Identification of Algae in Glen Cove

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Abstract

We are looking to describe the biodiversity of the algae within the waters of Glen Cove, specifically at Garvies Point Beach,and Garvies Point Pond. We will be going to these sites and collecting a total of 11 different samples between the locations. To determine the different species of seaweed and algae within Glen Cove, we will be using a technique called DNA barcoding. We predict that we will find more diversity of brown algae at Garvies beach and more diversity of green algae at Garvies point pond.

Introduction

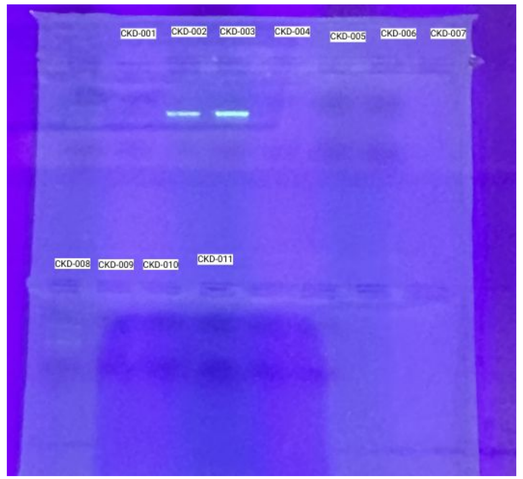
Seaweed, also known as macroalgae, is a large and diverse group of photosynthetic eukaryotic organisms. Algae is often used as a bioindicator, defined as a species that indicates the condition or health of the environment. The three most common kinds of seaweed are red algae (*Rhodophyta*), green algae (*Chlorophyta*), and brown algae (*Phaeophyta*). Most algae, specifically green and red, are indicators of good environmental health. Some benefits of these algae present are that it serves as a basis for many food webs and it generates oxygen, of which this is good for species like fish. However, not all algae is beneficial. For example, brown algae is an effective bioindicator for metals present in water. As of 2017, Garvies Point underwent a cleanup to remove excess heavy metal waste in the water sources around the area. (Olson, 2017) Due to the fact that brown algae indicates heavy metal presence we do not expect to find brown algae in Garvies Point since it has been five years since the cleanup. If brown algae was found, it could suggest that the cleanup was not as successful as it was expected to be. If we find brown algae we will know that there are still possible traces of heavy metals in the area/water environment at Garvies Point. We are looking to identify the variations of seaweed found in the waters of Glen Cove, in freshwater and saltwater.

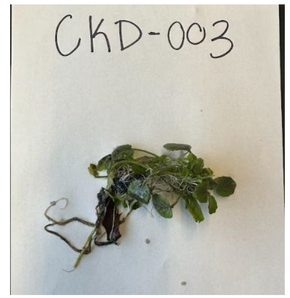
We predict there will be more diversity of brown algae within the saltwater environments (Garvies beach), and more diversity of green algae within the freshwater environment (Garvies Point Pond). Seaweed such as *Sargassum*, also known as gulfweed, and l*aminaria* (kelp) are most common on Long Island; we hypothesize that these species will be present within the saltwater environments.

Materials & Methods

In order to identify the seaweed and algae of Glen Cove, we will be going to a variety of water sources and collecting approximately 11 samples. We plan to go to both freshwater and saltwater environments. The saltwater environment being Garvies beach, and the freshwater environment being Garvies pond. To collect these samples, we will be using tongs to remove the seaweed and algae from the environment and place it carefully into a plastic bag. To gain more information on the environment we will collect metadata involving the testing of the water's pH level and its salinity.

Following the collection of seaweed and algae, we will use a handheld microscope to photograph our samples. In order to further identify the species of both seaweed and algae we will be using DNA barcoding, by amplifying a section of the RbcL gene. The amplification of the RbcL gene located in the chloroplasts genome will be used to determine the species. After the collection, we will start the extraction of DNA, using silica isolation. We will use pestles to grind the samples in a lysis solution and take a small piece from each sample and place them each into test tubes. After the DNA extraction, we will add the RbcL primer to a PCR tube with 2 microliters of DNA from each sample. We will then put the samples into the PCR machine to amplify the RbcL gene. After PCR we will run gel electrophoresis to visualize the DNA and see if it was amplified. If our gel electrophoresis is successful and we see bands representing the RbcL gene, the samples will be sent out for sequencing and then we can analyze the DNA barcodes.





Discussion

In our study on Algae and Seaweed identification at Garvies Point, we collected a total of 11 samples however when it came to our genetic sequencing, we encountered an unexpected outcome where only sample CKD-003 produced usable results. However, to our surprise, the analysis revealed that CKD-003 was actually duckweed rather than the intended focus of our project, algae and seaweed. This unexpected result has significant implications for our study.

The outcome suggests that there might have been errors or contamination during the sampling or analysis process, leading to the misidentification of the sample. This deviation from our original hypothesis points to the difficulties and hurdles encountered during the study. It is crucial to acknowledge that such unexpected results can occur in scientific research and serve as valuable learning opportunities. A future study could be retesting our extracted DNA using the TUFA primer rather than rBCl to see if that primer could yield more conclusive results.

Although our study did not yield the intended results, it highlights the importance of thorough experimental design and quality control measures in future investigations. To build upon our findings, it is recommended to revisit the sampling and analysis protocols, ensuring accurate identification of the desired algae and seaweed species. Additionally, collaborating with experts in the field and incorporating more comprehensive analytical techniques may enhance the reliability of future studies in this area.

As we did not obtain any definitive information from samples of algae or seaweed, we can conclude that there is no indication of past or present pollution at Garvies as seaweed/ algae would have been detected.

References

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Acknowledgements

Thank you to Cold Spring Harbor DNA learning center for providing us with the materials to complete our projects.