

Using DNA barcoding to determine Biodiversity of Aquatic Macroinvertebrates in Forge Pond

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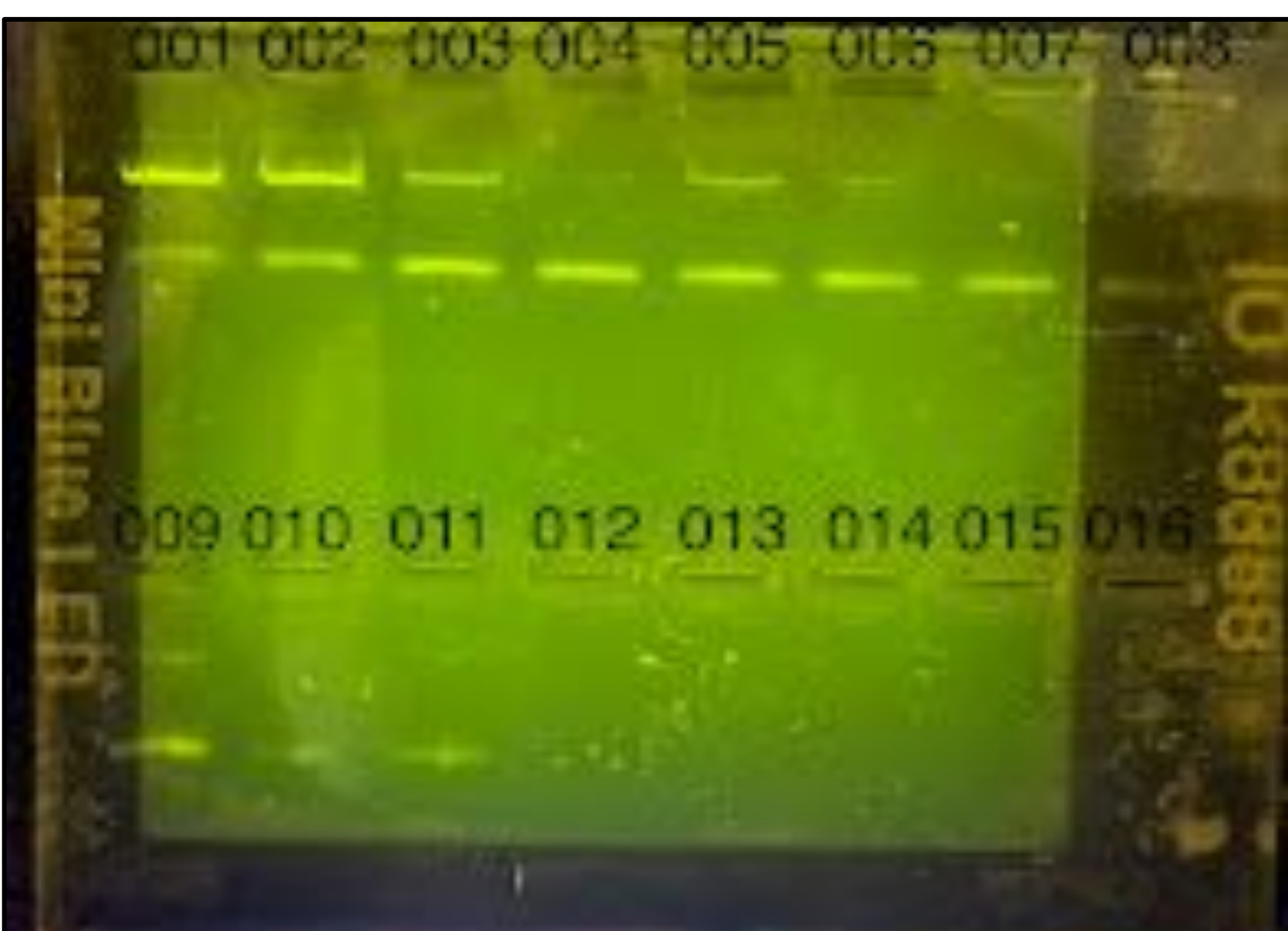
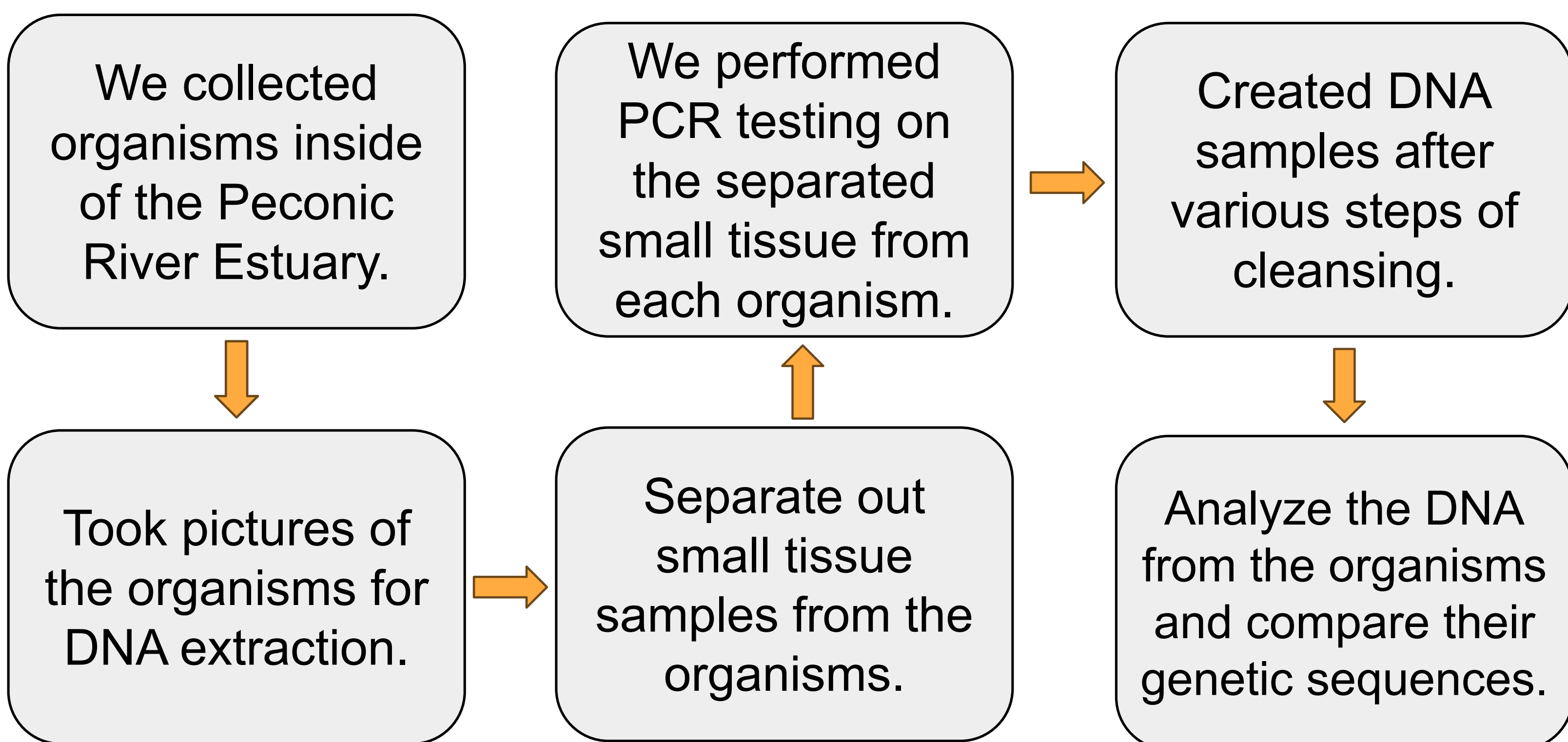
Abstract

Our study explored the biodiversity of invertebrates in Forge Pond, which is part of the Peconic Estuary, through the use of DNA barcoding. Samples that we collected from Forge Pond were stored in ethanol to preserve them. Inside of our school/labratory, DNA was extracted from the organisms and were then analyzed to identify different species. Unfortunately there was not a sufficient amount of species positively identified using the DNA Barcoding technique, which resulted in an inability to provide insight on the biodiversity of the Peconic River.

Introduction

This study uses DNA barcoding to analyze biodiversity in the Peconic River ecosystem and evaluate its environmental health over time. Biodiversity, or the variety of organisms in an ecosystem, is an important indicator of water quality, especially because invertebrates are sensitive to environmental changes. DNA barcoding identifies organisms using a short sequence of DNA, allowing for accurate detection of species, including those difficult to identify visually. The research question for this project is: What is the level of biodiversity in the Peconic River? It is hypothesized that this method will reveal a wide range of species, even ones that havent previously been suited for the environment. This project is important because it uses modern genetic tools to improve ecosystem monitoring and is relevant to the public because the Peconic River faces issues such as algal blooms, which can block sunlight needed by eelgrass and release toxins harmful to fish and shellfish.

Materials and Methods

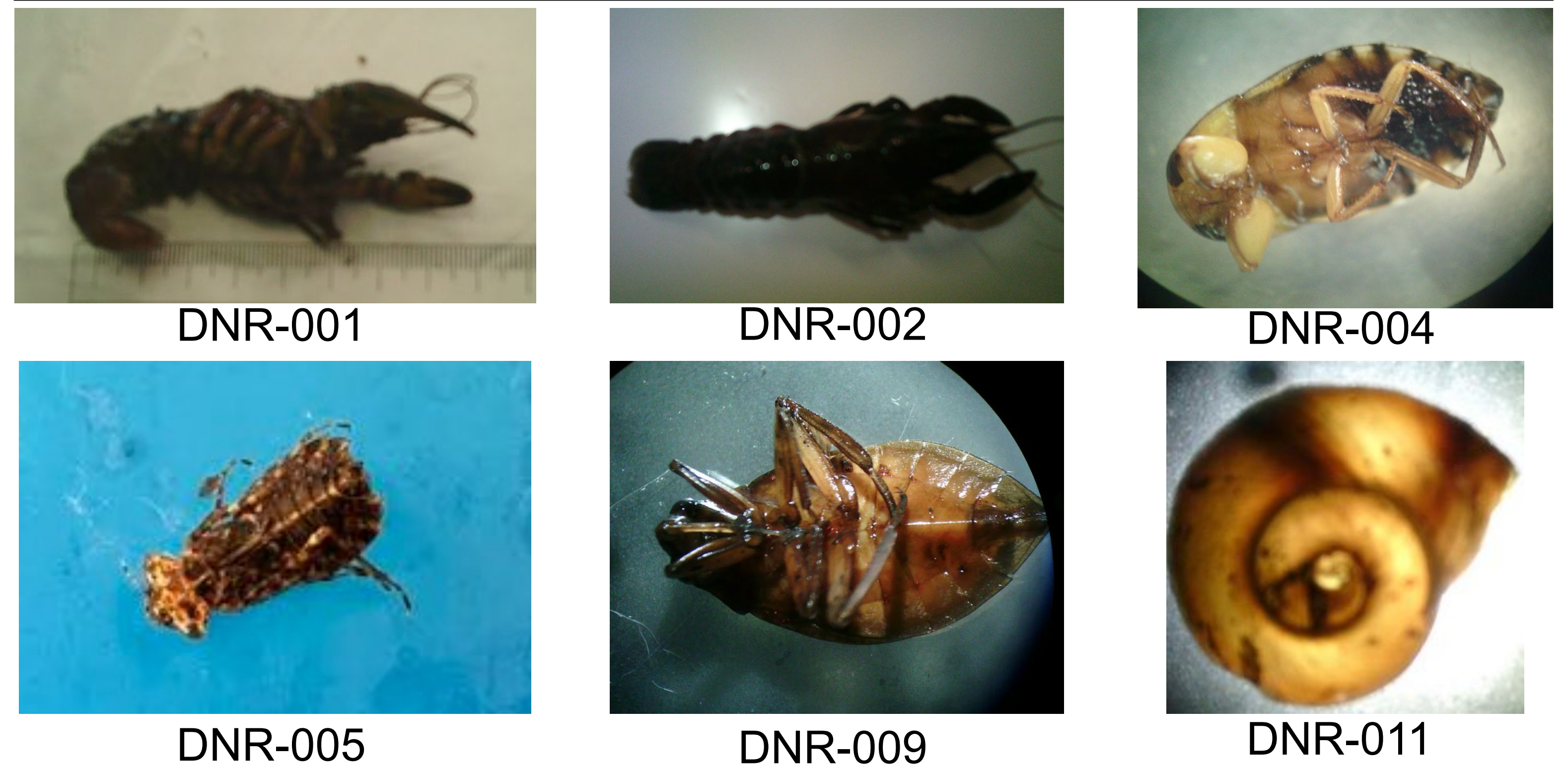


Gel Electrophoresis showing the DNA samples, with visible bands signifying that DNA was successfully amplified for use in DNA barcoding.

References

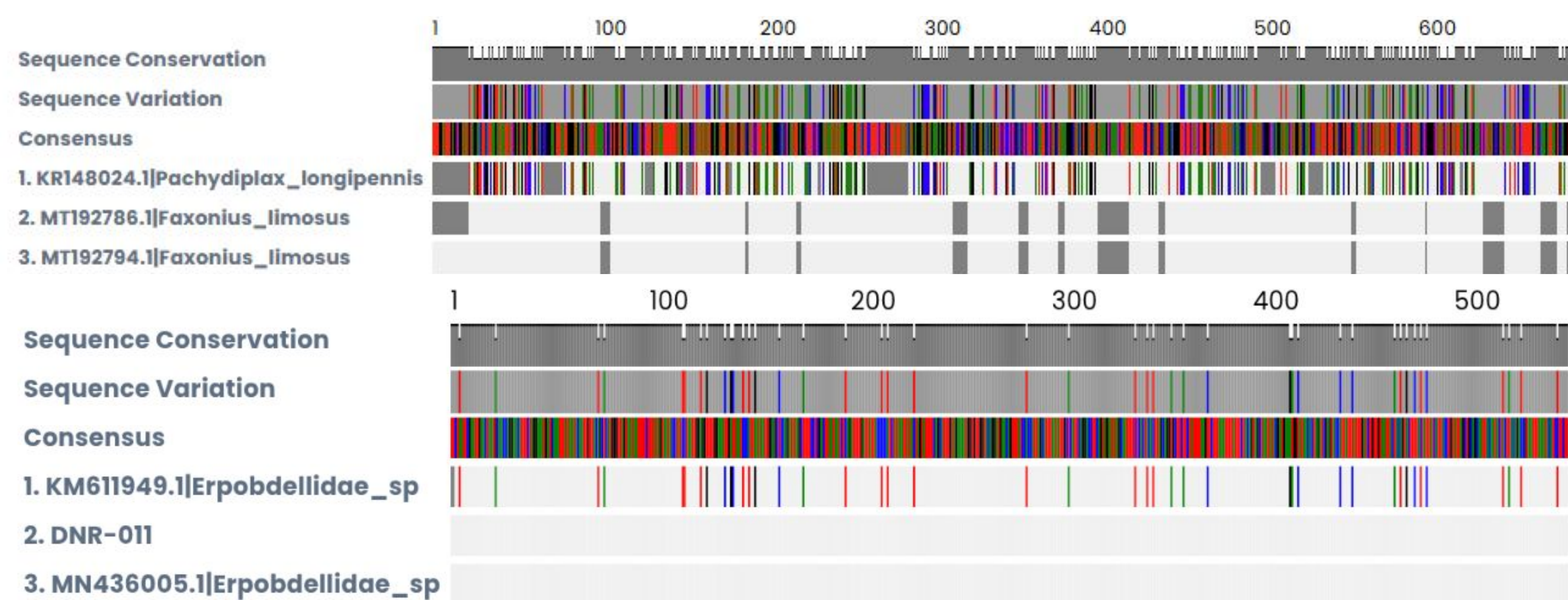


Results



Sample #	Scientific Name	Common Name
DNR-001	<i>Faxonius limosus</i>	Crayfish
DNR-002	<i>Faxonius limosus</i>	Crayfish
DNR-005	<i>Pachydiplax longipennis</i>	Blue Dasher
DNR-011	<i>Erpobdellidae sp.</i>	Leech

DNA Barcoding results indicated positive identification of sample DNR-005 and DNR-011. These samples were identified as a Blue Dasher and a Leech. Samples DNR-001 and DNR-002 did not result in sufficient DNA barcodes but did yield results that are consistent with the physical identification of the samples, with DNR-001 and 002 being a crayfish. Given the insufficient data results, an assessment of the biodiversity of the study area could not be determined.



Discussion/Future Directions

The findings from the experiment were not sufficient enough to determine the biodiversity of the study area. Further sample collection and DNA Barcoding is needed. DNA barcoding was shown to be a successful technique in the identification of one species within the ecosystem of the Peconic River. Biodiversity levels within an ecosystem can therefore be better evaluated using this method as compared to others. This is key in environmental science since the method allows for accurate determination of biodiversity within an ecosystem through genetic analysis. For the average person reading about this work, the key lesson from this finding is that there is a direct correlation between biodiversity and the health of the river.

The experiment can be furthered by conducting similar DNA barcoding analyses using multiple samples collected from other parts of the Peconic River. Comparing the results for various seasons, as well as analyzing larger sample sizes, can provide a better overview of the biodiversity within the area. Another possible approach may include comparing the results obtained from DNA barcoding with those found by conventional species identification techniques.

Acknowledgements

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