



- Methodology -

The location that we will travel to is the Cold Spring Harbor spit (40.862962 N, -73.465568 W) at around 9:30 am. We will split up into different groups to cover different areas in order to collect water samples. We will use test tubes and buckets for our water samples. When collecting species, we will make sure to use gloves while collecting species using tweezers and collection tubes. For example, if we happen to come across an isopod or a water scorpion, we will carefully pick them up with sanitized tweezers and put them in test tubes to eventually store in ethanol alcohol (which will be used in order to preserve smaller species). For larger species, we will handle them with gloves on and put them in a bucket to later be frozen at the DNALC (DNA Learning Center). Our collection method for the grass shrimp was to get a net and filter through the bay water to catch them. Once they were caught, they were put in a test tube to be stored in ethanol to preserve the species for later DNA barcoding to determine the species found. All samples collected are labeled with our group name and latitude and longitude coordinates.

- Hypothesis/Purpose -

Materials used in this experiment are:

Buckets, Pail, Tweezers, Gloves, Test Tubes, Ethanol alcohol, Collection Tubes

In order to start this experiment, we first had to develop a question and a hypothesis. Our question was "What is the effect of grass shrimp on the biodiversity of Cold Spring Harbor?". This question requests both the species of grass shrimp that was found and how this species affects the biodiversity of Cold Spring Harbor.

The goal of our project is to determine the species of grass shrimp and investigate how this species affects the biodiversity of Cold Spring Harbor. We had assumed that the grass shrimp we collected was the species *Palaemonetes* sp., but we were still uncertain of the species and/or if it is a different type of grass shrimp. From this, we could infer that the grass shrimp could possibly be a new invasive species brought here from recreational vehicles in the water. DNA barcoding can help answer these questions. As we plan to collect multiple marine invertebrates, we can identify some of these invertebrates in order to see the population of the grass shrimp. We will use DNA barcoding to identify the grass shrimp we have found if the grass shrimp is a different species than assumed and to determine how these grass shrimp affect the biodiversity of Cold Spring Harbor. As we investigated more, this led us to a better understanding of biodiversity and how it changed over time in Cold Spring Harbor. Investigating this species of grass shrimp can help lead to an understanding of how biodiversity has changed over time in Cold Spring Harbor. Our hypothesis is that these grass shrimp are the species *Palaemonetes* sp., otherwise known as ghost shrimp, based on a taxonomic key given to us and the fact that grass shrimp are abundant in the area. The grass shrimp are abundant in Cold Spring Harbor because of the pH of the water, as well as the abundance of food. It is proposed that the ideal conditions of the water and the land both give the grass shrimp resources needed to survive and thrive in the area.

The Effect of Grass Shrimp on the Biodiversity of Cold Spring Harbor

Team: The Troupe / Cold Spring Harbor High School / Sheila Mauriello
Team Members: Jonathan Browne, Nicholas LaCapra, Stephen Kania

- Limitations -

- schools resources
- labs resources
- freedom of choice
- the internet
- education

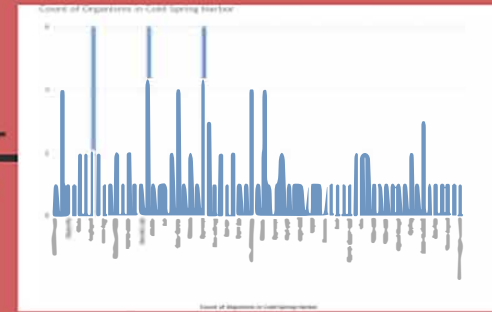
- Delimitations -

- limited amount of time
- limited resources
- limited samples
- limited time frame
- set location

-Future-

Grass shrimps can be studied further in their aquatic habitats. Few studies have evaluated the feeding strategy of grass shrimp. The feeding preferences of the freshwater grass shrimp may vary depending on the habitat. We can study feeding them plants and animals for food. We can also study the availability of food in their habitat and the impact on the body size of the shrimp. Food availability will influence the shrimp such as whether they can find and capture the food to eat and influence their growth. Another study to explore is whether a grass shrimp's biodiversity changes depending on what time of the year it is. For example, in the fall vs the spring and the winter vs the summer, the shrimp may be influenced by their habitat. The water may be more or less dense, the water temperature may be higher or lower, or food may be more prevalent or scarce during certain times of the year. These factors will change the biodiversity of the grass shrimp.

Data Analysis



- Review of Literature -

Grass shrimp are known to be abundant in Cold Spring Harbor (Welsh, 2019). Grass shrimp are a type of crustacean and are very small, with the adults being less than 2 inches, while the juveniles are usually bigger than the male (Massie, 1998). They have a transparent carapace and their head is very long compared to the rest of their physique (Aunkst, 2019). The diet of the grass shrimp consists of other zooplankton, algae, and decaying plant material. The adults, however, eat algae, small crustaceans, and other crustaceans. As grass shrimp grow, they molt. A softer skeleton takes its place, which becomes hard over time. Female grass shrimp carry their eggs in a special pouch. When these eggs hatch, they go through a stage and are called zoea. Grass shrimp advance through more stages of development as they mature. They are generally found in salt marshes, seaweed, and eelgrass beds (Unger, 2005).

-Abstract-

The objective of this research was to ascertain the effect of the species of grass shrimp we collected (assumed to be *Palaemonetes pugio*) on its environment. As we determined the species of grass shrimp, we were able to identify its effect and cause of its migration towards Cold Spring Harbor. Initially, we gathered organisms, and DNA barcoded them to gain information about their species and determine what species of grass shrimp we gathered. DNA barcoding is a method of species identification using a short section of DNA from a specific gene. Once their species was identified, we were able to acquire data on it using outside resources, specifically how it affects humans and their environment. We believed that the identified species of grass shrimp were abundant in the Cold Spring Harbor area due to the PH of the water as well as the availability of food sources. We collected water samples from two different areas. Our method of collection involved the use of nets and filters to catch them. All samples were labeled with our group name and specific longitude and latitude coordinates. Depending on the type of grass shrimp, there was a possibility for the grass shrimp to be included in the diet of humans, or interfere with the food chain. The species' data aided us in our research of whether the grass shrimp interfered with biodiversity. The results gave us more information on the species.

-Conclusion-

Our organism, the grass shrimp, was found to be abundant during the Davenport study. The grass shrimp was found multiple times by different groups, showing that it is now abundant in the area. Previously, the grass shrimp weren't found to be present in Cold Spring Harbor. Compared to the organisms that were collected, the grass shrimp we collected that were abundant were greater than the others. Organisms that weren't found to be abundant, such as the grass shrimp, are now found to be abundant now. With the help of an entomologist, we were able to use taxonomy to identify the organism that we found as a grass shrimp, comparing them to pictures we were given by the ab. In comparison to what Davenport used for the study on the biodiversity of Cold Spring Harbor, we had better tools to help us identify the organism and determine the biodiversity of Cold Spring Harbor.