Article

A new species of *Pyropia* (Rhodophyta, Bangiaceae), from the Pacific coast of Mexico, based on morphological and molecular evidence

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Abstract

Pyropia raulaguilarii sp. nov. is described from Michoacán, tropical Mexican Pacific, on basis of comparative morphology and nrSSU, *rbc*L sequence analysis. It is distinguished from other *Pyropia* species by the foliose and lanceolate gametophyte, a monoecious thallus and the zygotosporangia in packets of 2x2x4. The phylogenetic analysis showed that the two Pacific Mexican samples, from Caletilla and Carrizalillo (Michoacán), were almost identical and formed a distinctive and well supported clade segregated from other species of *Pyropia* from Brazil, USA and Mexico. The Mexican entity is morphologically and genetically distinct from other *Pyropia* species, suggesting that this species should be assigned to a new taxon.

Key words: Bangiales*,* molecular phylogeny, nrSSU, *rbc*L, marine red algae.

Introduction

Species of *Porphyra* C.Agardh have few characters for distinguishing species, however, these characters alone have proved to be misleading based on the discovery, using molecular sequences, of many cryptic taxa among species with very similar morphologies (e.g. Brodie & Irvine 1997, Broom *et al.* 2002, 2004, Neefus *et al.* 2002, Teasdale *et al.* 2002, Lindstrom & Fredericq 2003, Niwa *et al.* 2005, Brodie *et al.* 2007, Lindstrom 2008). Almost all of these studies have used either nrSSU or plastid *rbc*L gene. The use of the more conservative nrSSU locus has generally resulted in phylogenies with a well-supported "backbone" but little differentiation of closely related taxa. The protein-coding *rbc*L gene clearly distinguishes species, but support for ancient divergences is often less than the one obtained in analyses based on the nrSSU gene (Lindstrom & Fredericq 2003, Nelson *et al.* 2006).

"*Porphyra* sensu lato" as the cited papers include species no longer considered part of *Porphyra* (sensu stricto) (Sutherland *et al.* 2011). Molecular studies have revealed extensive cryptic speciation within the genus *Porphyra* (Broom *et al.* 1999, 2004, 2010, Jones *et al.* 2004) and has been used in the genetics (Kuang *et al.* 1998) and breeding of *Porphyra* species since the end of the twentieth century (Jia *et al.* 2000, Xu *et al.* 2011). Most previous reports were focused on the identification, protection, construction, and classification of different strains (Iitsuka *et al.* 2002, Kunimoto *et al.* 2003, Liu *et al.* 2004, Sun *et al.* 2005, Weng *et al.* 2005, Qiao *et al.* 2007).