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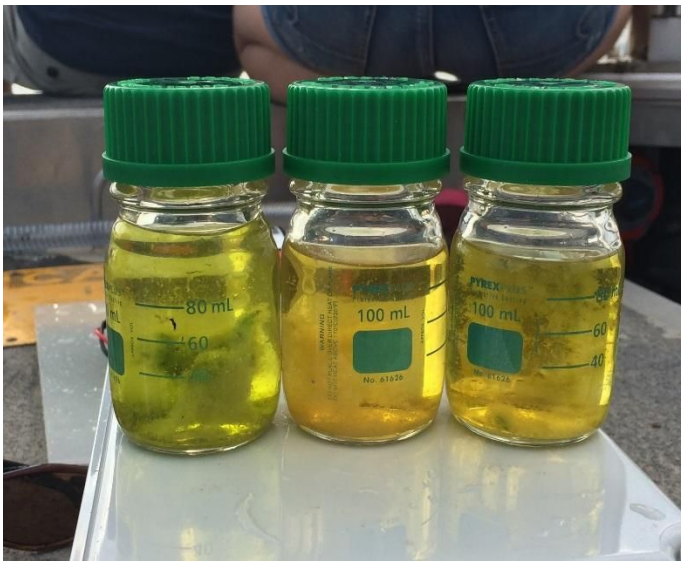
Digestion of Microplastics with the use of Nile Red Dye

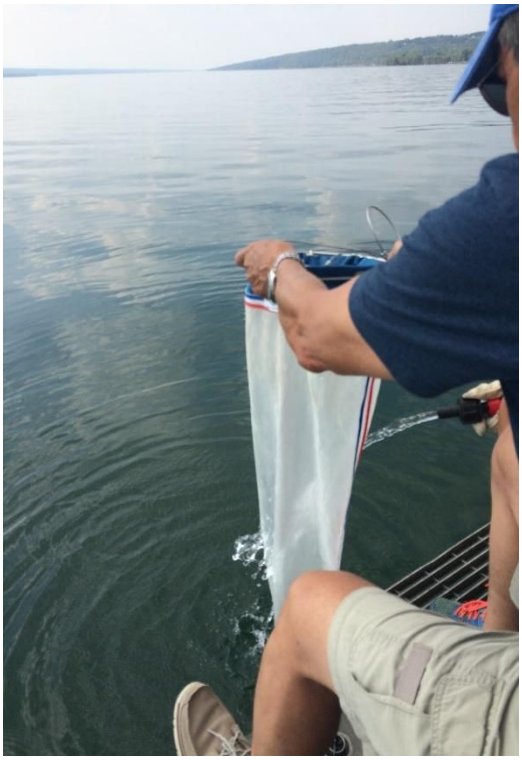
Introduction to Microplastics:

Microplastics are extremely small pieces of plastic debris from the break down of larger plastics. The relevance of microplastics is astounding because it truly exemplifies just how long plastic can stay in the environment. The demand and consumerism of plastics is a worldwide issue and promotes single use of plastic products, leading to environmental degradation. Microplastics are in the world's everyday lives in more ways than we know; in our water, food, and clothes. The popularity of plastic is continuing the contamination and spread of plastics that will break down into micro plastics throughout the world.

Explanation of Research:

This experiment begins with sampling methods to obtain micro plastics. This involves taking a research boat to various locations on Lake Cayuga, Ithaca NY., collecting water samples, and preserving them to study the micro plastics that may appear in the samples. The work that is done after the collection of lake samples is as follows: sieve, dry, and use a digestion process with less hydrophobic chemicals in order to get the best stain results when we add a dilute of Nile Red dye. This Nile Red dye helps to stain the microplastics, and have them fluoresce under a microscope using various spectrum colored slides. If the samples fluoresce under the microscope, it is confirmation that there were indeed microplastics in the sample that was digested.





Digestion Procedure:

The samples that were collected from the lake are sieved to an estimate of 350 microns, allowing the samples to be separate from any living material. The samples are carefully scraped in order to get the smallest particles possible to work with. The samples are dried and then ready to be stained with Nile Red.

Digestion:

Digesting the samples can be done in numerous ways, which is the main experiment of this procedure. The methods and materials are essential during this part of the research, because depending on what you use to dilute, stain, and mix with your sample it will have an effect on the results of fluorescence. The samples shown below were carried through using H202 digestion for seven hours.

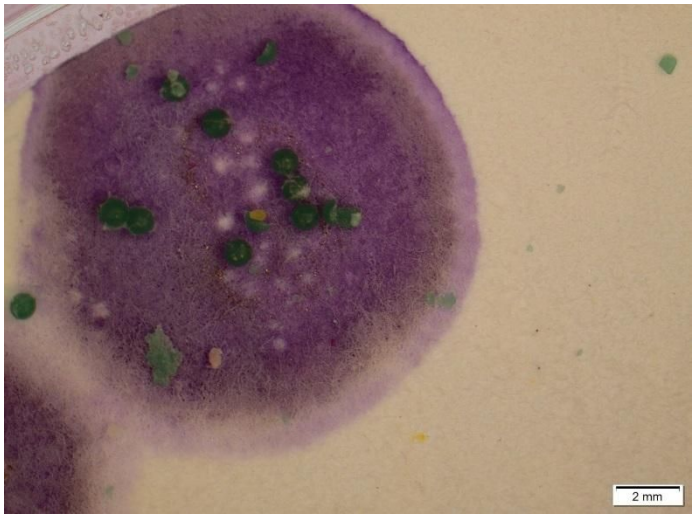


Figure 1. JJMB plastic under dissecting microscope. Post digestion using H2O2 diluted with Nile Red dye.

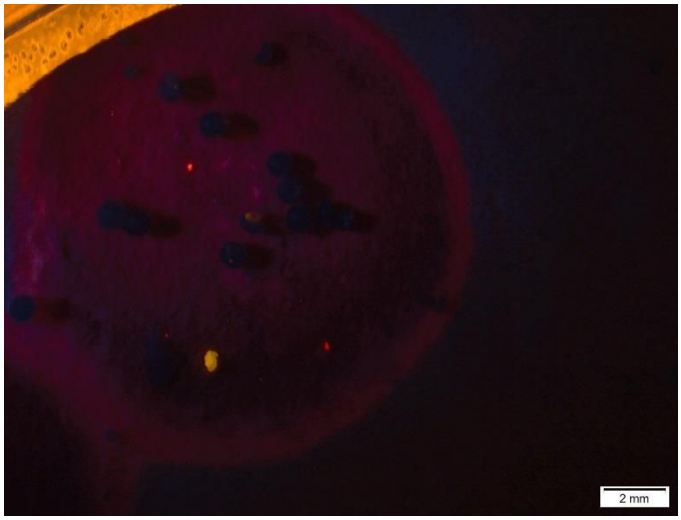


Figure 2. JJMB plastic under dissecting microscope with the use of orange and yellow filters. Post digestion using H2o2 diluted with Nile Red dye.

Conclusions:

Being able to provide evidence of samples that fluoresce under nile red staining is significant for a number of reasons. By first going through the digestion and staining procedure with samples that are surely plastic, such as JJMB, it assures the accuracy of the experiment. Applying the same procedures method to samples from Cayuga Lake is relevant to scientists and the local

community. Finding microplastics in lake samples from Cayuga Lake means that there is a connection between the production of plastic and the environment. Many are unaware of the environmental degradation that occurs due to demand of plastic, but if the problem was made to be local and could exhibit signs of microplastics in Ithaca's own water, then the community may start to rethink their ideas about plastic. This research can be significant not only scientifically, but as a moral issue to bring light to the ongoing consumption and waste of plastic in our environment.