### Introduction

- Although there are a variety of birds that all differentiate from each other, all birds have one aspect in common; they all need a safe home for their eggs.
- Birds-create nests out of the resources they have available. Some create a simple scrape in the ground to place their eggs, while the majority of birds build nests out of twigs, grass, leaves, and other materials.
- Birds create these nests in places they believe are the most suitable for their offspring. So, they will be inclined to build these homes near organism habitats, where they can benefit from other species symbiotically, including organisms such as moss or lichen. These nests are all useful for the growth of their eggs, which provides a good foundation for their homes such as a structural outer part to keep the nest sturdy, and a soft interior so the eggs. don't crack.
- The soft material can be made of many items, such as dandelion seeds, or even other organisms like the lichen. In our biodiversity project, our team studied the diversity of lichen that inhabit bird nests, such as those of cardinals or sparrows.

The purpose is to identify the biodiversity of species of organisms of plants and to study them. to identify their differences and similarities in both taxunomic and structural beings.

## Specific Aims

We have several goals regarding the experiment.

- In nature, the types of plants surrounding nests can vary based on environmental factors such as location, climate, and the specific bird species building the nest. While some plants exhibit similarities due to adaptation to particular environments, the diversity of plant species is extensive. The adaptation into distinct environments plays a crucial role in determining the types of plants that inhabit nests.
- Our goal is to figure out what types of plants prefer to thrive near nests, and how similar or different the plants are to one another.
- We will also determine if there is a correlation between the type of plant and the nest that they surround. When considering the similarity among plants, it's important to recognize all factors. Some plants may grow near deserted nests due to the availability of nutrients in those surrounding
- . The presence of plants near nests can be influenced by various factors that include soil composition, sunlight exposure, and regional climate. When it comes to plants inhabiting old bird nests, we need to figure out how stable that home is for plants even if it may be a temporary home or possibly not even a home at all. Bird nests are often constructed with materials that break down relatively quickly which may make them less suitable for long-term plant habitation.



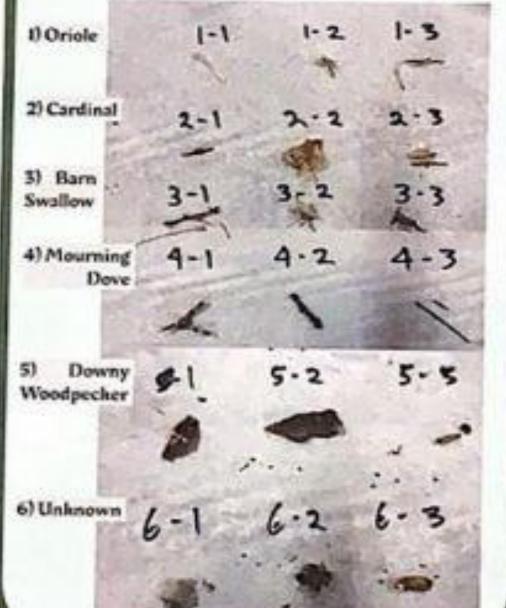
Investigating and Discovering a Correlation Between the Lichen Surrounding Bird Nests in the Garden City Bird Sanctuary

> Sara Shamail and Amishi Sharma Garden City High School





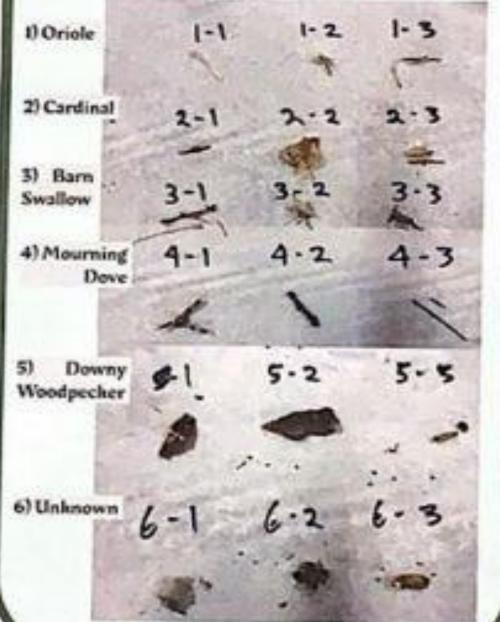
## Sample Collection & DNA Isolation



# Data Interpretation Plan

- Out of the samples we collect, the ones that will be successfully barcoded under Gel Electrophoresis will be analyzed to see how closely related the plant specimens are. We will observe the characteristics of the electrophoresis bands and notice their distance from each other, their similarity in frequencies, their intensity, and more. We will also observe the photos of the plants, and make a table of the similarities, differences, and characteristics of the organisms, so we will have a variety of information about the plants to compare and contrast with one another.
- We will also use DNA Subway to analyze the DNA. predicting and annotating the genes while also searching the genetic material for similarity with other sequences. DNA subway has 5 lines. 1) Annotate a genomic sequence, 2) Prospect Genomes using TARGet, 3) Determine Sequence Relationships, 4) Next Generation Sequencing, and 5) Metabarcoding Analysis. We will be using the Determine Sequencing Relationships line and using a fungal specific PCR primer to analyze the Internal Transcribed Spacer region of DNA. The ITS region is a highly variable sequence that is very important in distinguishing fungal species from one another. By putting the DNA into DNA Subway, we will make a model of our sequence and compare it to base pairs that scientists have provided in a database, Phytozome, to see the genetic diversities between the lichens.





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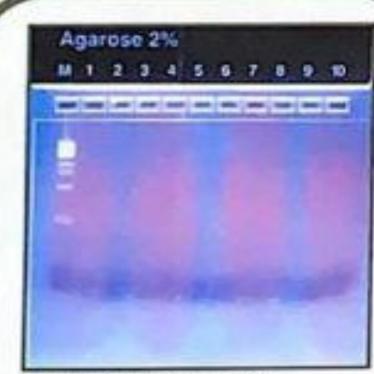
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Lane M-CSL DNALC 100 bp primer Lanes 1-3 Sample 1 triplicate Lanes 4-6 Sample 2 triplicate Lanes 7-9 Sample 3 triplicate Lane 10-BstN1-EcoR1

Lane M-BstN1-EcoR1 Lanes 1-3 Sample 4 triplicate Lanes 4-6 Sample 5 triplicate Lanes 7-9 Sample 6 triplicate Lane 10-DNALC 100 bp primer

# Carolina Biological rBCL Primers (PCR)

CSL DNALC rBCL Primers (PCR)



Lane M-BstN1-EcoR1 Lanes 1-3 Sample 4 triplicate Lanes 4-6 Sample 5 triplicate Lanes 7-9 Sample 6 triplicate Lane 10-DNALC 100 bp primer



Lanes 1-3 Carolina Fungal (ITS-1) primer Lanes 4-6 CSHL Lichen Primer Lanes 7-9 CSHL-ITS-1 Primer Lane 10-BstN1-EcoR1

# Photo of bird nests in display case at GCBS



1) Baltimore Oriole



2) Barn Swallow



3) Mourning Dove



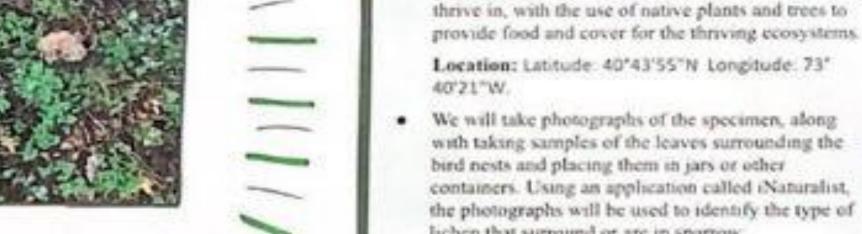
4) Cardinal



5) Downy Woodpecker



Unknown



with taking samples of the leaves surrounding the bird nests and placing them in jars or other containers. Using an application called (Naturalist, the photographs will be used to identify the type of lichen that surround or are in sparrow, hummingbird, and cardinal bird nests, without harming the actual habitat or ecosystem by taking a thin section of the lichen.

Methods

Our samples of lichen such as Parmelia sulcata will

be collected from the Garden City Bird Sanctuary

Originally a neglected and trash filled storm water

now a flourishing community nature preserve. The

local green space has many habitats for organisms to

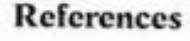
basin (sump), the Garden City Bird Sanctuary as

We will be using nests that have been collected and put into display cases along with nesting boxes that are no longer in use, and also will be collecting samples outside of the breeding season to ensure that no harm will be inflicted upon the organisms

Using the samples, we will use the Silica DNA method to isolate the DNA, and also enhance the DNA using PCR so it can be read. We will then use Gel Electrophoresis to compare and analyze the amplified DNA, where the procedure can be found at https://dnabarcoding101.org/lab/

## Conclusions + Discussions

- The DNA of archival nests is probably too degraded to obtain DNA from in traditional methods, so we do not know for sure if there is a correlation between the lichen and bird nests, or if they choose to locate in the same area.
- · Based on the usual locations of cardinal, woodpecker, and other bird nests in trees along with the location of lichen on trees, it can be presumed that they may reside in similar
- However due to the lack of clear evidence of if they do depend on each other, it can be presumed that they live independently of one another.
- The nest boxes actually have mice nests in them. so fresh nest samples cannot be obtained.
- With better DNA samples and more evidence, we could then make a more confident conclusion.



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