NYLON MICROFIBERS DEVELOP A DISTINCT PLASTISPHERE BUT DO NOT IMPACT THE GUT MICROBIOME OF THE BLUE MUSSEL (MYTILUS EDULIS)

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Abstract

Microplastics are a ubiquitous emerging contaminant across marine systems. Because of their small size and widespread distribution, microplastics occupy the same size fraction as the food source of many suspension feeders, such as marine bivalves, and ingestion of plastic particles could pose a threat to the health of these organisms. Ingestion of plastic particles with adsorbed compounds or microbial communities could potentially affect the gut microbiome of the host through mechanical blockages or abrasions, leaching of plasticizers or adsorbed chemicals, or direct influence on microbial communities in the gut. In many species, the microbial community of the gut aids in digestion, mediates abiotic stressors, and affects host immunity. Similar functions may be performed in bivalves. Thus, changes in the gut microbiome may have indirect effects on bivalve health. To test whether microplastics affect the gut microbiome of the blue mussel, *Mytilus edulis*, animals were exposed to nylon microfibers (length = 500 μm, diameter = 30 μm), *Spartina* spp. particles, or no particle, for 21 days. *Spartina* spp. particles were of comparable size and aspect ratio to nylon fibers and were used to control for the presence of indigestible particles. Mussels were fed a microalgal diet of *Tetraselmis* spp. (concentration in microcosm of 10,000-15,000 cells/mL) and Shellfish Diet (concentration in microcosm of 5,000 cells/mL). All particles were aged for three days to develop a biofilm. Two experiments were conducted, one with an exposure concentration of approximately 50 particles/L/hr/mussel/day, and one using a concentration of approximately 100 particles/L/hr/mussel/day. Genomic DNA was extracted from gut tissue, nylon, *Spartina* spp., and stock water samples and sequenced using 16S high throughput techniques to determine community taxonomic composition. Data indicate that mussel gut microbial communities are resistant to disturbance by nylon fibers.

Keywords: mollusc, bivalve, microbiome, microfiber, plastisphere

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