

TITLE: BACTERIA ASSOCIATED WITH PLASTIC POLYMERS IN THE DEEP ATLANTIC OCEAN

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ABSTRACT: Marine litter, composed mostly of plastics, is a global problem in expansion due to the improper waste disposal in the environment. Recent research confirms that one of the final destinations of this waste is the seabed and from the earliest studies it was observed the colonization of these wastes by microorganisms. However, little is known about how this association occurs and if the microorganisms are only adhered to the plastic or if they are using it as a carbon source. The present study aimed to contribute to the knowledge of the microbial communities of the deep sea that are associated with plastics, verifying how microorganisms are distributed in these plastic substrates and if there were signs of microbial degradation. In addition, the present study intends to isolate and verify the biodegradation capacity of these microorganisms, what may in the future assist and optimize the biodegradation processes. Three sampling points were selected in the deep Southwest Atlantic Ocean off the coast of Espírito Santo, Rio de Janeiro and São Paulo States. Four types of substrates were also selected: polyethylene and polypropylene pellets, non-biodegradable and biodegradable bags. The substrates were submerged using a Lander structure at 3300 m depth for 22 months. Samples recovered from the deep sea were submitted to Scanning Electron Microscopy (SEM) and traditional culture techniques. SEM results showed that few cells of microorganisms colonized the substrates surfaces. On polypropylene pellets, isolated cells were observed, whereas in non-biodegradable plastic bags, cells were observed in patches. Regarding the cultivation of the samples, it was observed microbial growth associated with the plastics of the three sampled points. The 22 isolates were identified by sequencing of the 16S rRNA gene, showing ten different genera present: *Sulfitobacter*, *Rhodococcus*, *Marinobacter*, *Zunongwangia*, *Halomonas*, *Bacillus*, *Salinicola*, *Kocuria*, *Halobacillus*, *Pseudoalteromonas*. The isolates have been tested for specific plastic polymers degradation activity.

Keywords: plastic degradation; deep sea; microorganisms; marine litter

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