

Abstract

Barnacles have a vast number of species and exist in abundance in marine environments, and water depth and location are factors that affect the specie that lives in that area. By sequencing the DNA using the barcoding guidelines, the objective of the project was to determine the variation of barnacle species in the different bodies of water on the North and South shores of Long Island. The most important materials needed were DNA reagents and the samples of barnacles from the Long Island Sound and the Great South Bay. The significant methods and materials include PCR and DNA reagents. Our results concluded that our hypothesis was incorrect as there was not a difference in species of the samples collected as the organisms were all identified as *Semibalanus balanoides* through DNA Subway.

Introduction

Barnacles are organisms that adhere to larger organisms or immobile objects such as rocks or manmade docks in marine environments. Due to the prevalence of aquatic environments, Long Island is the perfect place to find several different types of barnacles and study the biodiversity of these organisms. The calcite shell of the barnacle allows it to endure most conditions, so that accounts for its ability to thrive in various locations. Barnacles impact human and environmental well being. They cause issues with boats as they attach to them and add inconvenient weight and drag. Environmentally, barnacles reside in large numbers on the rocks, posts, or pilings which impacts the topography of the environment, but they are not considered to be damaging or parasitic. Studying the biodiversity of the organisms was possible as species could be collected and investigated from both the North and South shores of Long Island. It was expected that there would be a difference in the species of barnacles found. Barnacles can be roughly identified by the depth of the water they were in or location they were found on. Barnacles can be identified by coloring patterns or grooves and indents on the outer shell. However, these identifications will not give an exact species because many barnacles look very similar which is why the barcoding aspect of this project is necessary. The investigation was conducted by collecting 10 samples of barnacles from posts or dock pilings in the water from the North Shore and 10 from the South Shore of Long Island in order to study the biodiversity of barnacles in the region.

Biodiversity of Barnacles on Long Island

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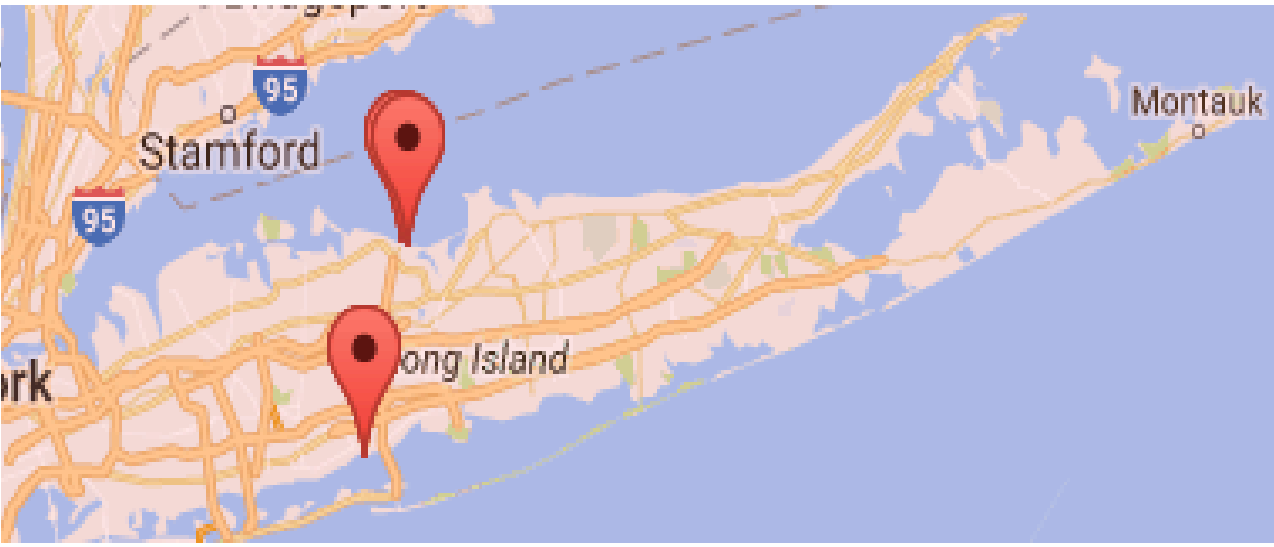


Fig. 1 The above picture shows all locations the barnacles were retrieved from on Long Island



Fig. 2 Barnacle retrieved from North Shore



Fig. 3 Barnacle retrieved from South Shore

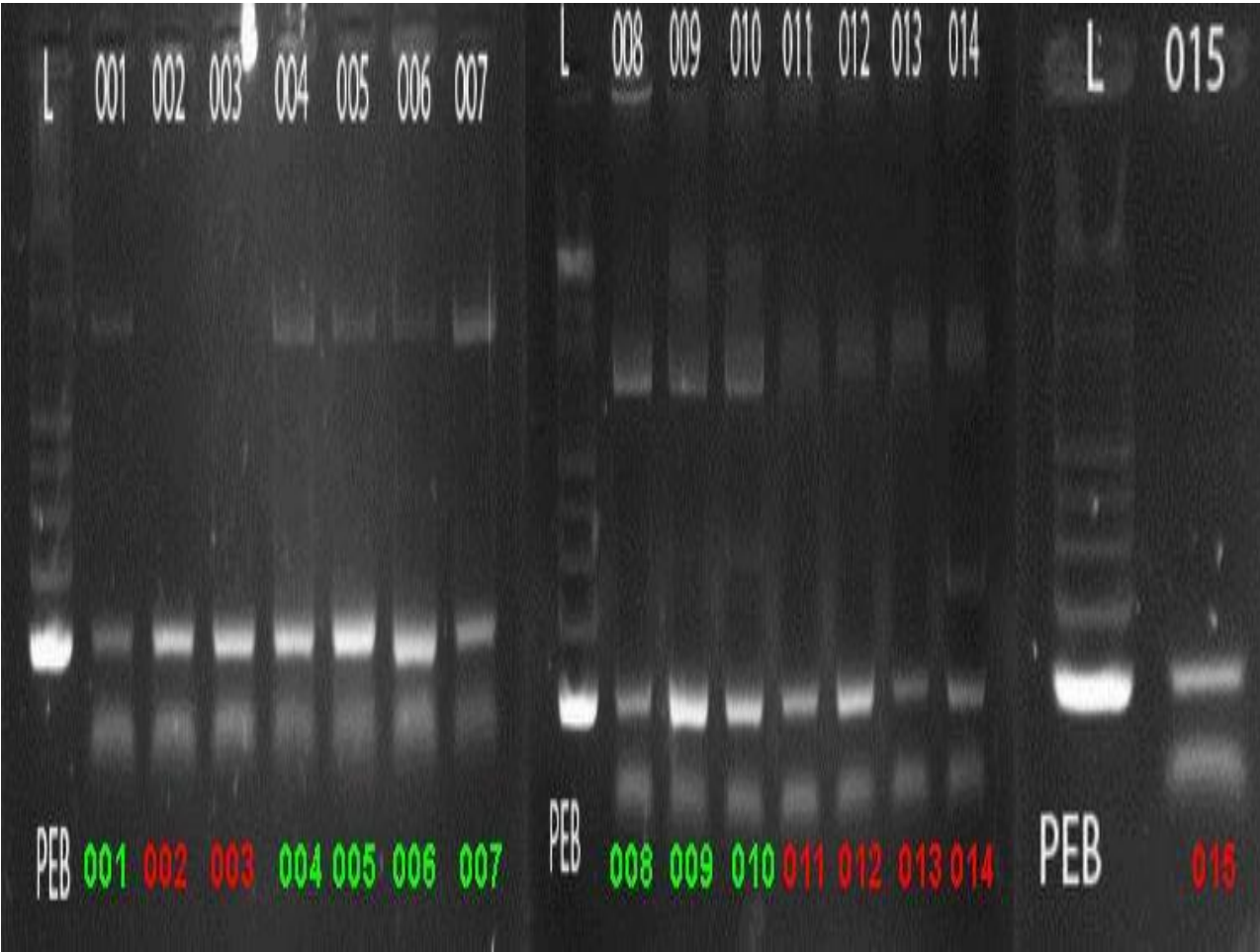


Fig. 4.C

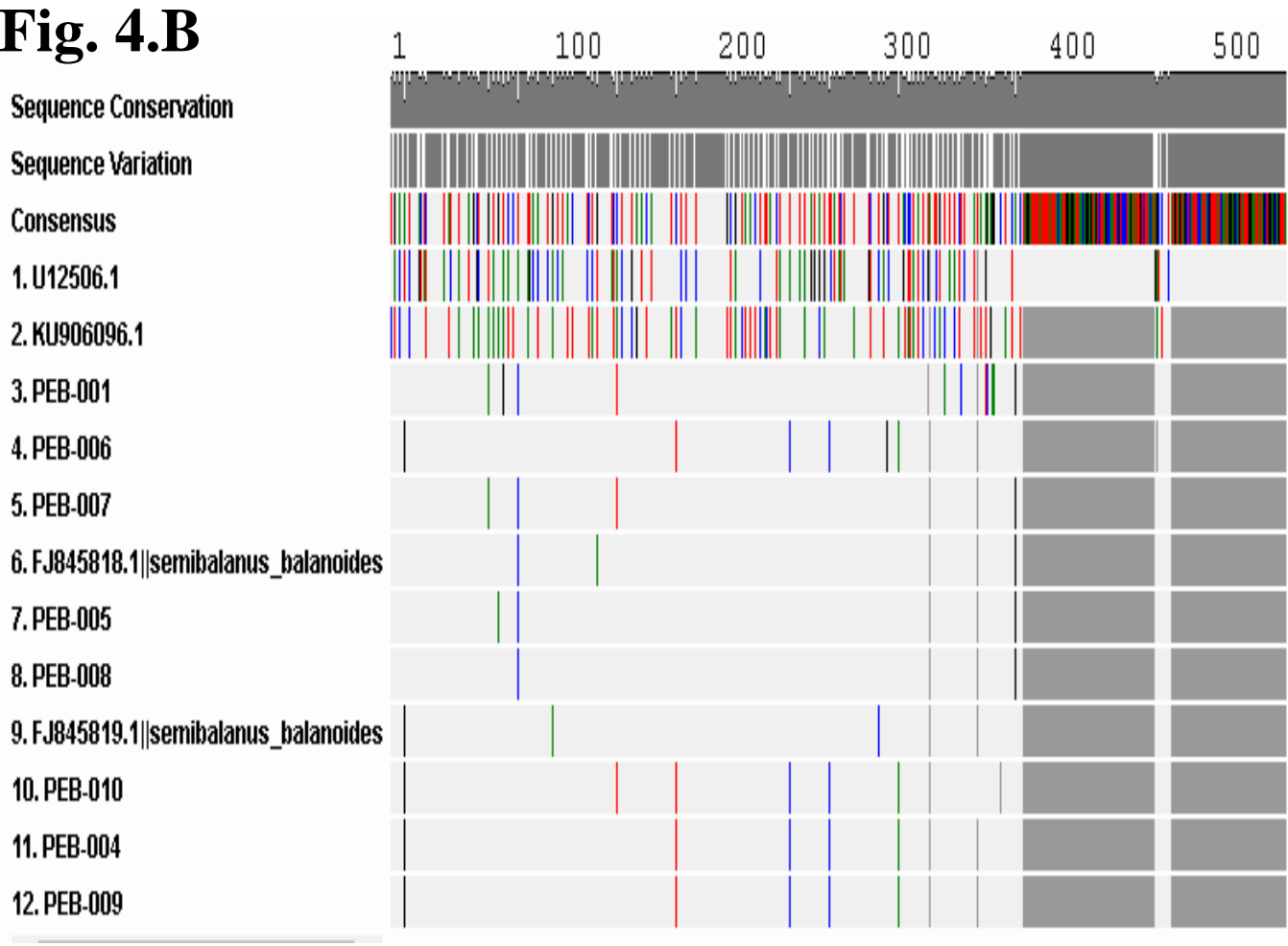
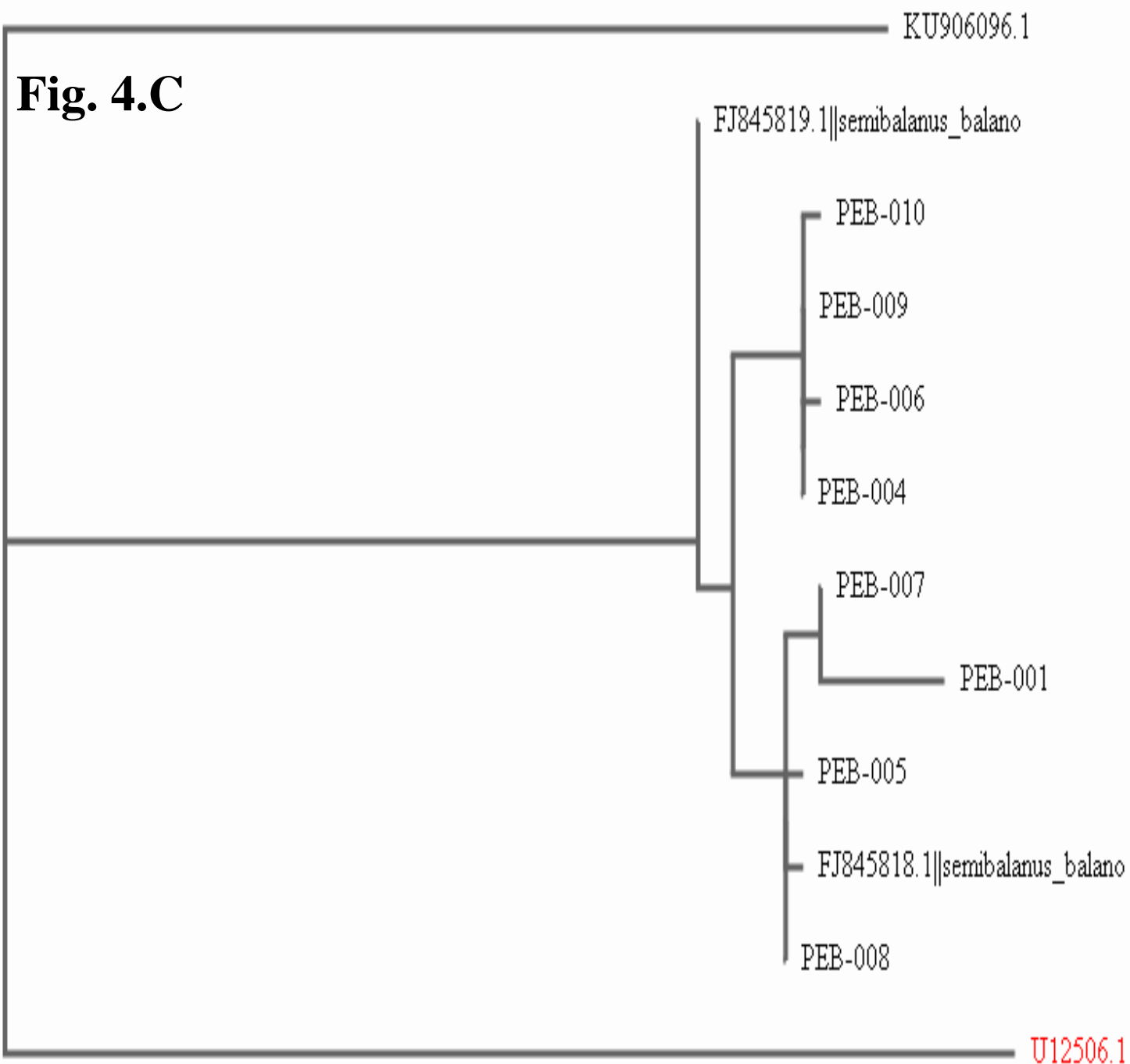


Fig. 4

A: The gel pictures determined what collected samples were able to be sequenced. Samples 001, 004, 005, 006, 007, 008, 009, and 010 were all able to be sequenced.

B: This shows the trimmed nucleotide comparison of the samples were sequenced, and the alignment indicates similarities between both samples and species.

C: The phylogenetic tree constructed on DNA Subway demonstrates the close relation of all of the samples. U12506.1 represents the barnacle, *Amphibalanus improvisus*, located on the Pacific coast. KU906096.1 represents the bay barnacle, *Pollicipes polymerus*.

Methods

The collection of barnacles occurred in various places on the North and South shores of Long Island from public areas such as docks, bulkheads, and man made jetties using a clam knife. Five barnacles were collected from each collection site. The barnacle DNA was processed by using standard DNA extraction techniques and equipment given to use by the Cold Spring Harbor Laboratory. DNA subway was used to trim the DNA sequences, and it was compared to genbank to identify sequences and known species. Phylogenetic trees were created using DNA subway to compare the barnacle samples that were collected.

Results

The results from sequencing the DNA of the barnacles from the North and South shores showed that the species, *Semibalanus balanoides*, is the same on both shores. All of the sequenced samples, 001, 004, 005, 006, 007, 008, 009, 010, are *Semibalanus balanoides* barnacles. When compared to two different species of barnacles, *Amphibalanus improvisus*, from the Pacific shore and, *Pollicipes polymerus*, a bay barnacle, it was found that the species living on the shores of Long Island are different than species of barnacles found in other locations. However, all three of the species share a common lineage.

Discussion

The results show that North and South shores both had the same species of barnacles. This conclusion contradicted our original hypothesis that was created due to barnacles being collected from man made jetties and shorelines, while other species may live on the side of docks, boats, etc.. Two outgroups of barnacles were selected, *Amphibalanus improvisus* from the Pacific, and *Pollicipes polymerus* which is a bay barnacle. The phylogenetic tree shows that even though these outgroups were different species, they have a common lineage with the samples that were collected.

References:

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