

Hybrid Speciation and Morphological Differentiation in *Senecio* (*Senecioneae*, *Asteraceae*) from the Andes

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Abstract : The Andes hold one of the highest plant species diversity in the world. How such diversity originated is one of the most intriguing questions in studies addressing the pattern of plant diversity worldwide. Recently, the explosive adaptive radiations found in high Andean groups have been pointed as major triggers of this spectacular diversity. The Andes are one of the most species-rich area for the largest genus from the *Asteraceae* family, *Senecio*. There, the genus presents an incredible variation in growth form and ecological niche space. If this diversity of Andean *Senecio* can be explained by a monophyletic origin and subsequent radiation has not been tested up to now. Previous studies trying to disentangle the evolutionary history of some Andean *Senecio* struggled with the relatively low resolution and support of the phylogenies, which is indicative of recently radiated groups. Using Hyb-Seq, a powerful approach is available to address phylogenetic questions in groups whose evolutionary histories are recent and rapid. This approach was used for *Senecio* to build a phylogenetic backbone on which to study the mechanisms shaping its hyper-diversity in the Andes, focusing on *Senecio* ser. *Culcitium*, an exclusively Andean and well circumscribed group presenting large morphological variation and which is widely distributed across the Andes. Hyb-Seq data for about 130 accessions of *Senecio* was generated. Using standard data analysis work flows and a newly developed tool to utilize paralogs for phylogenetic reconstruction, robustness of the species tree was investigated. Fully resolved and moderately supported species trees were obtained, showing *Senecio* ser. *Culcitium* as monophyletic. Within this group, some species formed well-supported clades congruent with morphology, while some species would not have exclusive ancestry, in concordance with previous studies showing a geographic differentiation. Additionally, paralogs were detected for a high number of loci, indicating duplication events and hybridization, known to be common in *Senecio* ser. *Culcitium* might have lead to hybrid speciation. The rapid diversification of the group seems to have followed a south-north distribution throughout the Andes, having accelerated in the conquest of new habitats more recently available: i.e., Montane forest, Paramo, and Superparamo.

Keywords : evolutionary radiations, andes, paralogy, hybridization, *senecio*

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