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Freshwater Cyanobacteria of North-Eastern Australia: 2. Chroococcales

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Abstract

This volume provides the first detailed account of the Chroococcales of north-eastern Australia. It provides keys, morphological and ecological data for 6 families, 33 genera and 112 species, and photomicrographs and original illustrations to enable the identification of natural populations based on stable and recognizable characters observable with the aid of light microscopy. Distributional data are based on extensive surveys at 270 sites representing the major freshwater habitats including rivers and streams, palustrine and lacustrine wetlands, thermal springs, and man-made reservoirs in Queensland and the Northern Territory as well as a review of the Australian phycological literature.

Introduction

The cyanobacteria are a morphologically diverse monophyletic group within the domain Bacteria (Castenholz 2001). As a phylum they range from microscopic unicells and colonial groups to macroscopic mats and colonial agglomerations and form a major component of photosynthetic microphytic assemblages in benthic, periphytic and pelagic environments. Significantly contributing to the productivity of aquatic ecosystems, they support food webs and many species produce biologically active compounds which are of both great interest and potential concern to human, agricultural and ecosystem values. This is the second volume in the series documenting the cyanobacterial flora of north-eastern Australia. Thirty three genera encompassing one hundred and twelve species from the Order Chroococcales are presented. This order comprises coccoid taxa which may occur as solitary cells of various shapes including spherical, oval, fusiform and rod-shaped, some less than 1 μm in diameter, or clustered into colonial groups of various configuration, some forming macroscopic agglomerations. In Australia and elsewhere, some members of the Chroococcales, notably species of the genus *Microcystis*, have been associated with human and animal intoxications (Zurawell *et al.* 2005). They often dominate the plankton of lakes and reservoirs and account for most of the picoplanktonic and nanoplanktonic species.

Due to their size and relatively simple morphology, their identification continues to be challenging. This volume provides a phenotypic baseline for the identification of field populations of the coccoid cyanobacteria in north-eastern Australia. It uses morphological features readily discernable by light microscopy shown to have high levels of congruence with ultrastructural and molecular markers. This phenotypic and ecological characterization of natural populations provides a basis to further ecological, toxicological and systematic research. This is a practical method for the widespread recognition of cyanobacterial diversity from different regions and habitats and is the first methodological step towards a comprehensive polyphasic evaluation of Australia's cyanobacteria flora.