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Myriapoda Biodiversity in Central Park

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Abstract

Centipedes and millipedes were collected from Central Park near the Bridle Path on two different days. After collecting approximately 30 centipedes and millipedes samples, we extracted DNA from the samples and used PCR to amplify the DNA. After DNA amplification was confirmed through gel electrophoresis, the PCR products were sent for sequencing. We hypothesized that the biodiversity of myriapods would be higher on a warmer day than on a colder day because the environment would be more suitable for their survival in warmer weather and the evidence collected supported our hypothesis.

Introduction

- Centipedes and millipedes are in the subphylum Myriapoda (Library of Congress, 2019).
 - Almost 13,000 species in Myriapoda
 - Myriapods typically live in humid environments
 - Can be found in soil, collections of leaves, or under stones and wood
- Centipedes have one pair of legs on each body segment and have 16 to 78 legs, while millipedes have between 40 and 400 legs (Library of Congress, 2019).
- Central Park is an 843 acre-park in Manhattan, New York (Encyclopaedia Britannica, 2022).
- Originally the land of Central Park was cared for by the Lenape people as part of “Manahatta” (Washington Square Park Conservancy, 2019).
- In the early 19th century, a community called Seneca Village was on part of the site that became Central Park. Seneca Village provided relief from racial discrimination for African-Americans and was destroyed to create Central Park (The Central Park Conservancy, 2018).
- Central Park has many different habitats, including meadows, ponds and lakes, and forest-like places.
 - Central Park is home to at least 223 invertebrates (Central Park Tours, 2021).
- We hypothesized that there would be more myriapod diversity when the weather is warmer because the warmer environment is more suitable for myriapod survival and we found that our results supported our hypothesis.

Results

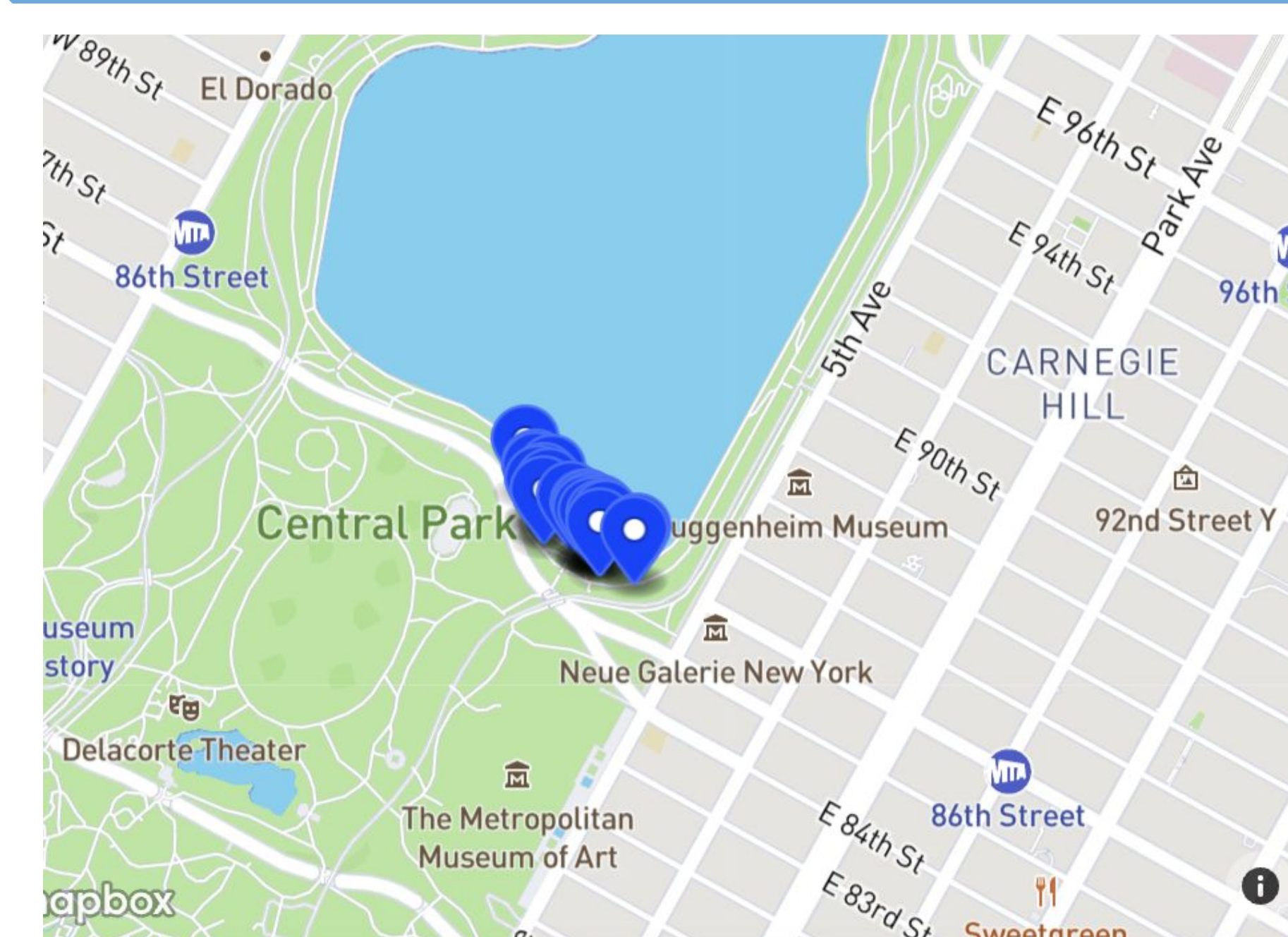


Figure 1. Sample Locations in Central Park. Shown is a map of Central Park with pins that indicate where each of the individual samples were collected on the Bridle path. We collected samples in dry leaves and dirt on the Northwest and Northeast sides of Bridge 24.

Latin Name	Common Name	Number Found
<i>Cylindroiulus caeruleocinctus</i>	Julid millipede	4
<i>Cryptops hortensis</i>	Cryptopidae centipede	3
<i>Brachyiulus</i>	Brachyiulus pusillus	1
<i>Ophiulus pilosus</i>	<i>Ophiulus pilosus</i>	1
<i>Proteroiulus fuscus</i>	Snake Millipede	1
<i>Oxidus gracilis</i>	Greenhouse millipede	1
<i>Nannarrup innuptus</i>	<i>Nannarrup innuptus</i>	1
<i>Stenotaenia linearis</i>	Streckformad Jordkrypare	1

Table 1. Species Collected by Sample. Myriapods were collected in areas on the Bridle Path in Central Park. The table shows the collected 13 samples and which species they are, identified using DNA sequencing and BLAST. We found that the Julid millipede was the most common sample found.

Materials and Methods

- 24 centipedes and millipedes were collected on the Bridle path near bridge 24
- DNA of the collected samples was isolated and amplified, through PCR
- We analyzed the PCR products, through gel electrophoresis
 - 13 samples were successfully sequenced and identified by BLAST

Centipede and Millipede Samples Collected in Different Temperatures

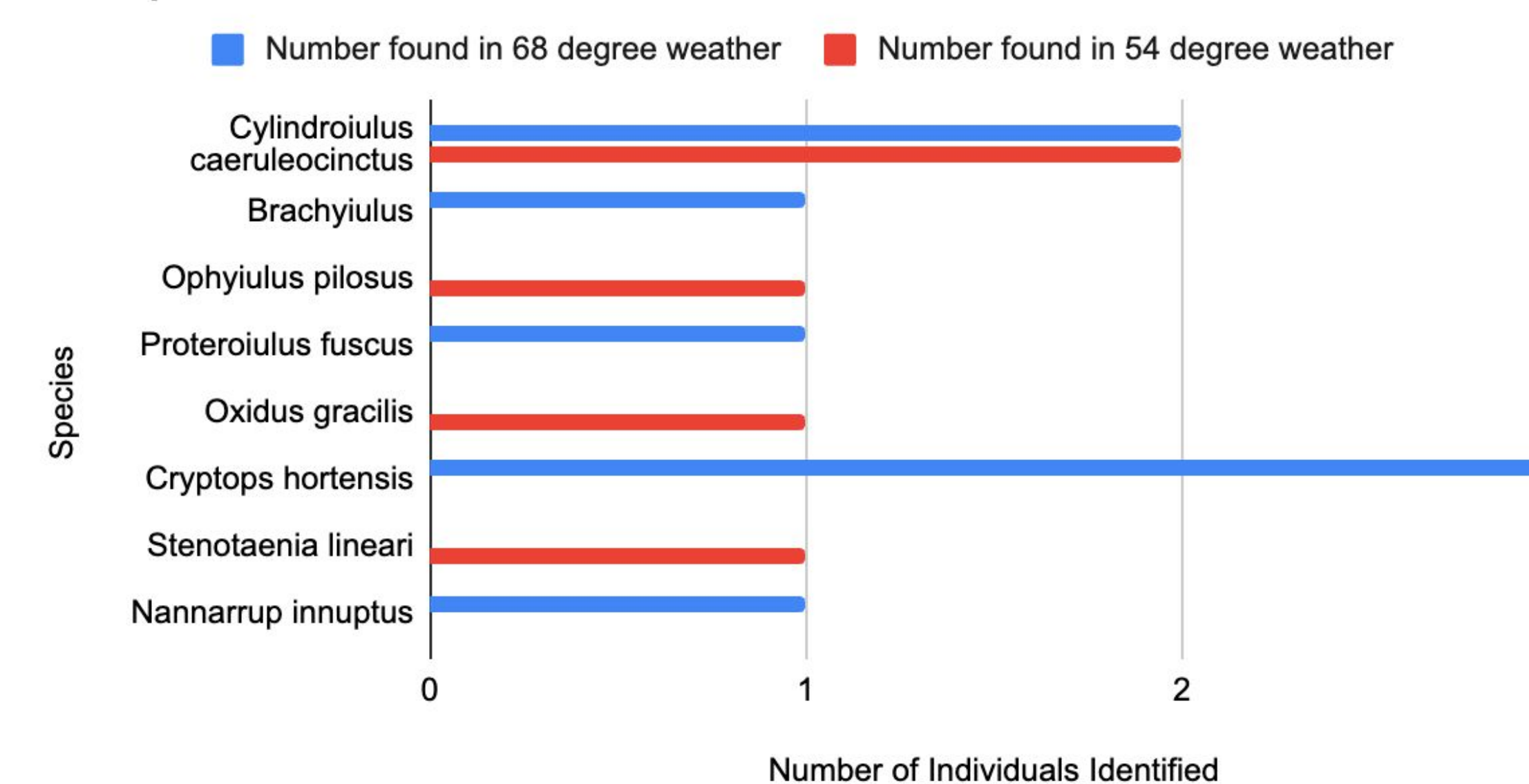


Figure 3. Centipede and Millipede Samples Collected in Different Temperatures. The samples show more myriapods were found in 68°F weather, with 8 samples found, than in 54°F weather, where only 5 samples were found.

	54°F Weather	68°F Weather
Total Number of Species	5	8
Simpson's Biodiversity, 1/D	3.6	4

Table 2. Simpson's Biodiversity in 54°F Weather versus 68°F Weather. The myriapods were collected during two different days on the Bridle Path. On one of these days it was 54°F and on the other it was 68°F. There was a greater biodiversity on the day with 68°F weather, through using Simpson's Biodiversity (1/D).

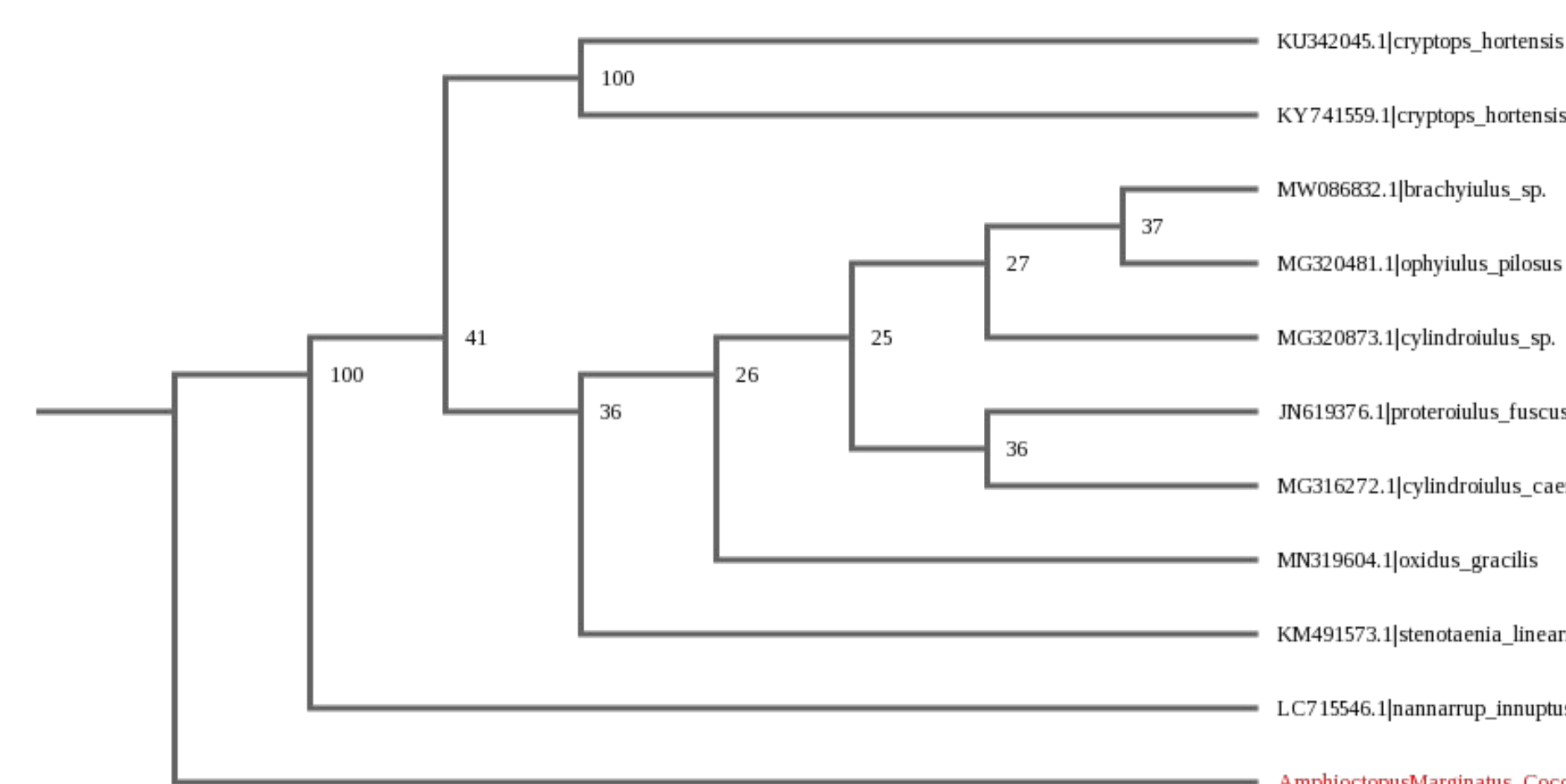


Figure 2. Neighborhood Joining Phylogenetic Tree of Sequencing Results. This phylogenetic tree demonstrates the connection between different species, in the similarity of sequence in their DNA. This reveals the evolutionary connections between the species of myriapods we identified. The outgroup is the *amphiocetus marginatus* coconut octopus.

Discussion

- We hypothesized that there would be more myriapod diversity on the warmer day than the colder day because the warmer environment is more suitable for myriapod survival.
- Our results supported this hypothesis, as 8 of the 13 successful samples were found in warmer weather.
- 24 samples of centipedes and millipedes were originally collected but only 13 were successfully amplified
- In the 13 samples that were successfully amplified, we found 7 different species
- As shown in Table 2, we saw a higher amount of biodiversity with a Simpson's Biodiversity (1/D) score of 4 on the warmer day, compared to 3.6 on the cooler day.
- In the future, increasing the number of samples would improve the accuracy of the experiment.
- In the future we could collect samples in a larger range of temperatures, in order to see if temperature really does affect biodiversity.
- Since the Bridle Path is heavily visited, there may be less biodiversity there than other parts of Central Park. In the future, we could collect samples from other areas in Central Park in order to account for the vast variety of environments offered in the park.

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