Analyzing Barcode Sequences to Determine Invertebrate Biodiversity

Jacob St. Clair, Alex Yat, Thomas Kreuter
Eastport South Manor Junior-Senior High School
Mentor: Mr. Robert Bolen

Abstract

The Peconic Estuary serves as a safe haven for developing aquatic and terrestrial species, but its stability is declining due to human impacts such as pollution and rising temperatures. These factors can cause algal blooms that deplete oxygen in the water, preventing respiration in aquatic organisms and leading to the loss of key species, which reduces biodiversity. A decline in biodiversity disrupts ecosystem balance and lowers the overall quality of the estuary, which is critical for the development of young aquatic organisms. To assess biodiversity, over 20 invertebrate samples will be collected using a seine net and hand-held nets, preserved in 99% ethanol, and stored in a freezer. DNA barcoding will then be used to identify their taxonomy and detect any invasive species.

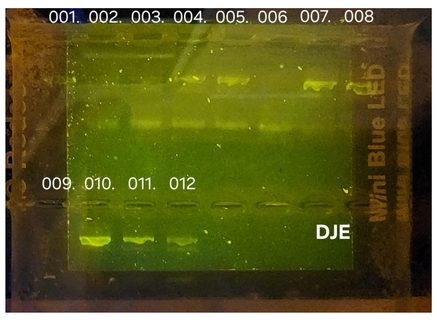
Introduction

DNA barcoding is used to identify species by using their CO1 gene to identify their certain specie. [4] This method allows researchers to identify species quickly and accurately and this is useful for biodiversity studies since it helps us identify species in diverse environments. [3] The Peconic river is studied to assess its ecological health and biodiversity . The major issues in the Peconic river is pollution, which is harming habitats and organisms that live there and this is leading to habitat loss for many species. This is affecting the ability of native species to survive and reproduce. [1, 2] Also, invasive species pose a huge threat, as they outcompete native species in food, space, and breeding sites. As a result native species populations are declining, and are being pushed toward extinction. These combined pressures are decreasing the overall biodiversity in the Peconic River.

Materials and Methods

Sample Collection
We began by collecting organisms in the peconic river estuary.

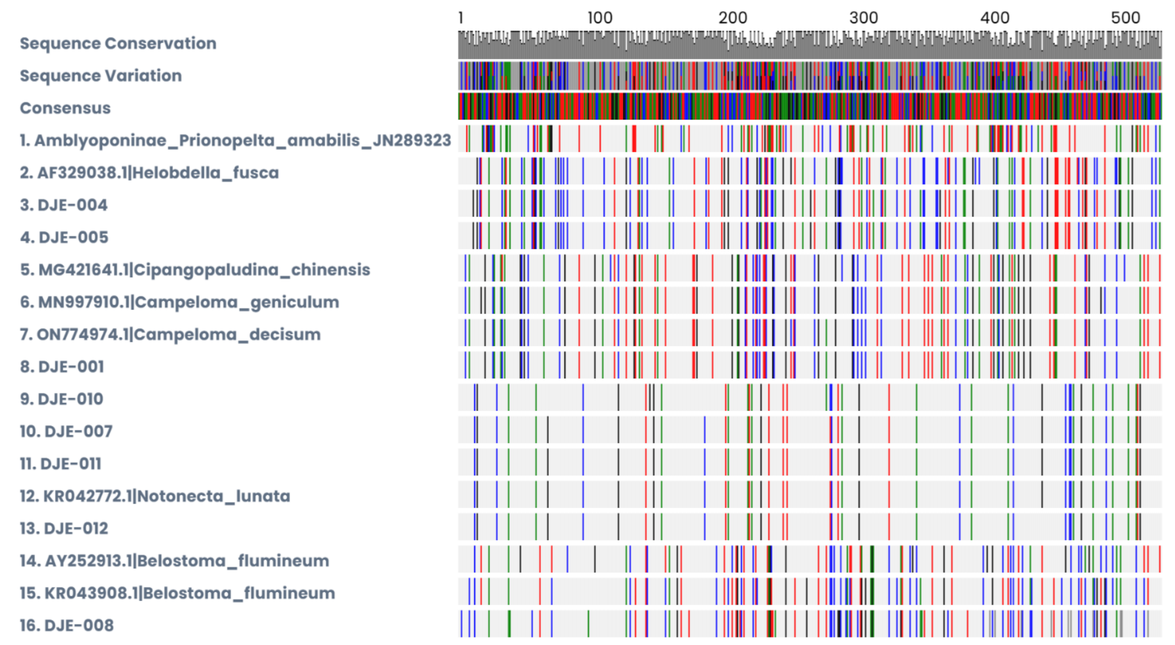
Sample Storage
Samples were stored and preserved in individual containers containing ethanol and frozen until use.



Data Processing
PCR tests were conducted on sample to identify the co1 gene and then samples were sent to cold spring harbor lab for dna sequencing. when sequences returned, we barcoded them using dna subway in order to organize our results and identify species.

References

Results



SAMPLE NUMBER	SCIENTIFIC NAME	COMMON NAME
001	*Campeloma decisum*	*Pointed campeloma*
004	*Helobdella fusca*	*Dark Leach*
005	*Campeloma Geniculum*	*Ovate Capeloma*
006	*Mooreobdella Melanostoma*	*Freshwater Jawless Leech*
007	*Notonecta lunata*	*Backswimmer*
008	*Notonecta lunata*	*Backswimmer*
010	*Notonecta lunata*	*Backswimmer*
011	*Notonecta lunata*	*Backswimmer*
012	*Notonecta lunata*	*Backswimmer*

Discussion

Our results showed that DNA barcoding can identify different invertebrate species and reveal biodiversity. They show a variety of species, meaning the ecosystem is diverse and healthy, which is important for science and the environment. DNA barcoding works well to study biodiversity, and the results were mostly what we expected

Future Directions

In the future we would continue this project by collecting more samples from different locations and times of years to compare biodiversity changes. We could also increase the sample size and improve DNA analysis techniques for more accurate results. Another next step would be tostudy how environmental factors affect invertabrate diversity.

Acknowledgements

Thank you to the DNA Learning Center Staff for support with proposals, providing laboratory equipment, and supporting sequence analysis. Special thanks to Jeff Petracca for technical and sequencing support.