

Microplastic Analysis in *Leukoma staminea* Clams Harvested From New Jersey



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Introduction

- Microplastics are plastic materials that are < 5 mm
- Microplastics in water, sediments, food, and organisms have gained attention in recent years
- It has been suggested that on average humans uptake ~5 grams of microplastics a day
- Microplastics form by the breakdown of plastic products, and can be found in many consumer items such as the breakdown of plastic containers or synthetic fibers from clothing
- Microplastics are found in aquatic systems. Shellfish, which are filter feeders, can accumulate microplastics. Humans can then be exposed to microplastics through the consumption of shellfish

Objectives

- Optimize digestion procedure and microplastic separation from clam tissue
- Quantify the number of microplastics in clams from two locations (Fig. 1)

Methods

Method Optimization

- Clams were digested in a 10M NaOH solution in an oven at 60°C for at least 2 days
- Separation methods:
 - Filtration
 - Clam digestion was filtered using a filtration flask onto a glass fiber filter (Figure 3a)
 - Density separation
 - Clam digestion solutions were emptied into glass funnels with clamped tubes and allowed to separate for at least 1 day. Microplastics have a density between 0.9 - 1.5 g/mL and float on top of the NaOH solution ($d \cong 1.4$ g/mL) while a majority of the undigested clam material settles in the funnel
 - The material at the bottom of the funnel was drained and the remaining digestate was filtered through a 0.3 mm mesh sheet to collect the microplastics. The microplastics were then rinsed with DI water into a glass jar

Analysis

- The Dino-Lite Digital Microscope was used to identify microplastics in the isolated samples
- Microplastics were classified into particles and fibers (Fig. 4)

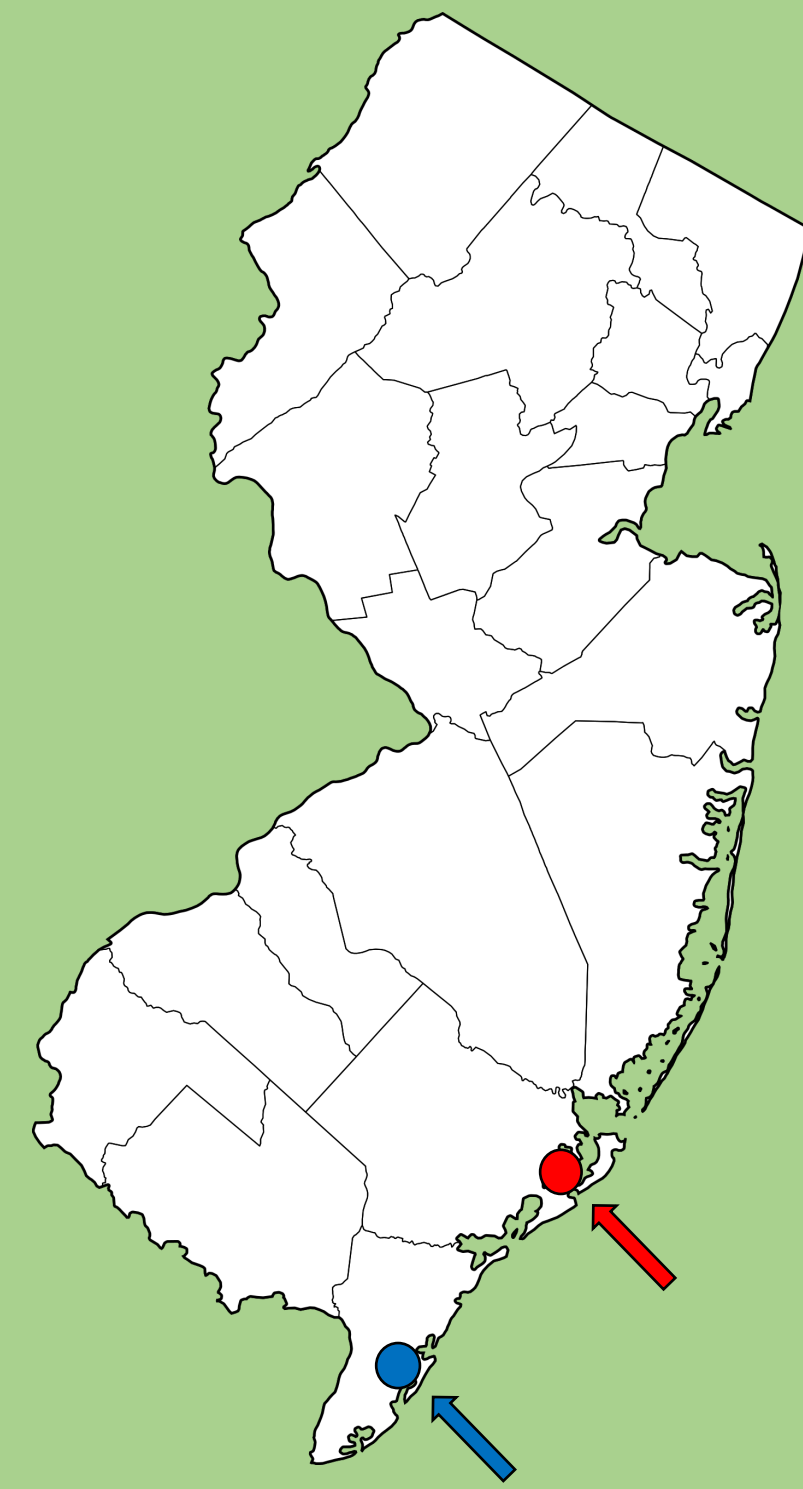


Figure 1: Locations of where the clams were harvested. Red = Little Egg Harbor (littlenecks); blue = Great Sound (middlenecks)

Clam Aquaculture Locations

- Two size classes (littleneck and middleneck) of *Leukoma staminea* were purchased from a seafood market in Pt. Pleasant, NJ for analysis
- Littlenecks: raised in Little Egg Harbor Bay, NJ
- Middlenecks: raised in the Great Sound, NJ

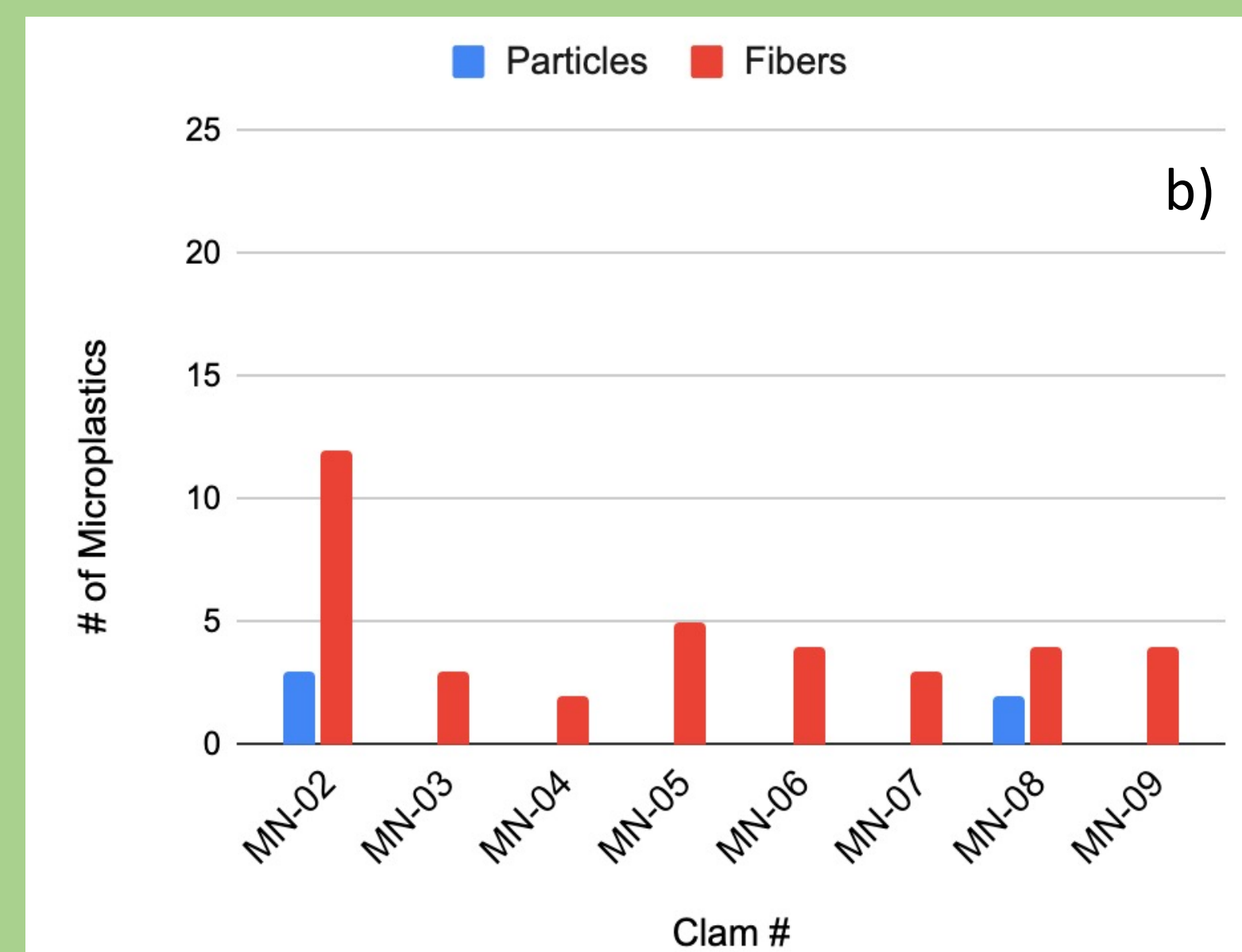
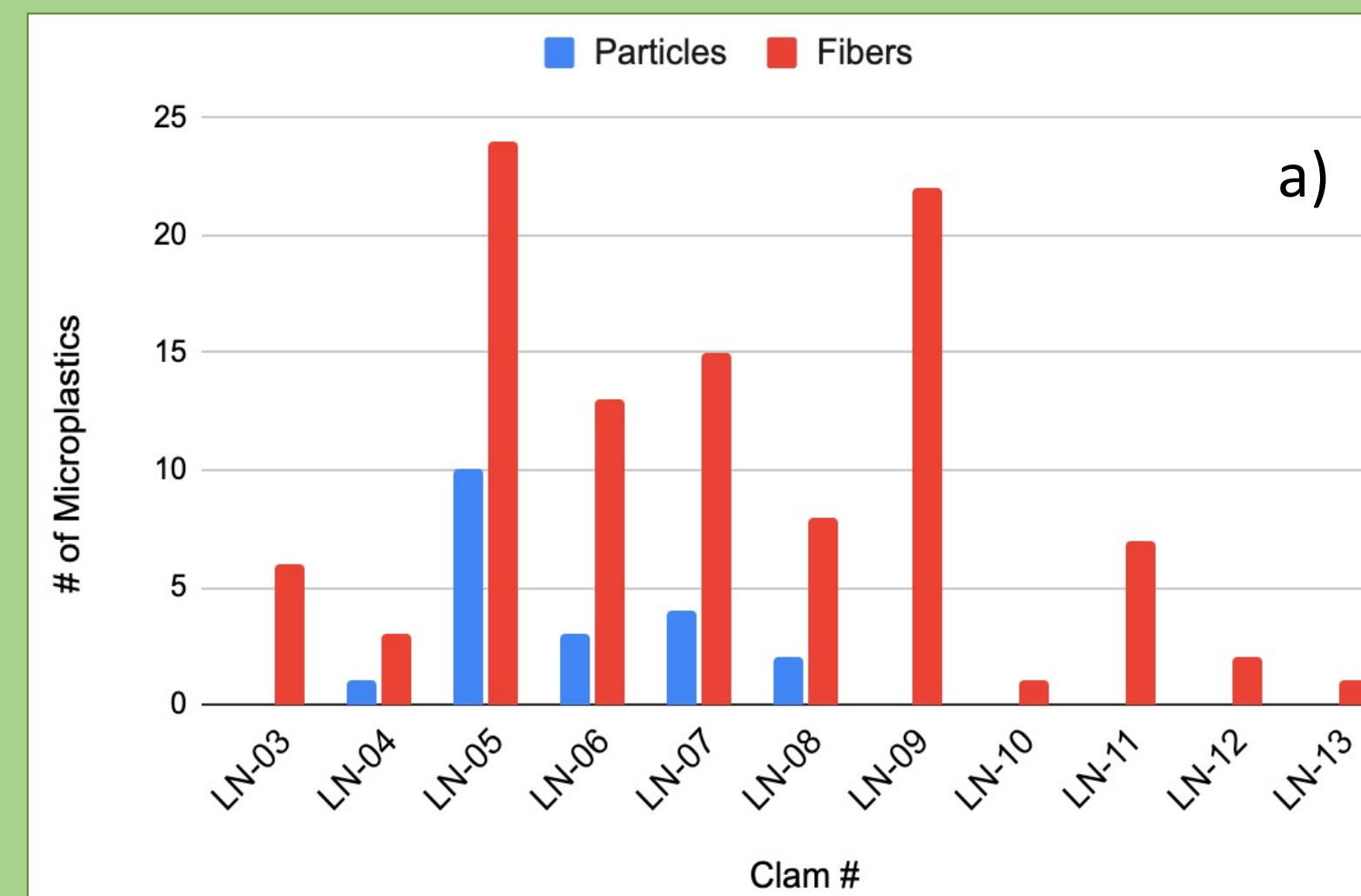


Figure 2. Graphs of the number of particles and fibers found in a) littleneck and b) middleneck clams that were digested. LN = littleneck, MN = middleneck

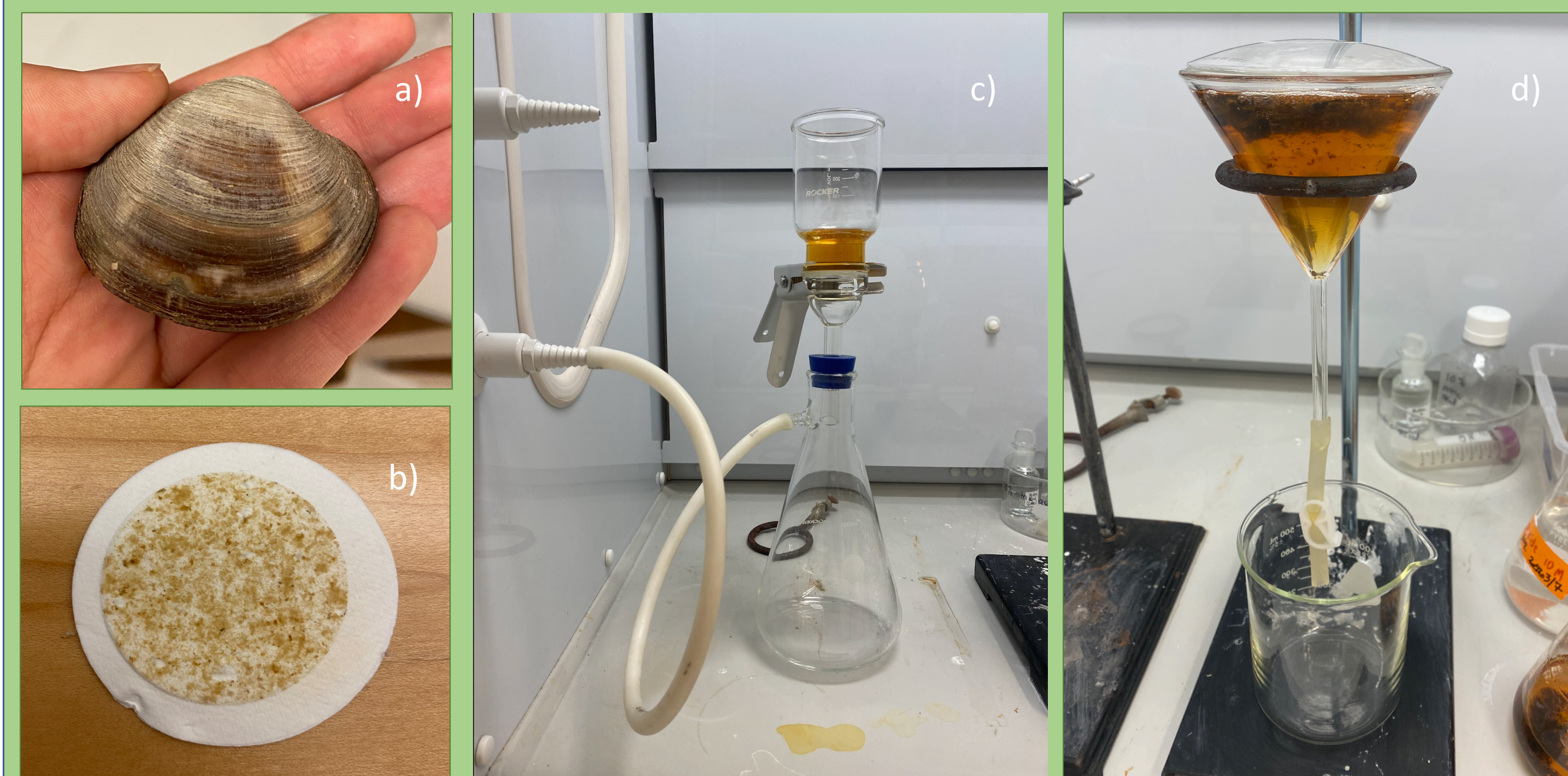


Figure 3: A middleneck clam (a), the glass fiber filter (b) and the glass filtration flask used for the filtration method (c), and the density separator (d).

Results

- The most effective isolation method was a 60°C, 10M NaOH digest followed by density separation
- The filtration method showed too many organic particles, making it hard to isolate microplastics
- Preliminary studies done on littlenecks found more fibers than particles, with an average of about 2 particles and 10 fibers per clam.
- The littleneck clam with the highest concentration of microplastics had 10 particles and 24 fibers

	Littleneck		Middleneck	
	Particles	Fibers	Particles	Fibers
Average	1.82	9.27	0.63	4.63
St. Dev.	3.06	8.20	1.19	3.11

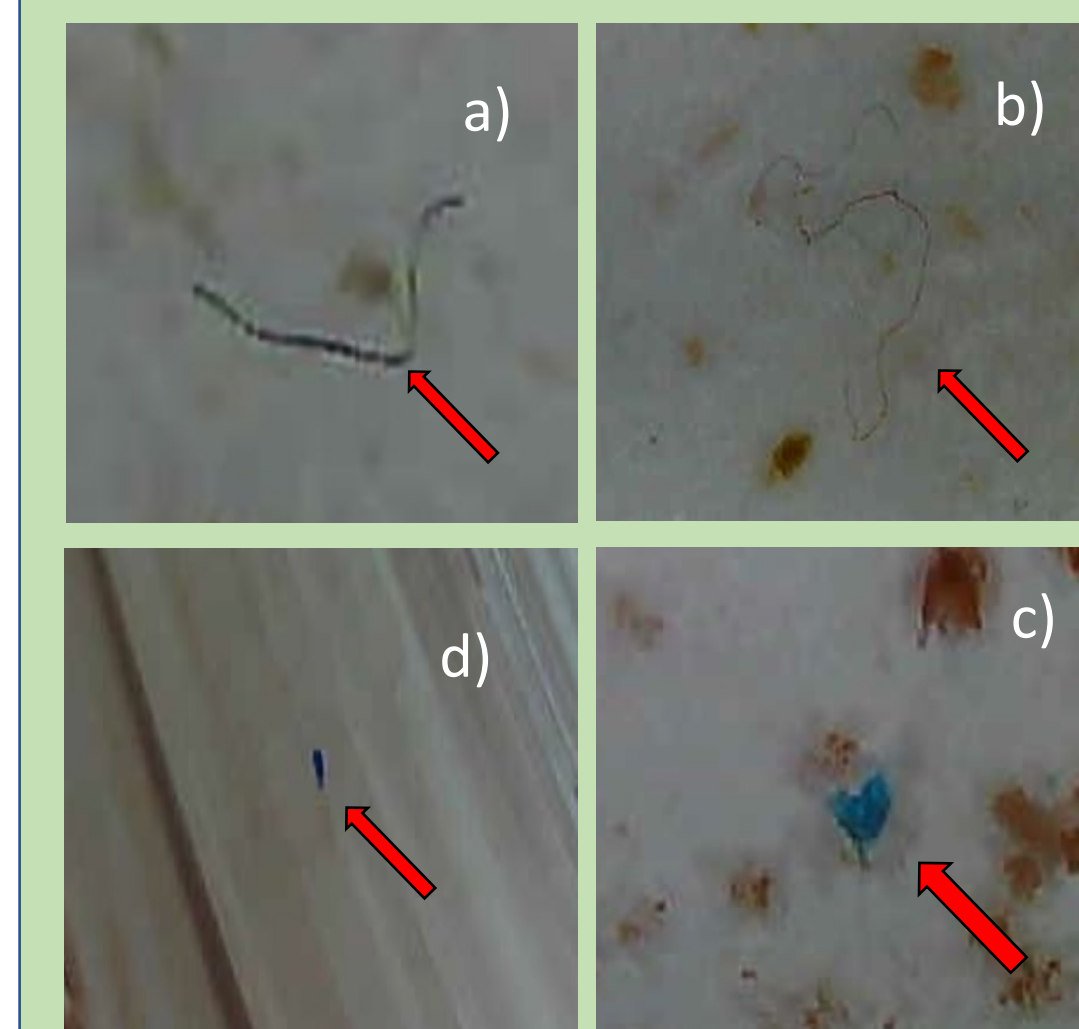


Figure 4: Pictures of fibers (A and B) and particles (C and D). A is LN-07, B is LN-08, C is LN-07, and D is LN-05. Brown specs in photos are classified as organic matter and are not microplastics

Discussion

- It is unclear if the higher number of plastics found in the littlenecks were a result of the smaller clam size or the location where they were harvested
- Future studies are needed which analyze the amount of microplastics in different aquatic organisms in order to determine the impacts of clam size and location on the presence of microplastics

Acknowledgments

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Literature Cited

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