



**Studies on Lophocoleaceae XXII. The systematic position of *Amphilophocolea* R.M.Schust. together with comments on the status of *Tetracymbaliella* Grolle and *Lamellocolea* R.M.Schust.**

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## Abstract

DNA sequence results show that *Amphilophocolea*, a monotypic genus endemic to New Zealand, is nested within *Heteroscyphus*. A morphological examination of specimens that agree with the protologue shows it to be identical to *Heteroscyphus knightii*. *Heteroscyphus cymbaliferus* in the DNA sequence analyses is sister to the clade consisting of the rest of *Heteroscyphus*, and the monophyletic *Chiloscyphus* and *Lamellocolea*, and suggests that the genus *Tetracymbaliella* should be reinstated. *Lamellocolea* is not included in either *Chiloscyphus* or *Heteroscyphus* in the trees derived from sequence data, but its position as sister to *Chiloscyphus* obtained from the Bayesian analysis lacks significant support.

**Key words:** liverworts, Marchantiophyta, *Amphilophocolea*, *Chiloscyphus*, *Heteroscyphus*, Lophocoleaceae, DNA sequence, morphology, phylogeny, taxonomy, classification

## Introduction

The genus *Amphilophocolea* R.M.Schust was described by Schuster (2001), who isolated the genus from other members of Lophocoleaceae on the basis of branching. The genus was described for a single species, *A. sciaphila* R.M.Schust., and based solely on sterile plants. Schuster (2001: 96) remarked that "after study of a bewilderingly large number of taxa I would suggest that instead of the 'traditional' division of lophocoleoids into two genera, *Lophocolea* and *Chiloscyphus*, we recognize four genera on the basis of branching modes" (*Chiloscyphus* Corda, *Stolonivector* J.J.Engel, and the two new genera introduced in that paper, *Cyanolophocolea* R.M.Schust. and *Amphilophocolea* R.M.Schust.). Schuster (2001) argued that all three major branching types (terminal, lateral intercalary, and ventral intercalary) were present throughout Geocalycaceae subfam. *Lophocoleoideae*, but that one of these, the lateral-intercalary type, had been lost in both *Cyanolophocolea* and *Amphilophocolea*. In *Amphilophocolea* the terminal type also had been lost. These losses in branching types identified them as evolutionarily specialized species deserving of generic recognition alongside *Chiloscyphus* and *Stolonivector*. Schuster (2001) also considered whether *Amphilophocolea* might be allied to *Geocalyx*, on the grounds that it has roughened leaf surfaces ("cuticle"), and *Geocalyx* has its leaf surfaces papillose. This would have placed *Amphilophocolea* in Geocalycaceae subfam. *Geocalycoidae*, but gynoecia were needed to confirm the presence of an *Isotachis*-type perigynium. In a discussion of the revised classification of Lophocoleaceae, Schuster (2001: 97) stated that "two criteria stand out: (a) ramification patterns; (b) presence vs. absence of an *Isotachis*-type perigynium," but added that "in the lack of gynoecial data, the status and position of *Amphilophocolea* remains ambiguous." Schuster (2001: 102) in conclusion remarked that "ultimately, the derivative branching pattern—only ventral-