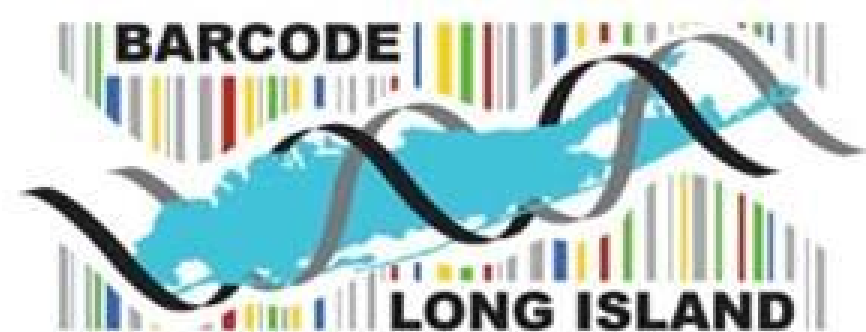


# Biodiversity and toxicity of leeches within the Argyle Lake ecosystem



Authors: Shaun Gentilin, Reese Logan  
Teacher: Claire Birone  
Babylon Junior Senior High School



## Abstract:

Argyle Lake is a very viable place for a large biodiversity of leeches to emerge due to the fact that leeches have the ability to tolerate pollution, while other organisms cannot. The hypothesis suggested that there would be a large biodiversity of leeches within the Argyle Lake area. Our aims in this project were to determine the biodiversity of leech species found within the Argyle Lake ecosystem, to determine genetic similarities within the genomes of the different leech species, and to find a possible common ancestor based on the similarities and differences and create a phylogenetic tree to show the evolutionary relationship. Meat, leaf litter bags, and string were used to collect the leeches that were later tested for genetic diversities from each other. The two leeches that were collected from Argyle Lake were determined to be genetically different than each other, therefore beginning to determine the biodiversity in Argyle Lake.

## Introduction:

The variety of life on Earth, or biodiversity, is extremely important to all world ecosystems, including the Argyle Lake ecosystem (2). In this experiment, biodiversity will be a major factor in the process of determining whether there are various species of leeches within the Argyle Lake ecosystem. This variety in leech species would be important for the ecosystem because it would allow for different traits within the organisms that could provide beneficial effects for the Argyle Lake ecosystem.

One of these benefits could include the breakdown and absorption of pollution (2). This specific effect on the ecosystem directly relates to leeches due to the fact that, as leeches, they have an ability to tolerate pollution, and are good indicators of whether pollution is present within a specific body of water (1). This is because of the fact that most freshwater organisms would be driven away from polluted areas and, therefore, there would be less competition for the leeches that are able to handle the pollution. Furthermore, if the leech species have any effect on the pollution within the Argyle Lake ecosystem, that would prove to be extremely beneficial. However, leeches can also be found in habitats that are not overly polluted or low in oxygen as well.

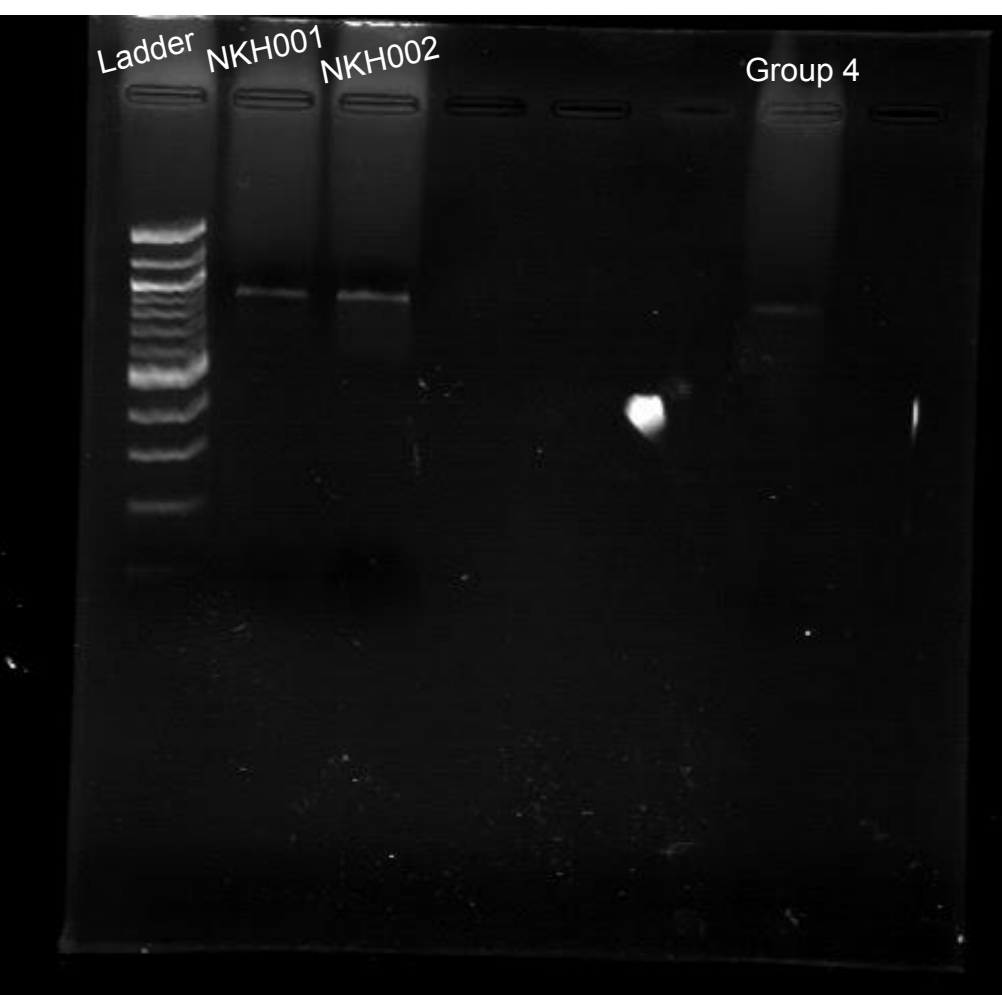
Argyle Lake is a manmade lake located in the town of Babylon New York. The lake is surrounded by houses on one side, a school on another, and two roads on the remaining two sides. Argyle Lake is of interest to this study because of the visible changes in the water of the lake that have occurred. The most likely reason for this change would be human pollution, however, there have not been any studies to prove this as of this time.



**Figure 1:** Image of NKH001 under 40x magnification.

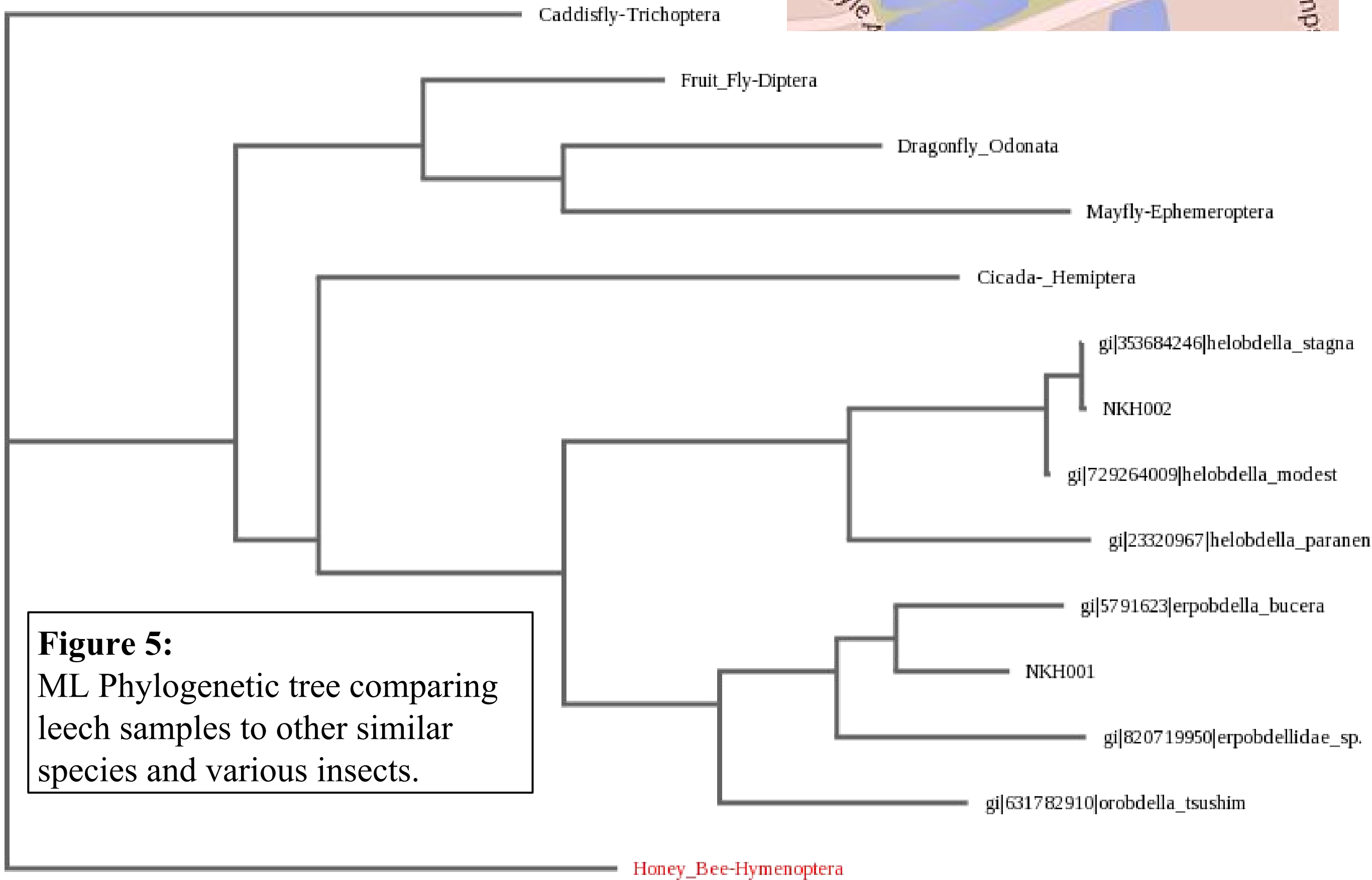
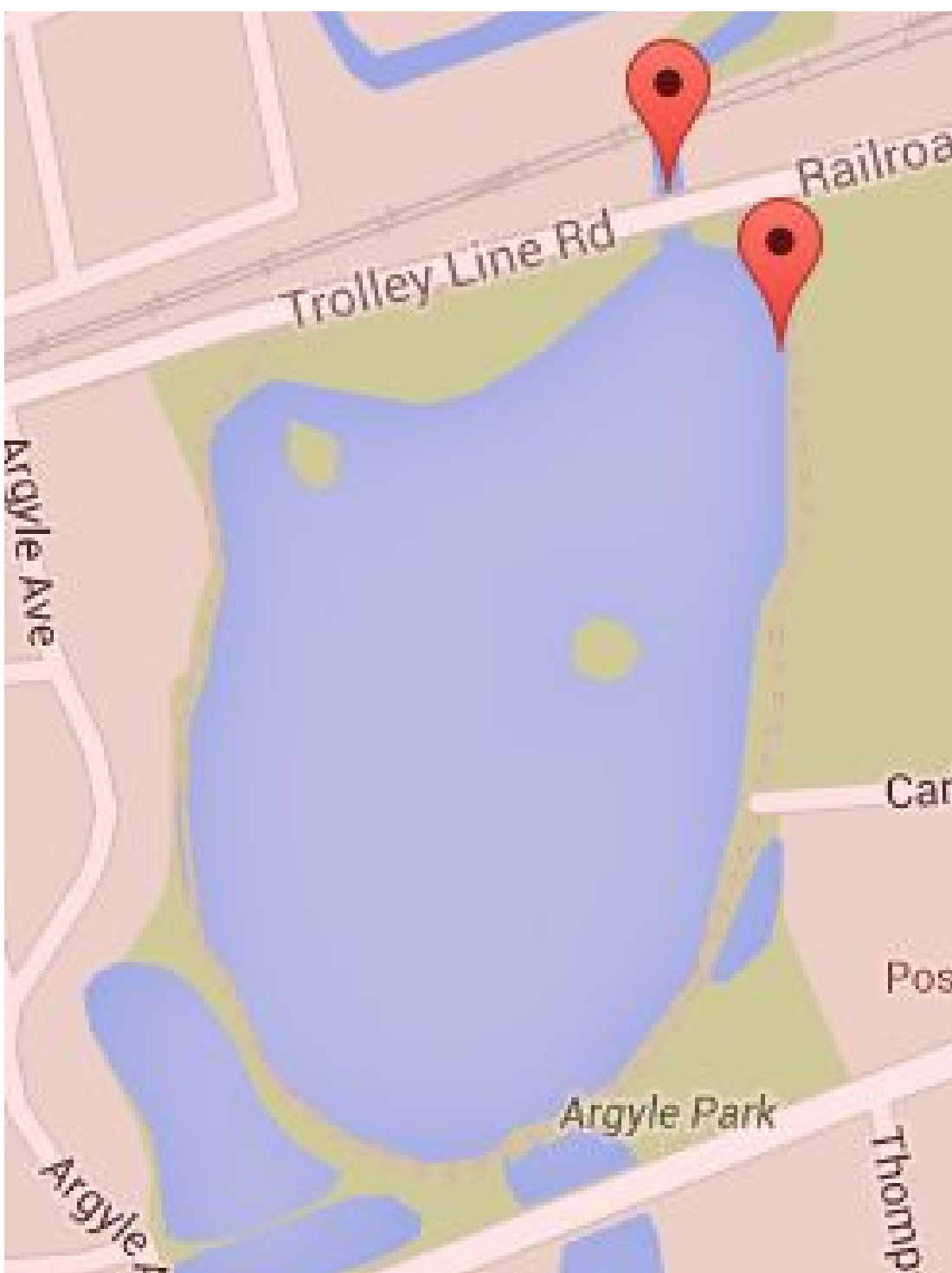


**Figure 2:** Image of NKH002 under 40x magnification.



**Figure 3 (R):** Map view of the locations where leech samples were collected.

**Figure 4 (L):** Image of gel used to sequence the DNA of leech samples. Both samples of leeches were able to be sequenced.



**Figure 5:** ML Phylogenetic tree comparing leech samples to other similar species and various insects.

## Method:

Samples of various leech species will be collected from Argyle Lake. They will be observed based on their specific life stages, physical appearances, masses, locations, latitude/longitude, and our field identification.

In order to obtain the DNA of the leech samples, we will use standard techniques, from the BLI protocols, in order to extract the DNA. Once the DNA of the COI region has been obtained, we will use DNA barcoding in order to find the specific DNA sequence of the leech samples.

After being sequenced the samples will be separated by species. Then the samples will be compared to each species in order to find the variation of all species found. This will help to find the amount of species of leeches found in the Argyle Lake ecosystem, and how different or similar the samples of leeches are. This would also help to find a possible common ancestor between the different organisms. As well as indicate the biodiversity of the leech population within Argyle Lake.

## Discussion:

Based on the data one can conclude that Argyle lake does have a biodiversity of leeches. This is known because the two leeches that were found were determined to be two different species. Sample NKH001 was determined to be genetically closest to *Erpobdella buccera*, and NKH002 was determined to be genetically closest to *Helobdella modesta*. However in order to get a better idea of how much diversity exists within the leech population of the lake, more would more samples would need to be found over a longer time period. This would help in getting a better idea of how many species exist in the lake.

## References:

1. Leeches (Hirudinea) (2015) Retrieved from <http://www.dec.ny.gov/animals/87943.html>
2. Why Is Biodiversity Important? Who Cares? (2014) Retrieved from <http://www.globalissues.org/article/170/why-is-biodiversity-important-who-cares#WhatisBiodiversity>
3. How do we measure the quality of our waters? (2012) Retrieved from <http://water.epa.gov/learn/resources/measure.cfm>