Examining the Effects of Marine Microplastics on Porifera Microbial Filtration

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Marine sponges (phylum Porifera) have the important job of controlling bacterial populations in coral reefs. The recent abundance of marine microplastics, however, which often harbor a microbial biofilm, may hinder their ability to filter out bacteria. To test the hypothesis that microplastics interfere with sponges' filtration by harboring bacterial colonies, a signal organism (Serratia marcescens) was allowed to form a biofilm on 2 types of microplastics -- polypropylene shavings and polyester fibers -- and was introduced to conditions with and without marine sponges (Cinachyrella alloclada). Bacteria suspended in broth were also added to sponge and no-sponge environments. These conditions were observed alongside additional controls monitoring the sponge microbiome in the absence of S. marcescens. All were placed in test tubes and agitated in a homemade device designed to replicate the movement of ocean currents for 48 hours. Following this, a sample was taken from each and incubated on nutrient agar. The number of S. marcescens colonies on each dish was counted and compared to the number of native colonies. After analysis with a two-factor ANOVA relating the influence of sponges and of microplastics on the number of bacterial colonies, it was determined that the interaction between them was significant. This indicated that the presence of microplastics sheltering a microbial biofilm may impact the sponges' ability to remove bacteria from the water, which could be disastrous to fragile marine ecosystems.

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