



Description of coccoid cyanoprokaryote *Nisada stipitata morphogen. et sp. nov.* from the supralittoral zone in the tropical Mexican Pacific

MICHELE GOLD-MORGAN¹, LAURA GONZÁLEZ-RESENDIZ^{1,2}, HILDA LEÓN-TEJERA¹ & GUSTAVO MONTEJANO¹

¹Departamento de Biología Comparada, Facultad de Ciencias, Universidad Nacional Autónoma de México (UNAM). Coyoacán, Código Postal 04510, P.O. Box 70-474, México, Distrito Federal (D.F.), México

²Posgrado en Ciencias Biológicas, Universidad Nacional Autónoma de México (UNAM).

* Corresponding author (e-mail: michloug.m@ciencias.unam.mx)

Abstract

A distinctive morphotype consisting of an epilithic, one-layered colony of polarized, 1–3-celled pseudofilaments was recognized in the rocky shores of the state of Oaxaca in the Mexican tropical Pacific. Morphologically, it was not identifiable as any species of a previously described genus. It is similar to species from the former order Chroococcales, recently modified by Komárek *et al.* (2014), in its sessile heteropolar pseudofilaments. Specifically, it is most similar to the colonial species of the genus *Chamaesiphon*; and of *Chamaecalyx*, but the cells of the Mexican populations divide symmetrically in one or two planes, differentiating them from *Chamaesiphon* which divides asymmetrically and only in one plane, and from *Chamaecalyx*, which has multiple fission. The other defining feature is that all cells of the pseudofilament have differentiated mucilaginous structures (pad and/or stipe and cup). It has not been possible to obtain cultures of our material for further studies to complete the polyphasic approach. Nevertheless, its morphological characteristics and life cycle, plus its distinctive extreme biotope, form a unique combination of features that derive in our proposal of the morphogenus *Nisada gen. nov.*, with the type species, *Nisada stipitata, sp. nov.* We describe the proposed taxa and the problems and current inconveniences regarding its assignment to higher taxonomic levels. We also discuss the different degrees of complexity of heteropolarity in *Nisada* and other taxa.

Key words: Cyanobacteria, Cyanophyta, *Chamaecalyx*, *Chamaesiphon*, Chroococcales, colonial species, *Godlewskia*

Introduction

Numerous recent studies of the Cyanoprokaryota at the ultrastructural and molecular levels have disputed monophyly of the previously described groups, including coccoids (Brito *et al.* 2012, Strunecký *et al.* 2014). Using the polyphasic approach the Czech school of Jiri Komárek has proposed a new classification. In its current version (Komárek *et al.* 2014) many taxa, especially genera, have been ranked temporarily awaiting the necessary information for a more definitive assignment.

It is to be expected that surveys in little known types of environment, such as the tropical upper tidal zone or tropical alkaline marshes, will reveal undescribed species, perhaps belonging to new supraspecific taxa. This assumption is supported by Nabout *et al.* (2013) who estimate that 3582 species of cyanoprokaryotes (57% of the total estimated number) worldwide have yet to be described due to the lack of biodiversity studies within this group and specially in tropical/subtropical and terrestrial environments.

During the floristic studies of cyanoprokaryotes of the tropical Pacific coast of Mexico, we collected populations of a colonial biofilm in the upper tidal zone, which were not identifiable morphologically into any known cyanoprokaryote at the generic level. Our populations have conspicuous morphological and life cycle features not present in any of the species of the morphologically closest genera. We herein describe the unique morphology of the pseudofilaments that compose the colonies and discuss different degrees of complexity of sessile heteropolarity. We comment on the harsh biotope in which the Mexican populations live and finally propose the new genus and species, *Nisada stipitata, morphogen. et sp. nov.*, in the spirit of Komárek *et al.* (2014) expressed at the end of their article: “Registration