



## The fate of *Robinsonia* (Asteraceae): sunk in *Senecio*, but still monophyletic?

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### Abstract

*Robinsonia* is a genus of eight species and is endemic to the Juan Fernández Islands. Previous studies based on ITS phylogenies place *Robinsonia* deeply nested within *Senecio*, however its monophyly remains uncertain. In this paper, we use phylogenies reconstructed from plastid, ITS-ETS, and combined data to test its monophyly. Plastid phylogenies support *Robinsonia* as monophyletic, whereas ITS-ETS trees suggest that *Robinsonia berteroi* may be more closely related to a South American clade of *Senecio* species rather than to the remaining *Robinsonia* species. Maximum parsimony and Bayesian inference analyses of the combined data are congruent with the plastid trees, whereas maximum likelihood analyses are congruent with the ITS-ETS data. Nodal support for either hypothesis is generally low, and Shimodaira-Hasegawa tests in which *Robinsonia* was either constrained to be monophyletic or to be non-monophyletic showed that these trees do not have significantly lower likelihood scores than trees from unconstrained analyses. Thus the monophyly of *Robinsonia* remains inconclusive despite additional data and analyses. The results of the present paper further corroborate the results of previous studies that *Robinsonia* is deeply nested within *Senecio*. We therefore propose to reduce *Robinsonia* to synonymy and present new names and combinations of the *Robinsonia* species under *Senecio*.

**Key words:** ITS, ETS, plastid, Juan Fernández Islands, incongruence, Compositae, new combinations, taxonomy

### Introduction

The Juan Fernández archipelago is composed of three small islands in the Pacific Ocean west of South America, approximately 667 km from mainland Chile (Bernardello *et al.* 2006). These islands harbor a small, but unique, flora with many endemic species. Although *Robinsonia* De Candolle in Guillemain (1833: 333, Senecioneae: Asteraceae) is comprised of only eight species, it is the second largest genus of flowering plants endemic to these islands. In previous phylogenetic studies focused on the delimitation of the genus *Senecio* Linnaeus (1753: 866, Pelser *et al.* 2007, Nordenstam *et al.* 2009) and the intergeneric relationships within the Senecioneae (Pelser *et al.* 2010), *Robinsonia* and four additional small genera were found to be deeply nested within *Senecio*. This finding was unexpected because *Robinsonia* is morphologically distinct from *Senecio*. All species of *Senecio sensu stricto* are monoecious herbs or small shrubs and, in contrast, *Robinsonia* species are dioecious trees or rosette shrubs. However, it is common for plant species on islands to experience strong selection pressures and become woody (Carlquist 1974, Sanders *et al.* 1987, Kim *et al.* 1996, Swenson & Manns 2003) and dioecious (Carlquist 1974, Bernardello *et al.* 2001), confounding the interpretation of evolutionary relationships using morphology alone (Kim *et al.* 1996).

In addition to being nested deeply within *Senecio*, the monophyly of *Robinsonia* remains unresolved. In an ITS phylogeny (Pelser *et al.* 2007), five of six sampled species of *Robinsonia* formed a well-supported