

Katelyn Zicker

Class of 2019

Majors: Marine Biology & Environmental Science

Concentration of Microplastics in *Geukensia demissa* from Bradley Point, New Haven, CT

Mentors: Dr. Gail Hartnett & Dr. Jean-Paul Simjouw

The objectives of this SURF project were to determine if ribbed mussels, *Geukensia demissa*, are an indicator species for microplastics (MPs) and to determine if a depuration period, a period to cleanse an organism, does remove MPs from *G. demissa*. To reach these objectives, twelve mussels were collected from Bradley Point and divided into two groups. The non-depuration group was immediately frozen for later analysis. The samples that underwent depuration were contained in individual bowls with artificial seawater for four days. The water was changed daily, and the wastewater was collected to later determine the number of MPs in it. Samples of 500 mL of artificial seawater were tested as the blank samples. All mussel samples were analyzed using a similar methodology to that of Li et al. (2015). The soft tissue of *G. demissa* was removed and each sample was placed in a 1 L glass jar where 250 mL of 30% H₂O₂ was added. The jars were placed in a Thermo Scientific MaxQ 4450 incubating shaker for 24 hours at 65°C at 80 rpm. Then, the incubating shaker was set for 48 hours at room temperature at 80 rpm; afterwards, 730 mL of filtered 5 M NaCl solution was added to the jars and settled overnight. The MPs were collected from the top layer of solution by using a gravity siphon constructed from rubber tubing, a Pasteur pipet, and a rubber stopper that lead to a vacuum filter. MPs were collected on a glass fiber filter (GFF) with a pore size of 0.7 µm. After collection, at least 0.75 L of DI water was filtered through the apparatus to ensure that no MPs were in the tubing. The GFFs were stained with a Nile Red (NR) solution of 1 mg of NR/mL of chloroform and MPs were counted under a Nikon SMZ 745 stereo microscope with an Analytik Jena UVP UVGL-58 UV light. As reference material, six different types of plastic were cut into MPs and underwent the same procedure as the mussels to observe the differences of the materials under UV light.

The average number of MPs in the non-depuration group of *G. demissa* was 132±32 and the average number of MPs in the depuration group was 189±45. The p-value obtained from an independent samples t-test conducted on the non-depuration and depuration groups was less than 0.001, which indicates a statistically significant difference. The average number of MPs collected from the waste water of the depuration group was 559±115 and the blank water sample had an average of 444±48 MPs. The independent samples t-test was run, and the resulting p-value was equal to 0.153, which is not statistically significant. Based on the results obtained, *G. demissa* does indicate the presence of MPs in an ecosystem due to the presence of MPs in the non-depuration group. The artificial seawater added MPs to the tissue of the depuration group, and therefore, the experiment will be repeated with filtered artificial seawater in the future. Further research will be conducted to determine the retention time of MPs in *G. demissa* as part of my senior thesis.

Reference

Li J, Yang D, Li L, Jabeen K, Shi H. 2015. Microplastics in commercial bivalves from China. *Environmental Pollution*. 207: 190-195.