Studying Biodiversity using Macroinvertebrates

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Abstract

In many ecosystems, changes in biodiversity are a significant indicator of the stability of the ecosystem, and the effects of human involvement. On September 30, 2022, students from Massapequa Ames campus collected samples of macroinvertebrates from a freshwater creek surrounded by a temperate deciduous forest in Massapequa preserve. Using DNA barcoding at Cold Spring Harbor DNA Learning Center, the genus and species of each sample was determined. It was found that based on this study's results, Massapequa preserve has relatively low biodiversity, as out of the 10 samples, there was a biodiversity of 5, with may samples being repeat samples. By monitoring the biodiversity of Massapequa preserve, one can observe changes in the environment, and use data from previous years to predict changes in the environment.

Background

Studies on Biodiversity are not uncommon. Similar studies have been done at a variety of places, such as stanford University. Studies on biodiversity are an indicator to the type of life that lives in an area, which can give researchers clues as to what kind of environment these organisms live in, as well as the level of human interaction,

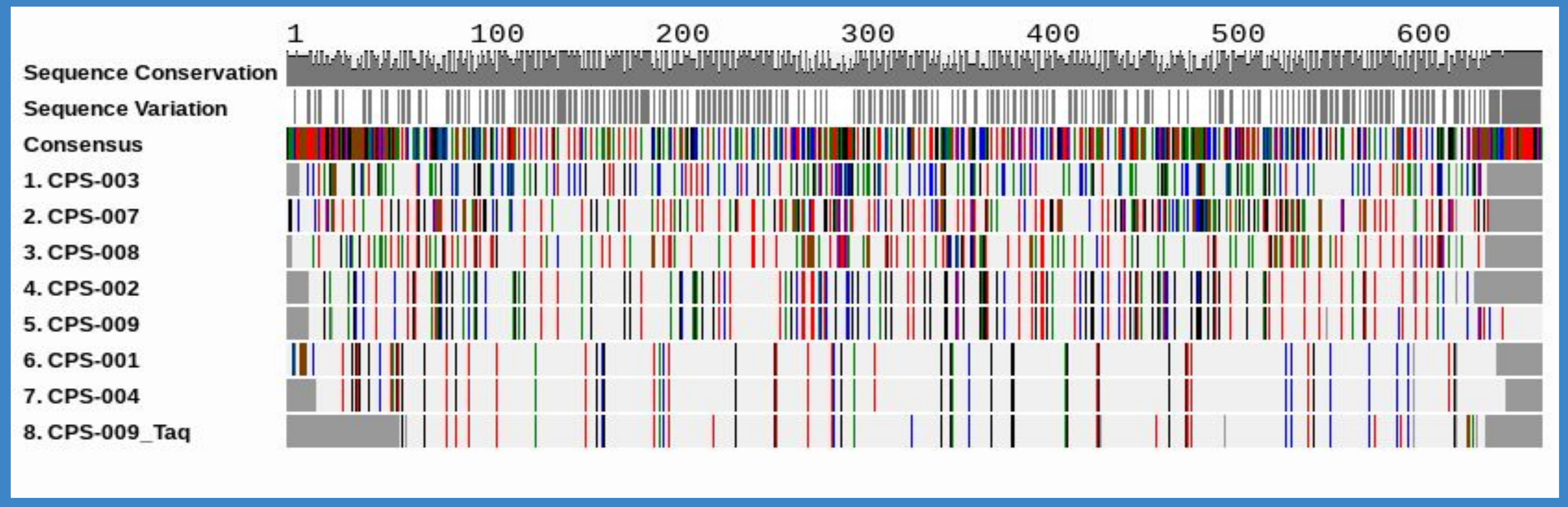
Methods

Sample Collection:
- Samples were acquired using mesh sieves, shovels, and hands.
- Researchers wore waders when collecting samples in the creek.

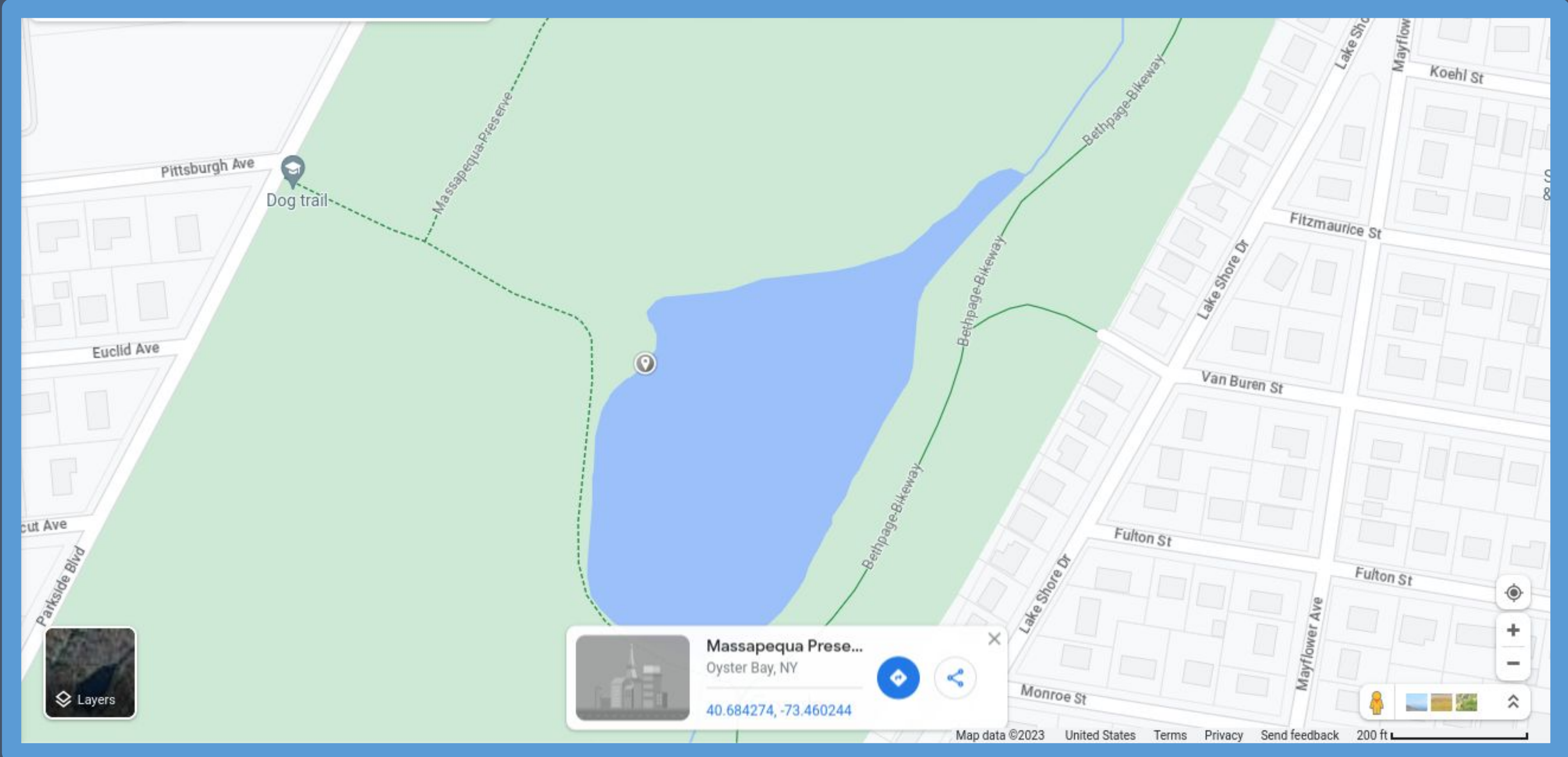
Sample Documentation:
- Pictures of samples were taken using an electric handheld microscope

Wet Lab:
- CSHL Silica Gel bead DNA extraction technique
- PCR CO1 amplification
- Gel electrophoresis to verify success of amplification
- Sequence of PCR product

Bioinformatics:
- Sequences analyzed by DNA Subway



Sample #	Genus	Species	Mismatches
001	Proasellus	Unknown	0
002	Hyalella	Azteca	1
003	Eukerria	Saltensis	6
004	Proasellus	Unknown	0
005	Unknown	Unknown	Unknown
006	Unknown	Unknown	Unknown
007	Corbicula	Fluminea (/Leana)	0
008	Philodromus	Rufus	1
009	Hyalella	Azteca	6
009 (taq)	Proasellus	Unknown	15



Results

It was found that samples 001, 004, and 009 (taq) were of the Proasellus Genus, Species Unknown, samples 002 and 009 were Hyalella Azteca, samples 005 and 006 were invalid, and samples 003, 007, and 008 were identified as Eukerria Saltensis, Corbicula Fluminea (Leana*), and Philodromus Rufus** respectively.

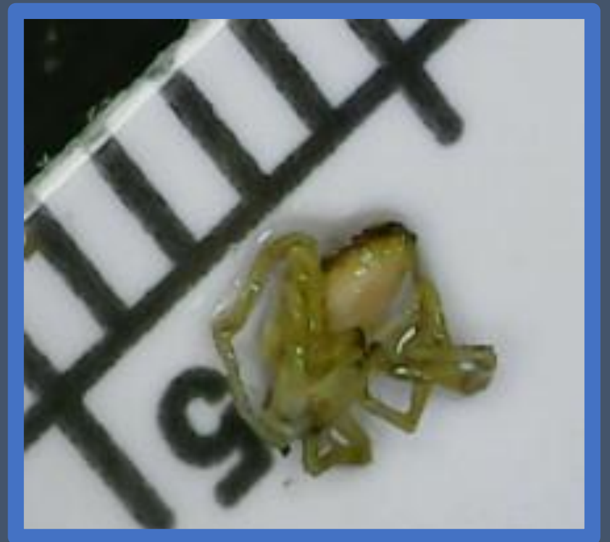
*Sample 007 was a 100% match to both Corbicula Fluminea and Corbicula Leana. However, Corbicula Fluminea is an invasive species native to Eastern and Southern Asia, which is inferred to have been introduced to North America sometime around 1930, by Chinese immigrants. However, Corbicula Leana is found in the Korean Peninsula and the Japanese archipelago. The samples were collected in North America; therefore, sample 007 is identified as Corbicula Fluminea.

**Philodromus Rufus is a land-dwelling arachnid, but it was found on the water's edge, which is why it was collected among the aquatic macroinvertebrates.

Discussion

Though results were found using reliable means, there are still some possible sources of error, such as:
- Possible cross-contamination
- Researchers' possible bias towards collecting more "charismatic" organisms (ex: easier to see, easier to catch, etc)
- Small sample size
- Mislabelled samples (ex: Sample 009 (taq) was found to be of the Proasellus Genus, but visual inspection identified Sample 009 (taq) to be of the Class Gastropoda, suggesting Sample 009 (taq) is mislabeled)

Additional information:
- Sample 008 was found to be Philodromus Rufus, a land-dwelling arachnid, meaning it does not fall under the target sample group



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