

Copepods, Champagne, and Climate Change

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Introduction

The Secret to NYC Tap Water:

- Often referred to as the "champagne of water," NYC tap water contains tiny, shrimp-like crustaceans called *copepods*.

Copepod Diet and Habitat:

- These microorganisms inhabit natural and man-made reservoirs. They feed on phytoplankton, zooplankton, algae, and most importantly, mosquito larvae.
- https://www.youtube.com/shorts/qOxkZW7_kws

Why They Survive the Journey:

- NYC's water system is unfiltered. Instead, it relies on ultraviolet (UV) light and chemical treatments.
- Copepods can survive these processes, which is why they end up in the tap water.

The Urban Heat Island (UHI) Effect: Urban areas trap heat and experience higher temperatures than surrounding rural areas. This is caused by:

- Heat-absorbing architecture (like concrete) and wind-blocking tall buildings.
- Anthropogenic (human-made) heat from cars and air conditioning units.
- The urban greenhouse effect driven by higher concentrations of pollutants and water vapor.

Vulnerability of Plankton:

- The UHI effect and global warming negatively impact biodiversity.
- Plankton are particularly susceptible because they react very quickly to environmental and temperature changes.

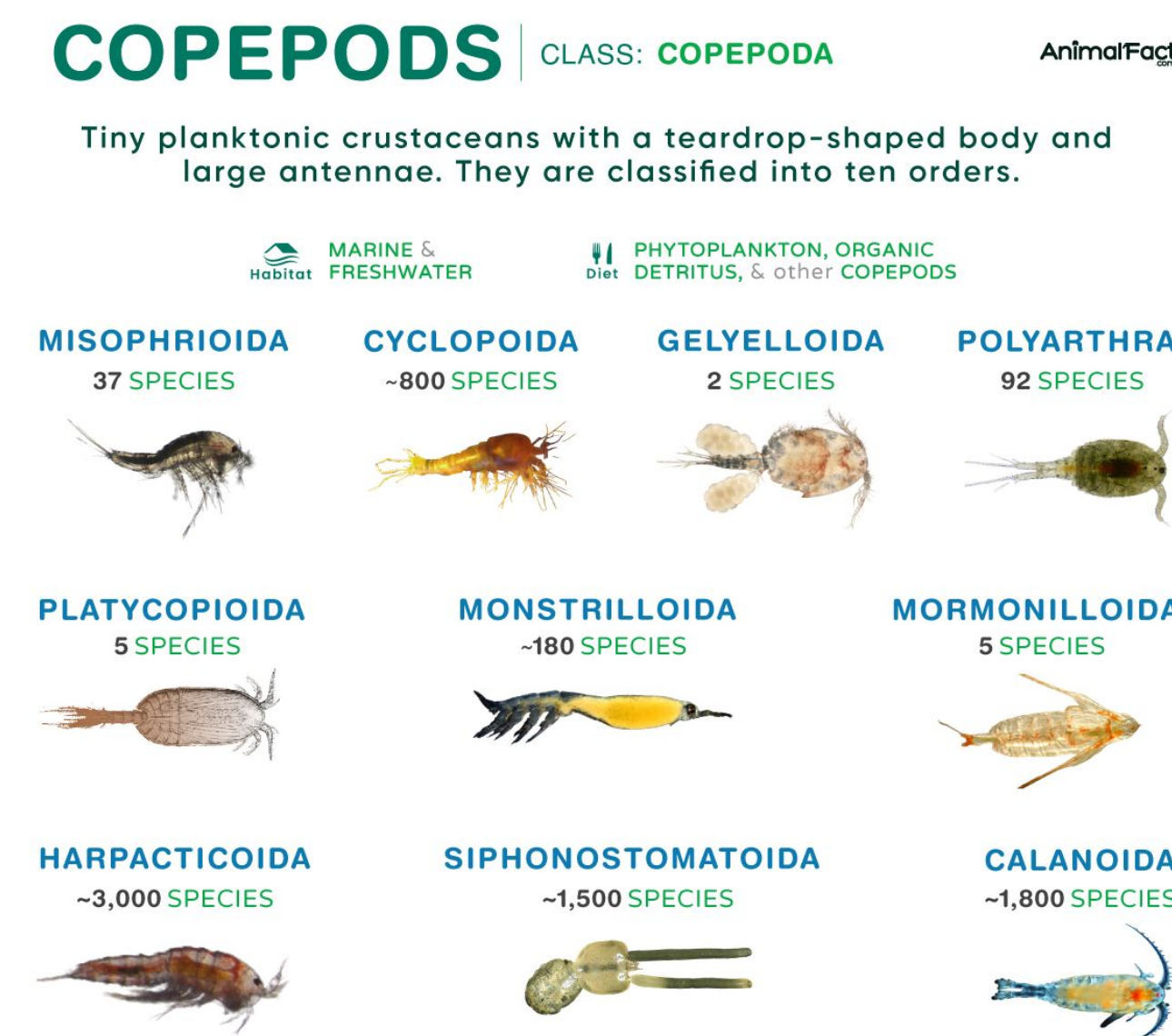
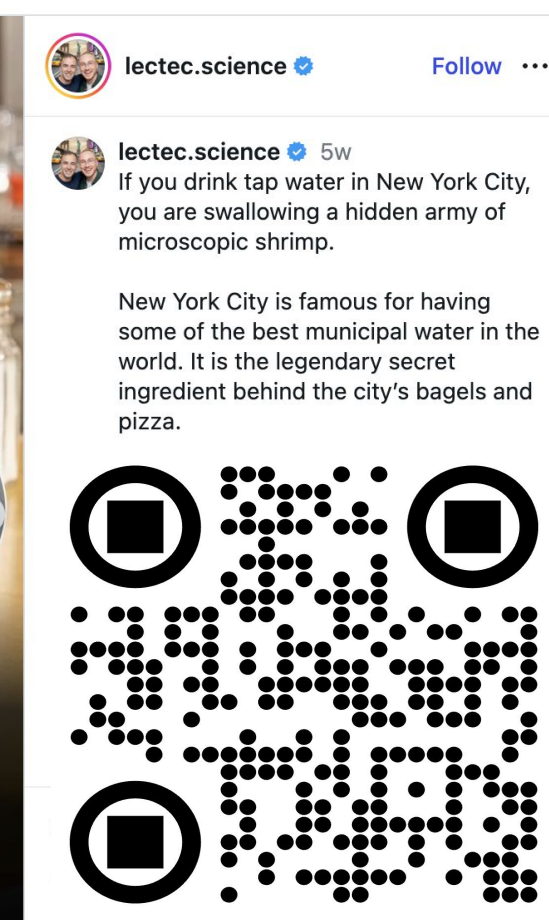
Urban Green Space Cooling (UGSC):

- To combat the UHI effect, cities utilize green spaces and bodies of water, which can effectively lower local temperatures by up to 5°C.
- UGSC cannot prevent Harmful Algal Blooms (HABs)
- HABs, which are triggered by rising temperatures and excess nutrients (like fertilizer or sewage runoff).
- These toxic blooms grow excessively and severely damage ecosystems by depleting oxygen levels.

Research Methodology & Aims:

- To better understand these ecological changes and their impact on plankton like copepods, the proposed research will combine environmental sampling with molecular analysis (DNA barcoding), microscopy, and music.
- We aim to identify copepod species in various water sources within New York City and State: tap water, natural water, and urban waterways.**
- We also aim to find ways we can use the presence of copepods in water to help assess the Urban Heat Island effect, climate change, and the effect of rising global temperatures on New York City.

Procedures



<https://animalfact.com/copepods/>



Young Women's Leadership of Astoria



Brooklyn Technical High School



LaGuardia Community College

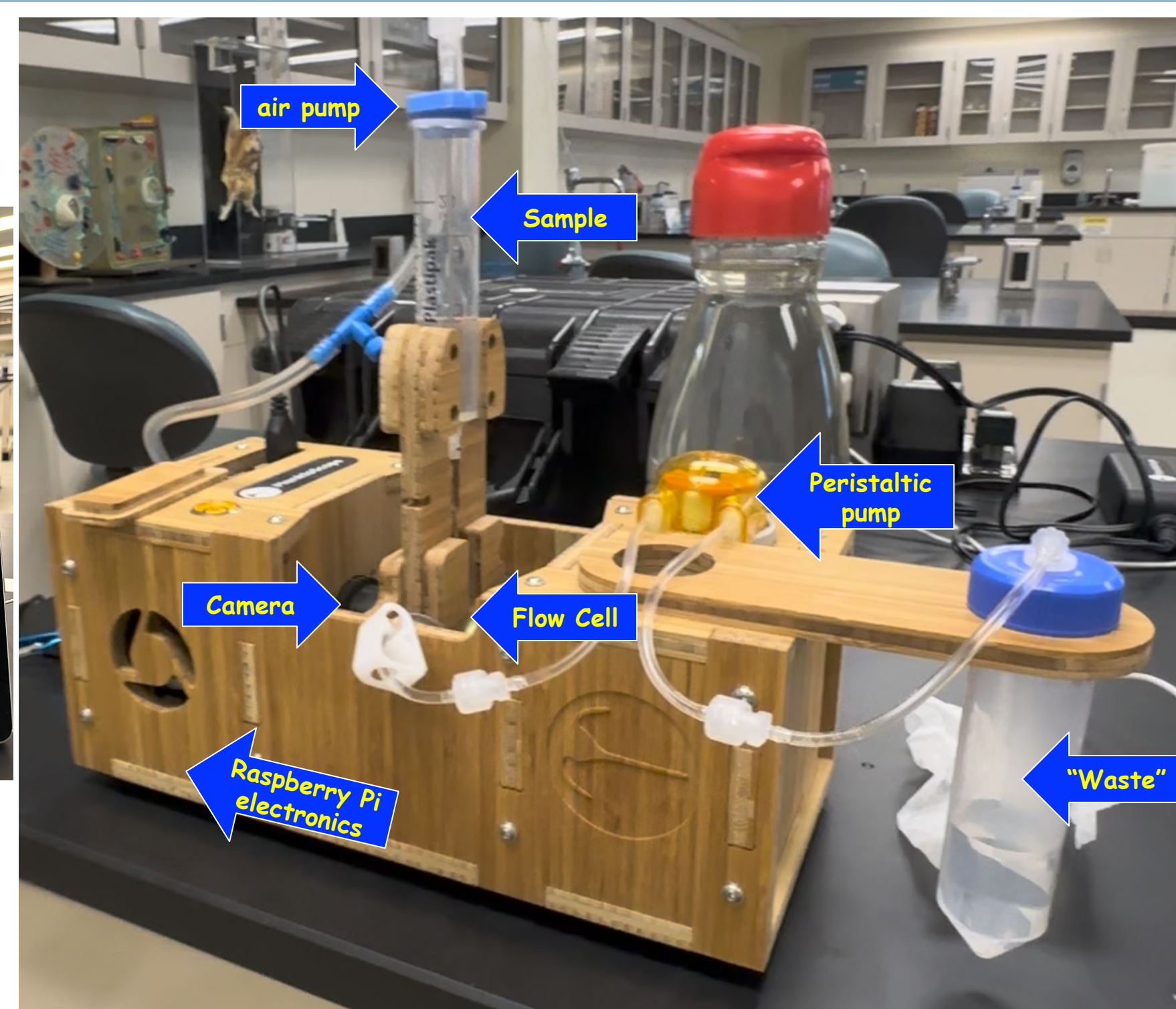


Bottle with water, red arrow indicates fill line

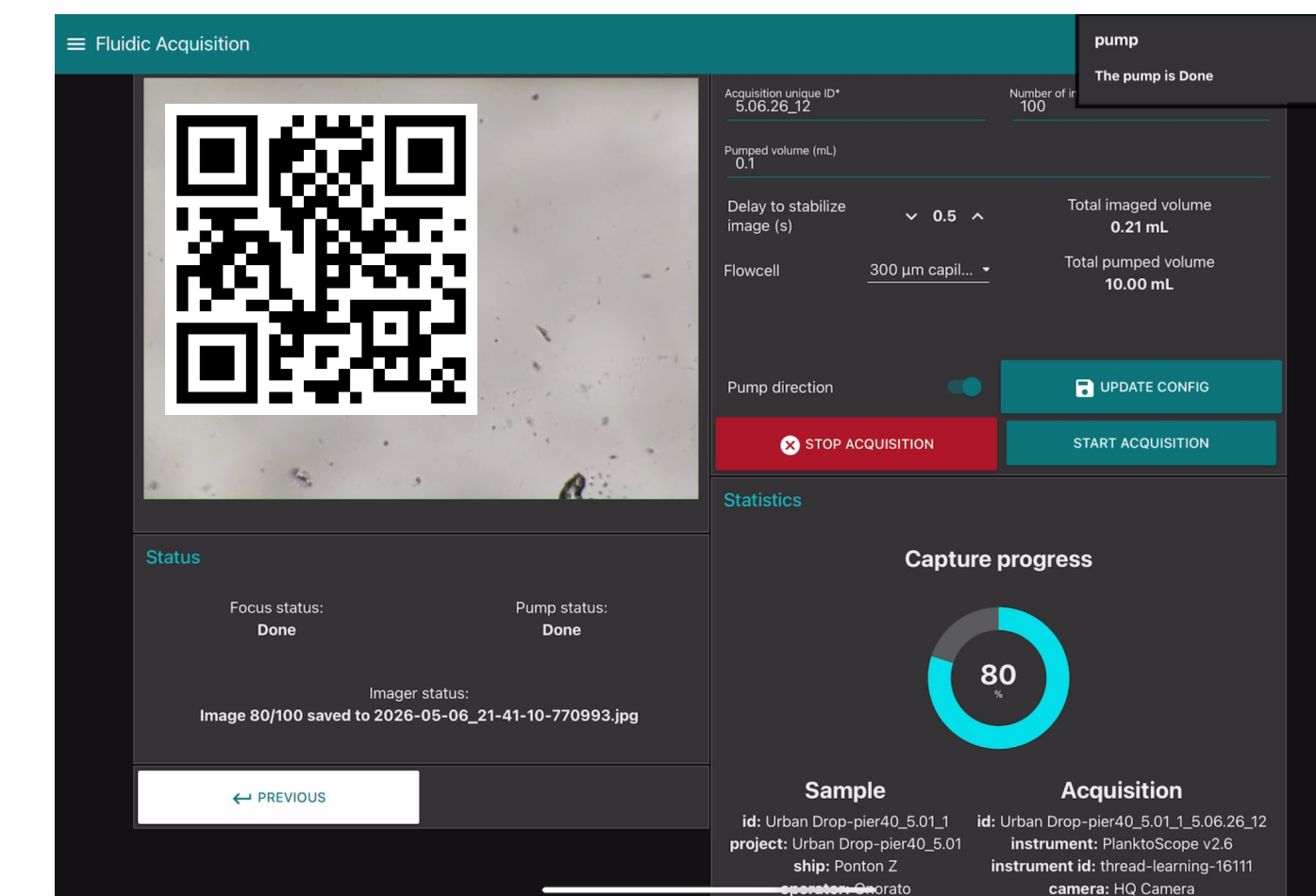


- 250ml bottle top filter with 0.22 micron filter
- filtered water through to capture organisms on the filter membrane
- carefully removed the filter membrane with forceps (washed with 70% ethanol)
- stored at -20C freezer in a 5ml plastic screw cap sample tube until we can send the samples to Mr DNA Lab for 18S and/or COI biodiversity DNA sequencing

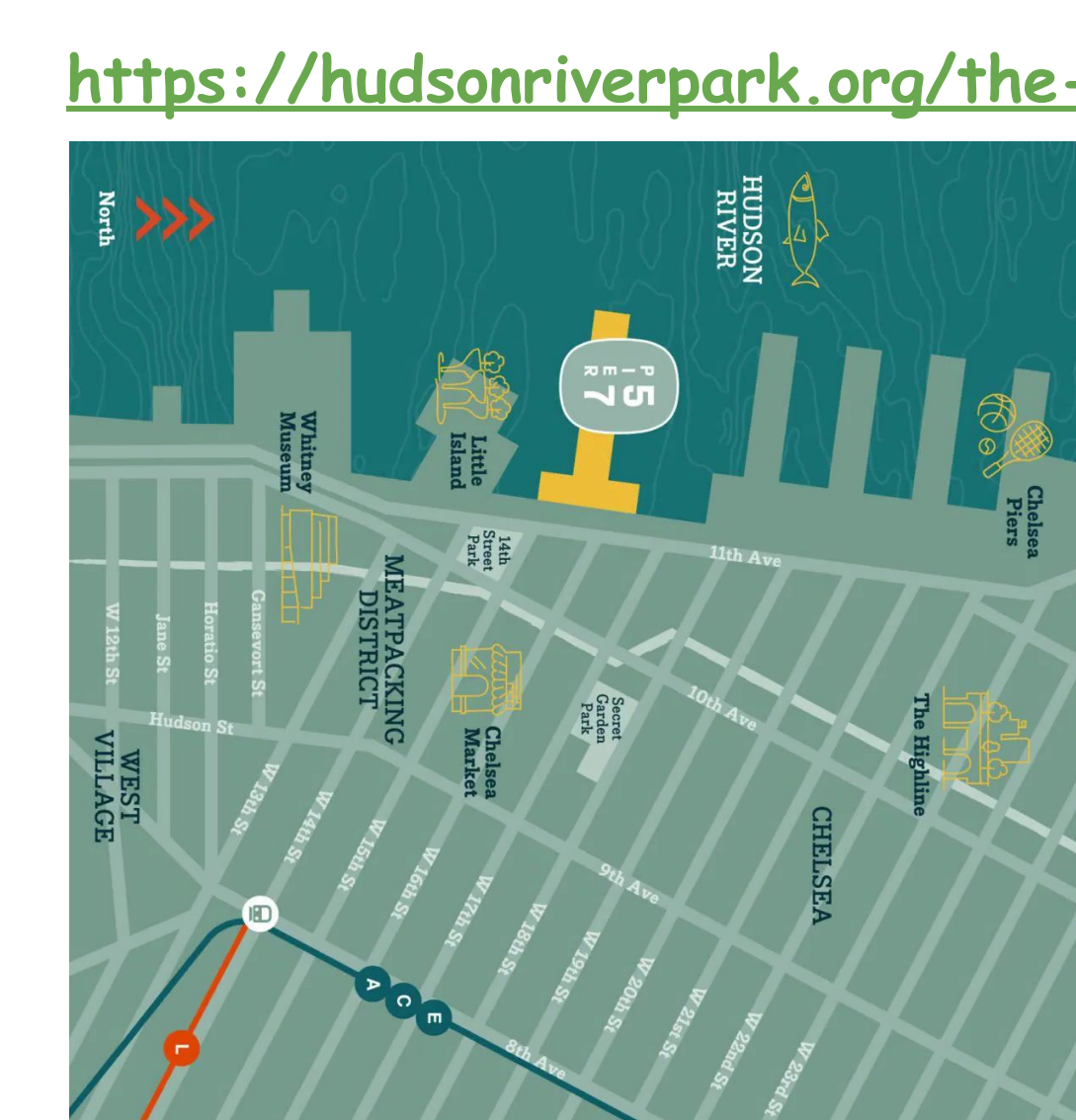
Planktoscope Setup



Planktoscope Imaging & Future Sampling



Pier 40 Floating Docks



Pier 57 Discovery Tank



Pier 96

<https://hudsonriverpark.org/the-park/piers-and-places/>

Unfinished & Future Work

- We need to sequence the 3 water samples collected from our schools
- Adapt our initial experimental design to fit into our newly funded Hudson River Parks Trust- CUNY Research Scholar Program Alliance project "Biomolecular Soundscapes of the Hudson River"
- Refine how we can use copepods to study the microecosystems of the Hudson River
- Link Planktoscope imaging & DNA sequencing through sonification
- Develop DIY, frugal science equipment for real-time, in field urban barcoding, biodiversity work

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