Harveya alba* Hepper). The Malagasy endemic *Alectra fruticosa* Eb.Fisch. holds an isolated position and differs from typical *Alectra* in several respects. Morawetz *et al.* (2010) dealt in more detail with clade VI sensu Bennett & Mathews (2006) which they called the tropical clade of Orobanchaceae, and clarified the phylogenetic positions of *Asepalum*, *Cyclocheilon*, *Nesogenes*, *Graderia*, *Sopubia*, *Harveya*, *Melasma* and *Alectra*.

Still numerous taxa assigned to Orobanchaceae (Fischer 2004) have not yet been studied. During taxonomical and ecological research in East Africa and Madagascar material of several genera was collected