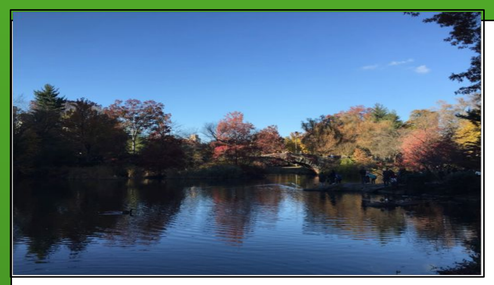

Turtle Pond, Central Park

Row Row Row Your Boat Gently, As There Is a Chance You Might Find Algae: Investigating The Presence of Algae In Turtle Pond, Central Park

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NYC URBAN BARCODE PROJECT
History of DNA barcoding

Abstract

Algae are ubiquitous organisms found in a variety of aquatic environments around the world. Many species perform important functions necessary for ecosystems to remain in balance, but some species, such as blue-green algae, can cause serious damage to the human body and marine life. We investigated the question of what types of algae are present in Central Park Turtle Pond. We collected water samples from Turtle Pond and performed a DNA extraction and amplification with plant and algae primers. Gel electrophoresis was used to separate the bands of DNA. Two distinct bands were observed,. These results seemed to indicate that as many as two distinct species were present in the Central Park Turtle Pond. Sequencing, however revealed that both bands belong to Hedera Helix, commonly known as ivy, and no algae was present.

Introduction

Turtle Pond is a small, freshwater body of water found in New York's Central Park. It is a popular walking destination for humans and their pets, as well as the natural habitat for a variety of birds and aquatic species. Identifying algae species in Turtle Pond would be important to ensure that harmful algae species do not cause undue harm to the organisms that live in or come into contact with Turtle Pond. Therefore, we set out to determine what species of algae, if any, are present in Turtle Pond. Our objective was to sequence DNA samples extracted from water samples taken from Turtle Pond to identify any species of algae present. We hypothesized that there were multiple species of algae present in Central Park Pond in light of the algal bloom warning signs posted around Turtle Pond at the time the samples were collected.

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Materials & Methods

- We obtained a permit to collect water samples from the Central Park Turtle Pond .
- We used a plastic tube to collect approximately 100 mL of water while wearing sterile gloves.
- The water was aliquoted in 25 mL centrifuge tubes and put through a centrifuge at maximum speed for one minute to form a pellet of sediment, which was then separated from the supernatant.
- The pellet was discarded. We repeated the centrifuge process one additional time, and then mixed silica resin with the supernatant. For our control, we purchased dry, edible seaweed from a local market.
- Following the guideline of the Urban Barcode Project, DNA extraction, PCR amplification and electrophoresis were carried out at the Biology lab in Friends Seminary.
- For amplification, we used a combination of targeting rbcL (plant primer) and algae primer genes (tufA).
- Amplified sequences were electrophoresed. Two Amplified DNA samples were sent out for sequencing. Sequence data was analyzed using DNAsubway.org.

Results

- The DNA extraction, amplification, and gel electrophoresis resulted in two distinct bands, in the size range of 580 bp.
- The control band appeared in the size range of 383 bp.
- The sequencing revealed that both bands contained slightly over 600 base pairs and were identical to each other within 99.6% agreement. In addition, these sequences were matched to the *Hedera helix*, a species of common ivy, in the DNA barcode database with an accuracy of 99.5%.. See Figures 1 and 2.
- The only instances of disagreement were from undetermined or missing nucleotides in the samples we isolated.

Images/Figures

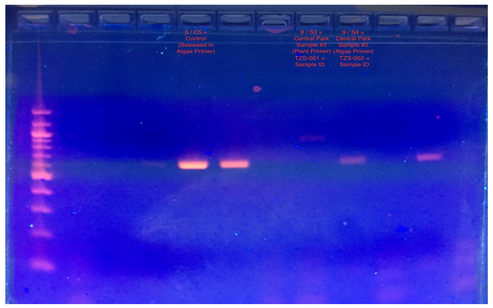

Image 1:This image above shows our initial DNA gel test that revealed two distinct bands relating to our samples.

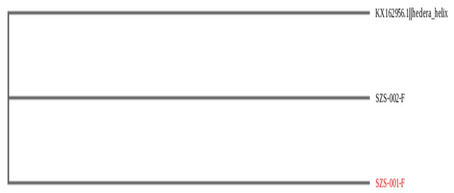

Figure 1: Phylogenetic tree for the two samples from Turtle Pond and Hedera helix.

Figure 2: For comparison, we generated a second phylogenetic tree in Figure 2 that also includes Schefflera heptaphylla, another species that was found from BLAST, albeit with a lower bit score, indicating a weaker match than Hedera helix.

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Discussion

- In contrast to our initial hypothesis that we would identify multiple species of algae in the water samples from Turtle Pond, the only DNA we were able to obtain corresponded to *Hedera helix*, with no indication of any algae present in the samples.
- It is not surprising that ivy would be found, since this is a common species in Central Park and the flowering season is late summer to late fall. However, we do find the lack of algae species somewhat surprising, since there were warning signs posted indicating that blue-green algae was present in the water.
- A number of extensions of this work would be highly valuable. First, collecting additional samples from other locations in Turtle Pond and at other times of the year would be very informative about the seasonal cycles of algae populations.
- Testing the effect of salinity and pH on algae biodiversity would also be valuable, since previous studies have suggested a strong link between pH and various algae species.

Acknowledgements

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