



Towards a monophyletic classification of Lejeuneaceae III: the systematic position of *Leiolejeunea*

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Abstract

The derived liverwort *Leiolejeunea grandiflora* was recollected at the type locality in Jamaica after more than 100 years. The characteristics of its oil bodies were described for the first time based on the new collections. Each leaf cell possesses 2-4(-6) rather small, subhomogeneous to very finely segmented, subglobose to ellipsoidal, colorless oil bodies. The plants were either dioicous or autoicous. DNA sequences of two chloroplast regions (*trnL-trnF*, *rbcL*) and the nuclear ribosomal ITS region were obtained for two accessions of *Leiolejeunea* to enable the inference of the phylogenetic relationships of these plants. Based on Bayesian inference of phylogeny as well as maximum parsimony and maximum likelihood analyses of a dataset including 87 representatives of Lejeuneaceae, *Leiolejeunea* was found as the putative sister to either Echinolejeuneinae or Cheilolejeuneinae. Thus, we propose the new monogeneric subtribe Leiolejeuneinae with relationships to Cheilolejeuneinae and Echinolejeuneinae. The analyses included also one accession of the generitype of *Cheilolejeunea*, *C. decidua* [= *Cheilolejeunea adnata*]. This species was found in a well supported sister relationship with *Cystolejeunea*. To avoid nomenclatural confusion, we propose a wide genus concept for *Cheilolejeunea* including *Aureolejeunea*, *Cyrtolejeunea*, *Cystolejeunea*, *Evansiolejeunea*, *Leucolejeunea*, and *Omphalanthus*.

Key words: liverwort, Lejeuneaceae, molecular phylogeny, Porellales, taxonomy

Introduction

Evans (1908a) described a new genus of Lejeuneaceae based on three specimens from the Blue Mountain Peak of Jamaica including only a single species, *Leiolejeunea grandiflora* Evans (1908a: 378). The minute plants had conspicuous, terete perianths and a pair of very large, wide-spreading bracts that exceeded the size of the leaves more than twice. In habit, these liverworts resembled *Harpalejeunea* (Spruce 1884: 164) Schiffner (1893: 126), but differed by lobules with a hyaline papilla positioned distal to the apical lobule tooth, a lack of ocelli as well as perianth keels, and the absence of true subfloral innovations. Based on the distal position of the hyaline papilla of the leaf lobule Evans (1908a) assumed relationships of *Leiolejeunea* Evans (1908a: 377) with *Cheilolejeunea* (Spruce 1884: 251) Stephani (1890: 284) rather than with *Harpalejeunea*. Gradstein (2013) accepted Evans' interpretation (1908a) and placed *Leiolejeunea* in subtribe Cheilolejeuneinae of Lejeuneaceae.

Although easy to recognize, *Leiolejeunea* has never been recollected at the type locality. Outside of Jamaica, it has been recorded only from Venezuela (Fulford 1972) but the identification requires confirmation (Dauphin *et al.* 2008). The lack of fresh collections prevented until now the study of oil bodies for these liverworts. This was required because Evans (1908a) did not describe the oil bodies of *Leiolejeunea*. However, these structures are recognized as valuable taxonomical characters in Cheilolejeuneinae (Heinrichs *et al.* 2014a). In December 2013, two of us (ASV, HvM) visited Jamaica and were able to locate three occurrences of *Leiolejeunea* in the upper regions of the Blue Mountain Peak. Based on this material, we describe the oil bodies of *Leiolejeunea*, and include the genus in molecular phylogenetic analyses of Lejeuneaceae. We also test genus concepts of Cheilolejeuneinae, and include a specimen of the *Cheilolejeunea* generitype in our analyses.

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