



## Phylogeny of the Andean genus *Deprea* (Physalideae, Solanaceae): testing the generic circumscription

CAROLINA CARRIZO GARCÍA<sup>1</sup>, GREG WAHLERT<sup>2</sup>, CLARA INÉS OROZCO<sup>3</sup>, GLORIA E. BARBOZA<sup>1,4\*</sup> & LYNN BOHS<sup>2\*</sup>

<sup>1</sup> Instituto Multidisciplinario de Biología Vegetal (CONICET), Av. Velez Sarsfield 1611, Córdoba, Argentina

<sup>2</sup> Department of Biology, University of Utah, 201 South Biology, Salt Lake City, USA 84112

<sup>3</sup> Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Entrada Calle 53, Bogotá, Colombia; A. A.7495

<sup>4</sup> Facultad de Ciencias Químicas, Universidad Nacional de Córdoba, Haya de la Torre s/n, Córdoba, Argentina

\* Corresponding authors: [gbarboza@imbiv.unc.edu.ar](mailto:gbarboza@imbiv.unc.edu.ar); [bohs@biology.utah.edu](mailto:bohs@biology.utah.edu)

### Abstract

*Deprea* (Solanaceae) is a small South American genus of 10 species occurring in Andean areas from Venezuela to Bolivia. The circumscription of *Deprea* has been repeatedly modified in recent years, with new species being described and others transferred into or out of the genus. The relationships of *Deprea* to other genera of Solanaceae are still poorly understood, although it seems to be closely related to *Larnax*. A phylogenetic analysis was performed to test the monophyly of *Deprea*. Sequences from three molecular markers (nuclear ITS and *waxy* and chloroplast *psbA-trnH*) were analyzed by parsimony and Bayesian methods. All the species of *Deprea* and *Larnax* sampled were intermixed in a strongly supported clade in the consensus trees, and therefore the currently recognized *Deprea* species do not form a monophyletic group. At least four strongly supported clades could be recovered within the *Deprea* + *Larnax* assemblage, but the affinities of several species of both genera remained unresolved. Additional sampling including the majority of the *Deprea* + *Larnax* species and more representatives of genera in the Physalideae should be done to clarify relationships within the clade and to pinpoint the closest relatives of *Deprea* + *Larnax*.

**Key words:** *Larnax*, ITS, *psbA-trnH*, *waxy*, South America

### Introduction

*Deprea* Rafinesque (1838: 57) (Solanaceae) is a small South American genus of 10 species occurring in Andean areas from Venezuela to Bolivia. Two species, *D. orinocensis* (Kunth in Humboldt *et al.* 1818: 12) Rafinesque (1838: 57) and *D. bitteriana* (Werdermann 1937: 130) Sawyer & Benítez de Rojas (1998: 527), have broad distributions from Venezuela to Ecuador, while the remaining species have more restricted ranges. For instance, *D. zamorae* Barboza & Leiva González (2013: 42) is found only in southern Ecuador (Loja and Zamora–Chinchipec Provinces; Barboza *et al.* 2013) and *D. nubicola* Sawyer (2007: 54) is confined to the Sierra Nevada de Santa Marta in Colombia (Sawyer 2007).

The circumscription of *Deprea* has been repeatedly modified in recent years, with new species being described (Garzón-Venegas & Orozco 2007, Sawyer 2007, Cueva & Treviño 2012, Barboza *et al.* 2013) and others transferred into or out of the genus (Sawyer 2001, Leiva González *et al.* 2005). The relationships of *Deprea* to other genera of Solanaceae are still poorly understood. Hunziker (2001) placed the genus in tribe Solaneae subtribe Witheringiinae Reveal (2012: 220), while Sawyer (2005) considered *Deprea* to be a member of tribe Physalideae Miers (1849a: 179). Morphologically, *Deprea* is similar to *Larnax* Miers (1849b: 37) (Barboza & Hunziker 1994, Sawyer 1998, 2005, Garzón-Venegas & Orozco 2007), and some authors (D'Arcy 1979, 1993) have combined the two genera under *Deprea*, the earlier published name. Sawyer (2005) redefined *Deprea* as a monophyletic group excluding *D. glabra* (Standley 1935: 32) Hunziker (1977: 25) and *D. sylvarum* (Standley & Morton 1938: 1036) Hunziker (1977: 25), which he transferred to *Larnax* (Sawyer 2001). However, neither Hunziker (2001) nor Sawyer (2005) considered *Deprea* and *Larnax* to be sister taxa, but instead proposed that each was more closely related to different genera in the