Microplastic Pollution in Aquatic Ecosystems of Rhode Island

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As global plastic production continues to grow, increasing amounts of microplastic (MP) pollution has been found in the environment. MPs have been found in every studied environment on the planet, and are known vectors for pollutants, disease, and invasive species, which can lead to negative outcomes for animals, ecosystems, and humans. There has been a global effort to quantify their presence and impacts and provide the information needed for waste and ecosystem management. However, little work has been done to quantify MPs in the aquatic environments of Rhode Island. The goal of this work was to design and operate a filtration device that could quantify MPs in freshwater sources, an important introduction source to the coast region. Three stainless steel filters were used in an innovative pump sampling system: 280 μm, 100 μm, and 10 μm. The sampled filtrate was then processed to isolate and extract MPs. First, samples were sonicated to remove particles trapped in filter pores. Then chemical digestion with potassium hydroxide and citric acid was used to dissolve organic matter. Density separation using potassium formate (d = 1.520 g*cm-3) was then applied to separate MPs. Lastly, a polycarbonate filter (5 μm mesh size) and a vacuum were used to isolate MPs for imaging. MPs were imaged using an automated Olympus BX63 Microscope in the Suckling Lab and were then characterized using Raman Spectroscopy. Throughout the sampling and processing procedure, strict contamination control and procedural controls were followed. The work conducted by our lab lays the framework for further work to be done studying the presence of MP pollution.