



Dragonflies in Van Cortlandt Park

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Abstract

In this lab the presence of dragonflies is being measured. The importance of dragonflies in our ecosystems are very important because they feed on smaller insects, keeping the ecosystems in balance. There are different types of dragonflies that are endangered, such as the Hine's Emerald Dragonfly. Making sure there are dragonflies in Van Cortlandt is helping make sure that there is a balance in the food chain and therefore in the ecosystem.

Introduction

A dragonfly is an insect belonging to the order 'Odonata'. Dragonflies are not actually a fly even though they both have six legs and three body parts, head, thorax and abdomen. The main difference between them is that flies only have two wings whereas dragonflies have four wings. All dragonflies are carnivorous in both the larval and adult stages of their lives. Dragonflies typically eat mosquitoes, midges and other small insects like flies, bees and butterflies, catching its prey while it is flying. A dragonfly's ability to manoeuvre in many directions makes them able to out-fly their prey. Because of this we wanted to see what kinds of dragonflies are in Van Cortlandt Park and how that is affecting what other organisms are living in the park. This will be done by DNA barcoding different dragonfly larva. A dragonfly undergoes incomplete metamorphosis. Female dragonflies lay eggs in or near water, often on floating or emergent plants. When laying eggs, some species will submerge themselves completely in order to lay their eggs on a suitable surface. After about two weeks, the eggs hatch and an immature dragonfly, or nymph, emerges. These are what we will take samples from. Also, the draining of agricultural land, filling in and pollution have all contributed to the disappearance of most countryside ponds. Canals have also suffered from pollution, especially by chemicals used on farmland draining into water. The loss of suitable freshwater habitats has affected dragonflies enormously and they are becoming increasingly rare. So by our experiment we can also see how well the dragonfly is thriving in Van Cortlandt Park.

Materials & Methods

To conduct this experiment, there are certain steps we have to take. First, we have to collect samples. This started by getting permission from Van Cortlandt Park to obtain samples which they agreed to. We are going to go to Van Cortlandt Park, more specifically the lake there, to collect our samples. We are going to collect visible invertebrate species. The goal of our project is to find out if water fleas are in the Van Cortlandt Lake. Since they are not always visible, we will also have to take some water samples that we will later observe under a microscope to see if there are other invertebrates or water fleas that were not visible to the naked eye.

After collecting the samples, and photographing the environment in which we found them, we have to prepare them to be barcoded. We will extract a tissue sample from the different invertebrates that we collect. After obtaining the sample, we would need to break the membrane of the tissue sample down. We would do this by changing the temperature of the tissue and also physically breaking it down. Then after adding the lysis solution, the tissue would be put into a centrifuge. The centrifuge would spin and collect debris then went to the bottom of the test tube. After the centrifuge, supernatant and silica would be added to a new tube and mixed, incubated (so the DNA of the invertebrates would bind to the silica resin) and then put in a centrifuge.

After this, the supernatant would be removed. A water buffer would be added and the test tube would be spun to remove any impurities. This would happen two times. Then the DNA would be removed from the silica pellet and spun to collect silica resin. The final DNA would be removed and stored in ice. Then gel electrophoresis would be conducted. It would be conducted by pouring setting and loading gel, and electrophoresing it. After all of this the samples would be sent away for sequencing and we would be able to analyse the results by using bioinformatics. We then inputted our data into the DNA Subway website and compared our DNA sequencing to the sequencing of other dragonflies until we made a conclusion of which dragonfly it was.

Tables and Charts



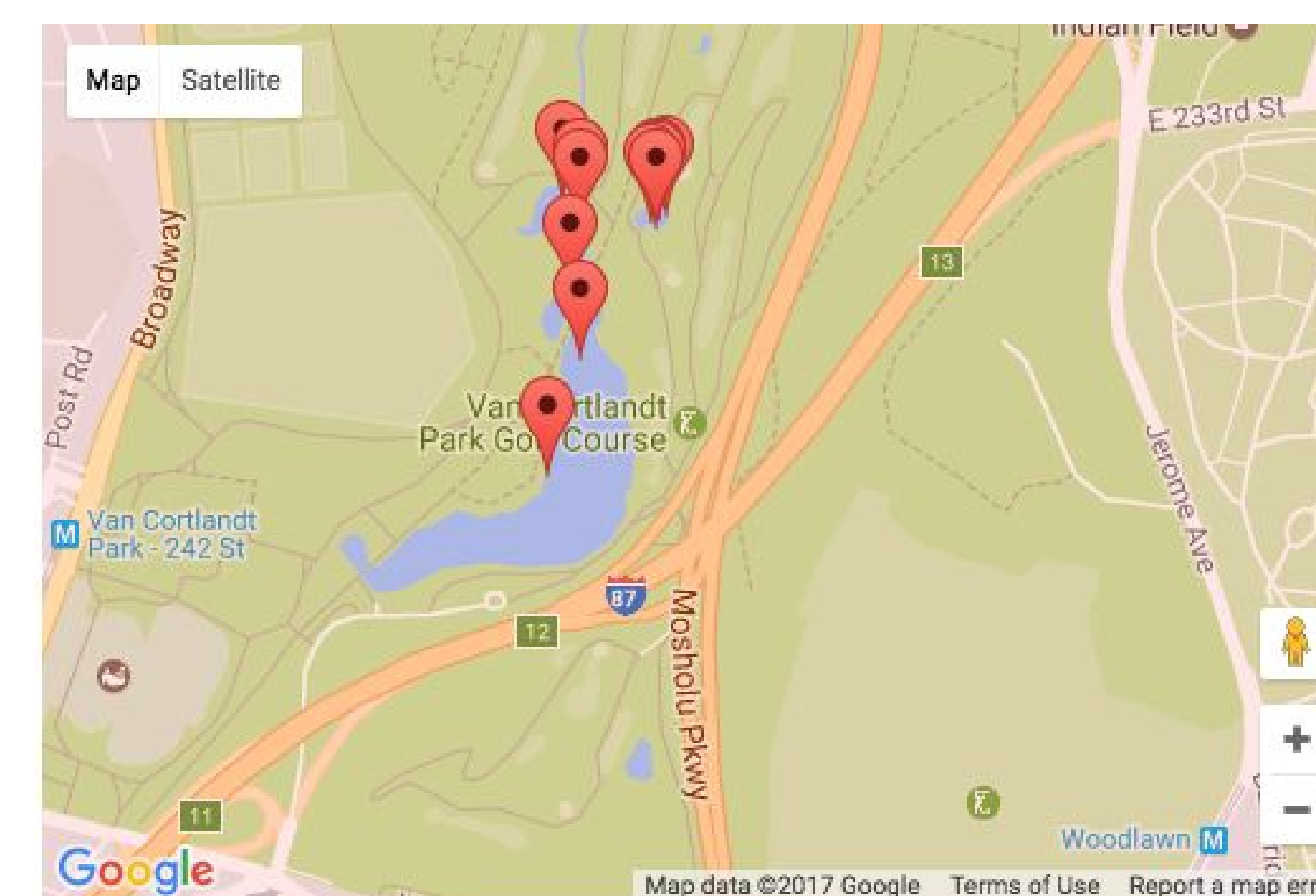
The dragonfly we found- *Erythemis simplicicollis*

	1	100	200	300	400	
						C 1 2
						C - 99.28 99.31
						1 99.28 - 98.46
						2 99.31 98.46 -

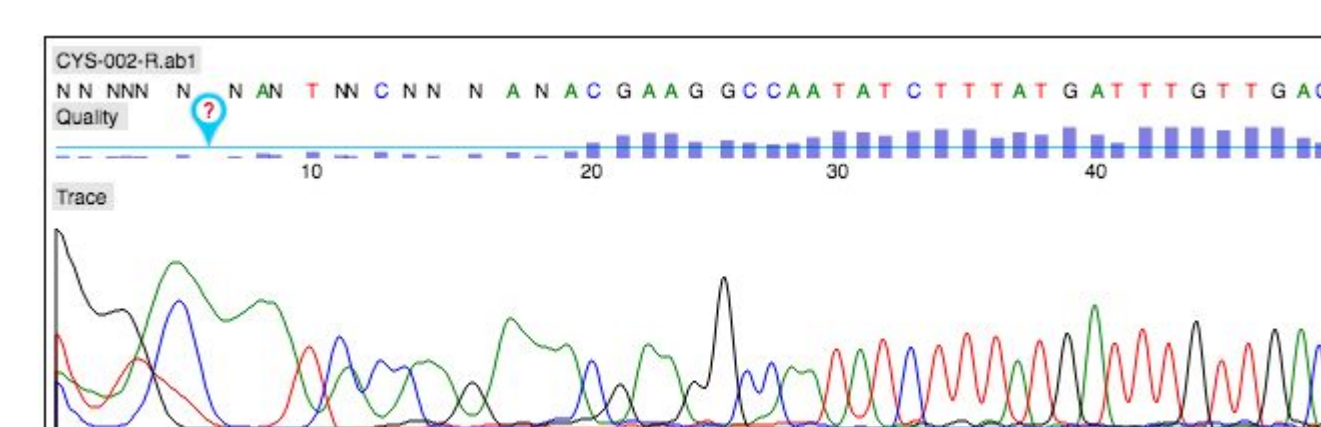
The percent similarities between our dragonfly and *Erythemis simplicicollis*

Results

By the end, we discovered the type of dragonfly was a *Erythemis simplicicollis*. Before the experiment even started, we looked closely at our insect to see if it had any distinctive features that would lead us to believe it was a particular type of dragonfly. After we extracted the DNA, we used the DNA Subway website to see the amount of matches we had with the different insects until we found the one with the least amount of errors. We made our conclusion from this.



Map of places we found invertebrates



DNA sequencing results

Discussion

The purpose of the lab was to determine whether there were dragonflies in Van Cortlandt park. Based off of the data that was collected it is shown that there is a 99.28 percent match to the *Erythemis simplicicollis*, which is a dragonfly that is commonly known as the Eastern Pondhawk. This is significant because of the dragonflies impact on the ecosystem. The Eastern Pondhawk is carnivorous, keeping the smaller insects in a balance that allows the ecosystem to thrive. It is important to make sure that there are dragonflies in our local parks and that they are not becoming endangered, like the Hine's Emerald Dragonfly in order to preserve a healthy balance. In order to find that the larva sample that was taken was a dragonfly and more specifically a *Erythemis simplicicollis*, we had to DNA barcode using COI primer. The error in this experiment is not significant, but there could be error from contamination or having putting not enough DNA when mixed with the primer. The fact that *Erythemis simplicicollis* was found in Van Cortlandt shows that there is an important species that is helping contribute to a healthy ecosystem

References

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