Little Miss Lichen Follows in Mr.Lichen's Footsteps to the Water

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Abstract

The purpose of this research is to examine the biodiversity of lichens at The Stony Brook School and the Avalon Nature Preserve in Long Island, NY, to examine whether the environment where the lichen grows has an impact on the biodiversity of the lichens. The hypothesis was made depending on whether the lichens thrive in the wet or dry environment; we predict that the lichens grown in the wet conditions would have more biodiversity due to the process of poikilohydry. By collecting the samples, sequencing DNA and identifying the different species, it was found that we are not able to conclude whether the lichens growing either in the wet environment or the dry environment affects the lichen growth, diversity, and species due to the low quality of the samples.

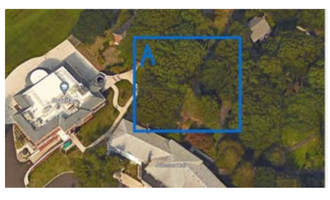
Introduction

Do lichens thrive more on a wet or dry surface? Is water a major factor for the growth of lichens?
Based on last year's approach, our We Sea Lichen group discovered various traits of lichens depending on the substrate they were grown on. This year, we decided to direct our interest to whether they thrive more on a wet or dry surface. The sea surrounds Long Island and undergoes various types of weather. While we can observe many lichens that grow on a damp area, we can hypothesize the difference between those that grow on a wet surface and those on a dry surface. Lichens absorb nutrients through their cortex. When wet, they "turn on" and start photosynthesizing and growing. When lichens are dry, they "turn off," and become brittle and go dormant. From this information, we predict that Lichens growing in a damp area(exposed to wet areas) may flourish on biodiversity, gaining access to sufficient nutrients compared to those growing on a dry surface. Based on the lichens that grow in different environments may contain different genes and even develop into different species. Through our experiment, we want to know if the other kind of environment affects the biodiversity of lichens. We will use DNA barcoding technology, including DNA extraction, PCR amplification, and gel electrophoresis.

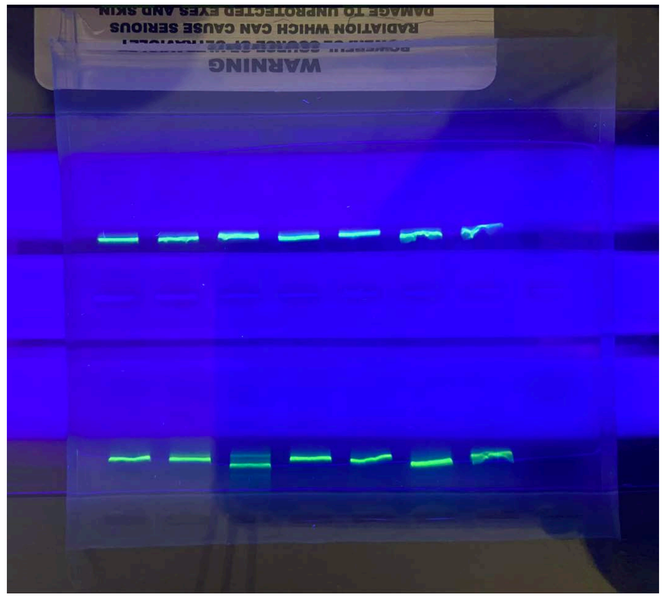
Materials & Methods

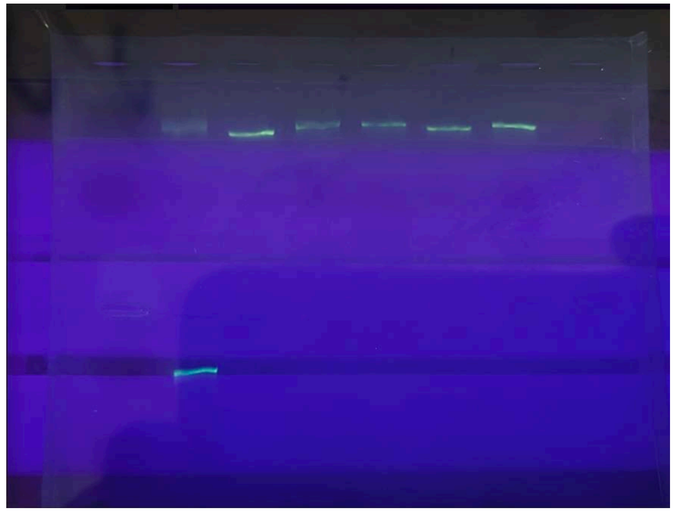
- To collect the lichens from the trees we first put on surgical gloves in order to prevent it from being contaminated further by bacteria.
- We then poured water over the lichen on the tree and gently scrubbed the bark with the spatula and used the X-acto knife to collect about 15mgs of lichen.
- Finally we put the collected 15mg of lichens into the labeled container with the habitat and exact location (longitude and latitude). To store the lichen we filled it with isopropanol alcohol and stored it into a freezer. This process was performed and repeated on trees by the track and the lichens near the water in Avalon Park.
- To identify the lichens we used a light microscope which helped us identify the different species of lichen
- Lichen DNA was then extracted from each sample and isolated to perform PCR testing for ITS and RBCL which were found through gel electrophoresis
- Sequences were analyzed through DNA Subway in both ITS and RBCL sequences

Results



Images





Discussion

This answers our question of whether the different environments where the lichens grow affect species of lichens and if the lichens growing on wet surfaces have a higher probability of flourishing when compared to the lichens grown in a dry environment. By analyzing our findings, we can conclude whether the environment where the lichen grows is wet or dry does not affect the biodiversity of the lichen. Due to the low quality of the lichen samples after the PCR test, we could not conclude whether the wet or dry environments where the lichen grows affect the biodiversity of the lichen. Though we can provide the gel photos of the DNA, we cannot compare the lichen samples' similarities nor provide the phylogenetic trees. Since our sample results were low-quality, we assumed that the lichen preservation and collection methods had included some errors. Though we used the ethanol to wash other contaminants and preserve the lichen samples better, we should have stored them in an airtight container and at room temperature instead of the freezer. We assume that keeping some of the samples in the freezer has made the lichen samples too dry, which made us unable to extract the DNA from them.

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