

# Invasive Earthworms in Van Cortlandt Park

Emma Medvedsek and Julia Nadeau

Ethical Culture Fieldston School

## Introduction

- ❑ Van Cortlandt Park in New York City is home to many species of earthworms, including common earthworms, *Lumbricus terrestris*, which are indigenous to Europe
  - ❑ Decomposers and herbivores that get their nutrients from bacteria in the organic matter they decompose and recycle
- ❑ Earthworms produce castings which act as a looser, top soil
  - ❑ Causes erosion and ruins trails, trail maintenance becomes expensive
- ❑ Earthworms consume leaf litter which affects the structure of soil and the nutrients available for plants and wildlife
- ❑ An invasive species refers to an organism that overpopulates and harms its environment.
  - ❑ An example including jumping worms, Asian Worms and Alabama Jumpers; areas with high jumping worm densities are predicted to see a decline in native species
- ❑ We aim to investigate the presence of invasive worms in Van Cortlandt Park

## Materials and Methods

- ❑ The earthworms were collected at different sites in Van Cortlandt Park and placed into test tubes filled with alcohol to be transported to Fieldston
- ❑ The DNA in the samples was then separated from the cells.
  - ❑ To separate the DNA, the samples were combined with lysis solution before being incubated. They were then ran through a centrifuge, before going through a process of being combined with wash buffer and being ran through a centrifuge.
- ❑ Next, all of the samples were run through a thermal cycler to amplify the DNA
- ❑ After the DNA was amplified, gel electrophoresis was used to determine if there was DNA present.

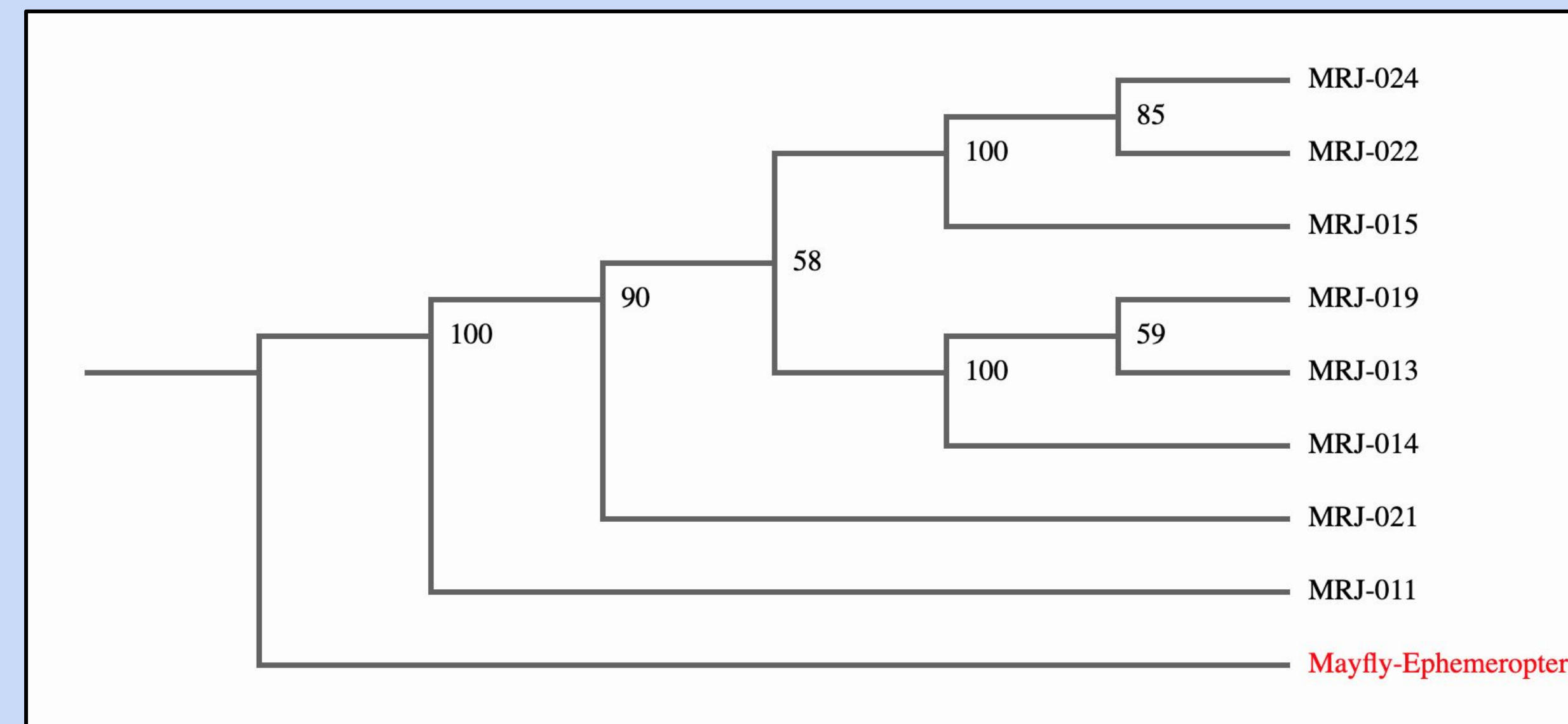
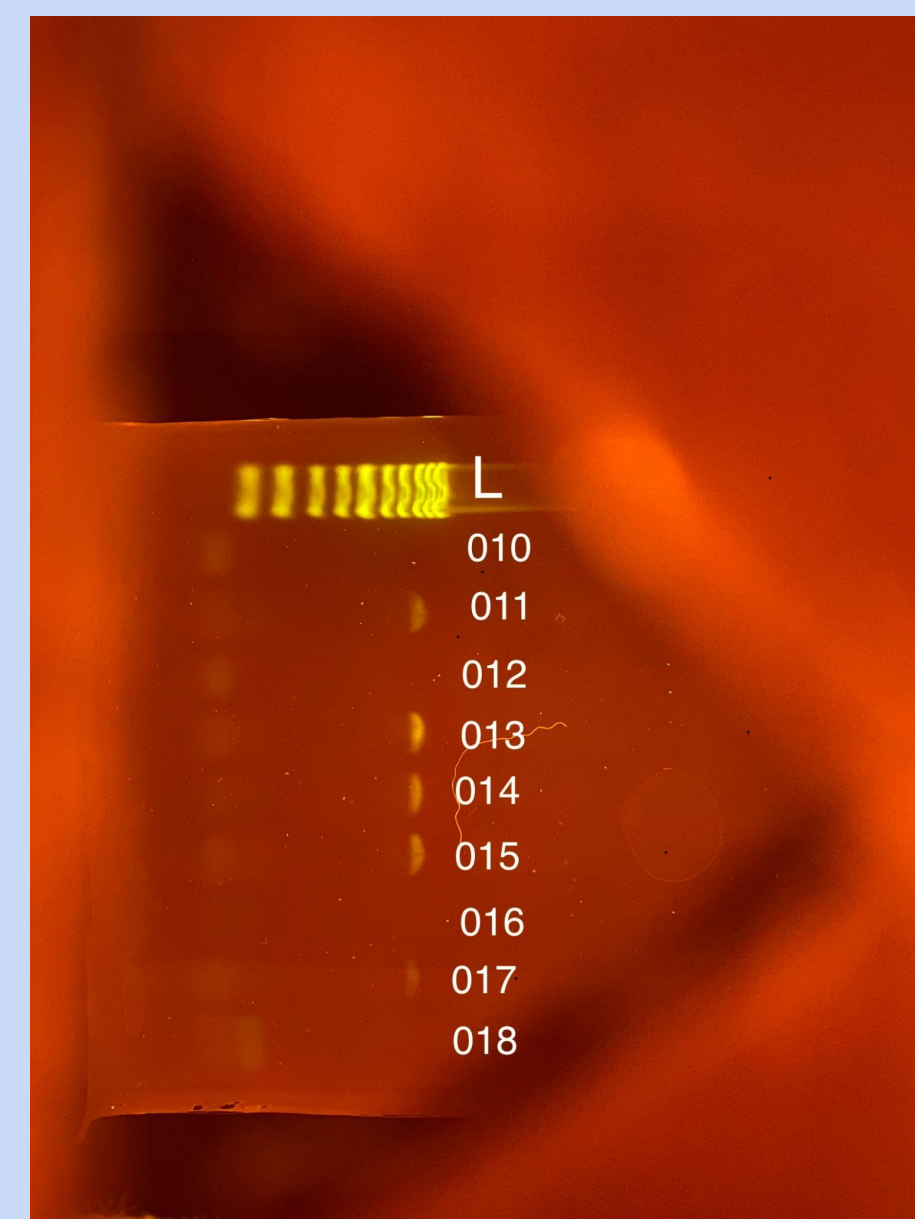
## Results

### Our Sequenced Samples

Sample ID	Species	Sample ID	Species
MRJ-011	<i>Octolasion cyaneum</i>	MRJ-019	<i>Metaphire agrestis</i>
MRJ-013	<i>Metaphire agrestis</i>	MRJ-021	<i>Metaphire hilgendorfi</i>
MRJ-014	<i>Metaphire agrestis</i>	MRJ-022	<i>Metaphire hilgendorfi</i>
MRJ-015	<i>Metaphire agrestis</i>	MRJ-024	<i>Metaphire hilgendorfi</i>
MRJ-017	unsuccessful		

Table of results for when the samples were sequenced.

The results of the gel electrophoresis. Samples 011, 013, 014, 015, 017, 019, 021, 022, and 024 displayed DNA.



**Phylogenetic Tree of Sequencing Results.** Phylogenetic Tree illustrating the genetic similarities and evolutionary links between the collected earthworm samples. The final species in red, Mayfly-Ephemeroptera, was used as the outgroup.

## Discussion

- ❑ Of the three species we found, two were species of invasive Asian Jumping Worm
- ❑ We found a majority of recently introduced species, which have the potential to take over the habitat and disrupt the biodiversity of the park
- ❑ However, these data may not represent the actual makeup of the worms in Van Cortlandt Park, due to our small sample size of 8 worms
- ❑ The Jumping Worms can affect the entire ecosystem
  - ❑ They eat the organic material in the topsoil and leave it dry of nutrient, and makes it harder for plants to hang on to the soil
  - ❑ The worms leave their castings on the surface of the soil which creates erosion after rain, and also washes away nutrients from the surrounding plant
- ❑ The Phylogenetic Tree shows that samples 024 and 022 are closely related, which makes sense because they are both identified as *Metaphire hilgendorfi*
- ❑ The tree shows that samples 013 and 019 are closely related which makes sense because they are both identified as *Metaphire agrestis*
- ❑ The tree shows that sample 011 has the least genetic similarity between samples, which makes sense as it was identified as *Octolasion cyaneum*, and had the most mismatches in its sequences, and smallest bit score
- ❑ To reduce the spread of invasive jumping worms in Van Cortlandt Park, it is crucial that trail maintenance remove any jumping worms from new soil before adding it to the park's environment

## References

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