
Microalgae diversity and interactions with fungi and bacteria in the estuarine plastisphere of Patos Lagoon, Brazil

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Abstract

Plastics act as artificial substrates in aquatic systems for diverse groups of organisms, creating self-sufficient communities called "plastisphere". These epiplastic communities have complex ecological interactions that are still under evaluated, particularly in estuarine regions. As two of the major phytoplanktonic groups, diatoms and bacteria have complex ecological relations. Diatoms use chemical substances produced during the decomposition or mineralization performed by bacteria; in turn, microalgae serve as organic matter to be used by bacteria in those processes. In addition, some microparasites such as Fungi can infect algae, affecting aspects such as growth and development. To better understand the ecological interactions of these groups in the estuarine plastisphere, we conducted a year-long in situ experiment in the Patos Lagoon Estuary, South Brazil, a dynamic environment with well-marked seasonal characteristics and intense urban development. The plastisphere was identified through DNA-metabarcoding, and classified into OTUs (operational taxonomic units). The co-occurrence of microalgae with fungi and bacteria can possibly allow an evaluation of their ecological interactions. Proteobacteria (Alpha, Beta and Gammaproteobacteria) and Bacteroidetes were found co-occurring with diatoms, such as *Thalassiosira* and *Nitzschia*, in several samples. The main phylum related to diatoms in previous studies was the fungal group Chytridiomycota, which we found in our samples and is often associated with *Cyclotella*, *Chaetoceros*, *Fragilariopsis*, *Navicula* and *Nitzschia*, also present in the Patos Lagoon plastisphere. *Skeletonema* e *Thalassiosira* were also found in our experiment and may have their density altered by the presence of Chytridiomycota. As knowledge on the diversity of the plastisphere increases, it is pivotal to also investigate the interactions among epiplastic organisms, and how they may affect natural environments such as the Patos Lagoon estuary.

Keywords: Plastic, DNA, metabarcoding, diatoms, bacteria, fungi.

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