



Funded by the  
Thompson Family Foundation

# Spider Diversity in Van Cortlandt Park

Mira Gorton,<sup>1</sup> Taja Grayson,<sup>1</sup> Gregory Hirsch,<sup>1</sup> and Jacob Horowitz,<sup>1</sup> Annie Kloimwieder<sup>1</sup>

<sup>1</sup>*Ethical Culture Fieldston School*

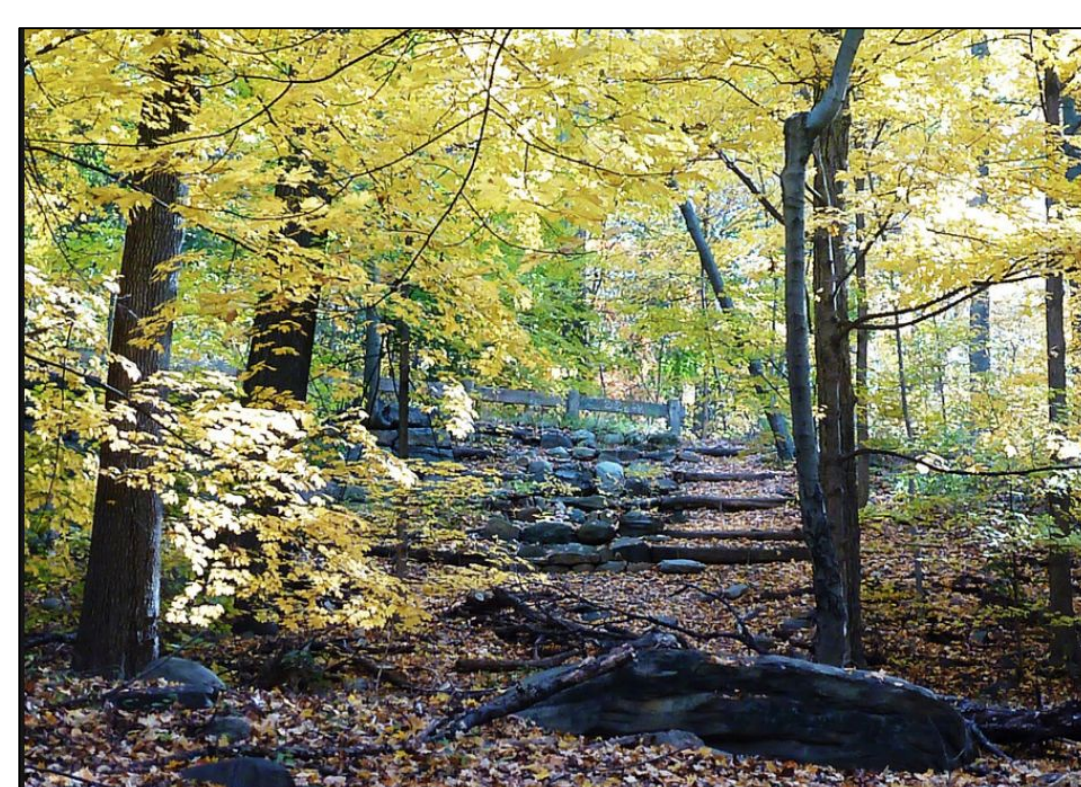


## Abstract

The purpose of this project was to determine the biodiversity of spiders in Van Cortlandt Park. This objective was completed by scanning a wide variety of areas in the park and collecting spiders with different apparent characteristics. After the spiders were collected, the DNA was extracted. Results were sequenced and then analyzed using bioinformatics to compare results to known species. After sequencing, one species, *Cicurina japonica* was identified. *Cicurina japonica* is predominantly found in Japan and Korea, and has been introduced to Europe. It has only been identified in Gloucester County, New Jersey in December of 2018 and has yet to be recorded in other regions. This is the first identification of *Cicurina japonica* in Van Cortlandt Park. *Cicurina japonica* is a non-native species, and therefore, may be invasive.

## Introduction

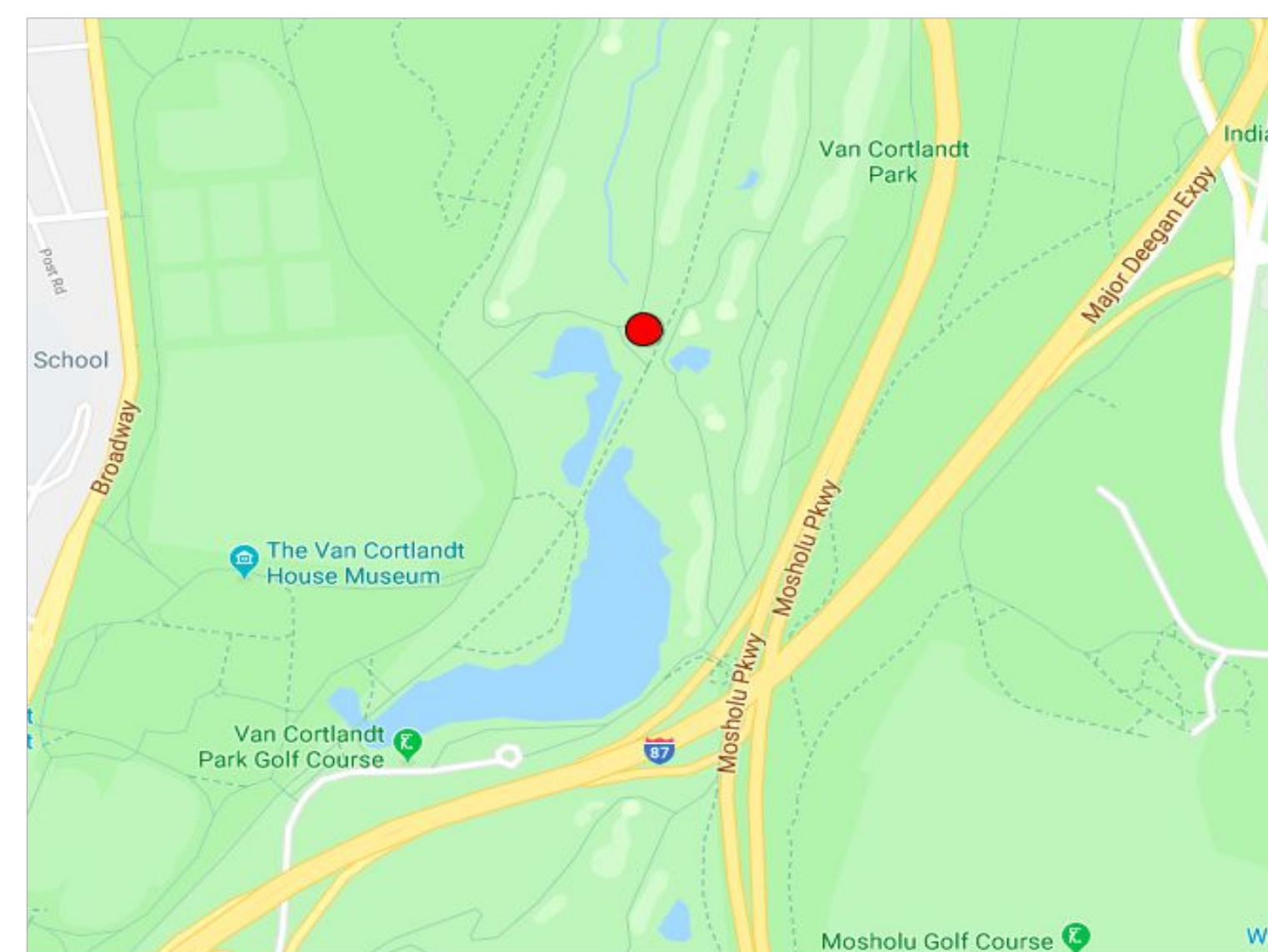
- Spiders are members of phylum Arthropoda and class Arachnida
  - They are secondary consumers that feed on other spiders or small insects
  - Most spiders are terrestrial and live on or near land
- The woods, wetlands, and meadows all provide a home to many animals, including many species of spiders
  - Some species of spiders in New York City include the nursery web spider, sac spider, black and yellow garden spider, sheet web weavers, grass spider, American house spider, nocturnal orb weaver spider, jumping spider, crab spider, wolf spider, brown recluse, black widow spider
- Van Cortlandt Park is located in the Bronx, NY, and contains over 1,146 acres of land
  - Spiders were collected from a wide variety of areas in Van Cortlandt Park such as woods, tree trunks, and grassy areas



Trees and foliage at Van Cortlandt Park

## Results

**Figure 1: Sample Locations in Van Cortlandt Park**



**Figure 1:** This map indicates the locations in which the spiders were collected in Van Cortlandt Park.

**Table 1: Spider Species Identification**

Spider ID	Species
RHJ-005	<i>Cicurina japonica</i>
RHJ-007	<i>Cicurina japonica</i>
RHJ-006-F	<i>Cicurina japonica</i>

**Table 1:** This table shows the identification number of the sequenced DNA and its corresponding species.

**Figure 3: Trimmed MUSCLE Alignment of Spider Sequences**



**Figure 3:** Trimmed sequence of spider samples produced by DNA Subway comparing known DNA sequences of the *Cicurina japonica* spider to collected samples.

## Materials and Methods

The spiders were collected in Van Cortlandt Park on October 18, 2018

- 22 samples were collected
- Spiders were submerged in ethanol
- DNA was extracted
- PCR was performed
- Gel electrophoresis was used to confirm PCR products
- PCR was sent for sequencing

**Figure 4: Spider Images**



**Figure 4.** Images of *Cicurina japonica* from the collection sites (compared to a ruler in centimeters) as well as an image of an adult *Cicurina japonica*, originating from Japan and Korea.

## Discussion

- The purpose of this experiment was to determine the biodiversity of spiders in Van Cortlandt Park through the collection and sequencing of the spiders' DNA
- Of the 22 collected samples, the DNA from three was ultimately sequenced
  - The species *Cicurina japonica* was detected in Van Cortlandt Park
- One error of the experimentation process that inhibited the production of viable results was the testing of the DNA of spider legs
  - The leg of a spider consists predominantly of chitin and therefore did not contain high amounts of DNA available for sequencing
- The results produced from the experiment expand the park's knowledge of the presence of *Cicurina japonica*, as well as providing a sighting of the *Cicurina japonica* species in New York City as a whole
  - The species is native to Korea and Japan, and has only been identified in the U.S. in Gloucester County, NJ, in December 2018.
- In the future, it is necessary that this experimentation be performed again in order to further expand the park's knowledge of the other species present
  - Next time the experiment is performed it would be beneficial to take DNA from the bodies of the spiders

## References

- Benedini, S. A. (2005). Along Came a Spider - Spinning Silk for Cross-Hairs. Retrieved from [https://www.theamericansurveyor.com/PDF/TheAmericanSurveyor\\_BediniAlongCameASpiderPart2\\_May2005.pdf](https://www.theamericansurveyor.com/PDF/TheAmericanSurveyor_BediniAlongCameASpiderPart2_May2005.pdf)
- New York State Conservationist. (2007, June). Common Spiders of New York. Retrieved from [https://www.dec.ny.gov/docs/wildlife\\_pdf/commonspiders.pdf](https://www.dec.ny.gov/docs/wildlife_pdf/commonspiders.pdf)
- Byrne, A. (2018, June 01). VCP Where NYC Discovers: Interns Dig Deep for Biodiversity. Retrieved from [https://vancortlandt.org/interns\\_dig\\_deep\\_for\\_biodiversity/](https://vancortlandt.org/interns_dig_deep_for_biodiversity/)
- Spiders. (n.d.). Retrieved from <https://www.assuredenvironments.com/pest-library/profile/spiders>
- Spiders are among most effective predators of plant pests. (n.d.). Retrieved from <https://phys.org/news/2016-06-spiders-effective-predators-pests.html>
- The Facts About What Spiders Eat | Terminix. (n.d.). Retrieved from <https://www.terminix.com/blog/education/what-do-spiders-eat/>
- Van Cortlandt Park. (n.d.). Retrieved from <http://www.vcpark.org/the-park/features/110-natural-areas.html>
- Van Cortlandt Park. (n.d.). Retrieved from <https://www.dec.ny.gov/outdoor/83581.html>
- Why Is Biodiversity Important? Who Cares? (n.d.). Retrieved from <http://www.globalissues.org/article/170/why-is-biodiversity-important-who-cares>

## Acknowledgements

We would like to acknowledge Dr. K for her help in the conducting of this experimentation, as well as John Butler and Alex Bryne for aiding in the collection of spider samples. We would also like to thank the Urban Barcoding project for allowing us the opportunity to investigate the biodiversity of Van Cortlandt Park.