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Revision of the genus *Bracteacoccus* Tereg (Chlorophyceae, Chlorophyta) based on a phylogenetic approach

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With 4 tables and 10 figures

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Abstract: The genus *Bracteacoccus* (Chlorophyceae) exemplifies the taxonomic challenges that are commonly faced in systematic studies of coccoid green algae. The original definition of the genus is extremely vague, which caused the genus name first to be synonymized with *Dictyococcus* and then segregated from it following emendments of the diagnoses of the two genera. Transfers of species in and out of *Bracteacoccus* followed, even prior to the advent of molecular phylogenetic methods. Since the 1990's, phylogenetic analyses have demonstrated monophyly of *Bracteacoccus*, but only after exclusion of morphologically similar but genetically distinct forms, such as the genera *Chromochloris* and *Pseudomuriella*. The present monograph reviews the taxonomic history of *Bracteacoccus*, confirms its monophyletic character using a multilocus phylogenetic analysis, and presents an assessment of the species-level diversity within the genus mainly using analyses of molecular sequence data and ITS2 secondary structure to distinguish species. In addition, morphological and ultrastructural features were examined and evaluated for taxonomic use. To date, ten species and two infraspecific taxa are accepted within *Bracteacoccus*. After revision, thirteen species are recognized, including six that are newly described, and four species for which molecular data are not obtainable because there is no live material available. *Bracteacoccus grandis* and *B. medionucleatus* are hereby synonymized with the name *B. minor,* and *B. minor* var. *glacialis* is elevated to species level. Among the main contributions of this study are the designation of an epitype for the type species, *B. aggregatus* – a strain newly isolated from the type locality – and its morphological and molecular characterization. This is an important disambiguation of the original description of *Bracteacoccus*. Furthermore, with the study of many new *Bracteacoccus* strains (a total of 92 strains were examined) this work greatly expands the current knowledge about the among- and within-species diversity as well as the geographic distribution of the genus. The phylogenetic approach to species delimitation used in this study sets an example for future work on similarly challenging groups of microscopic organisms.

Key words: 18S, ITS 2, rbcL, tufA, DNA barcoding, cryptic species.

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