



Ant Biodiversity in Westchester County

Justine Dolan¹, Grace Irving¹, Sophiana Simone¹, John Valente², Dr. Christina Andruk²,
Dr. Oxana Litvine¹, Stacy Unkenholz¹

1. The Ursuline School, 1354 North Ave, New Rochelle, NY 10804
2. Iona University, 715 North Avenue, New Rochelle, NY, 10801

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Abstract

This study investigated the biodiversity of ants in Westchester County, NY, focusing on Bronxville Park and New Rochelle. Samples were collected and identified using field guides, iNaturalist and DNA barcoding techniques. Results indicate a prevalence of the American winter ant (*Prenolepis imparis*) in Bronxville Park during December 2023, suggesting adaptations of this species to colder climates. On the other hand, New Rochelle samples, which were collected in June and July 2023, exhibited higher species diversity, highlighting the dynamic nature of ant populations in response to environmental cues. The study contributes valuable insights into ant biodiversity and underscores the interplay between environmental factors and species distribution in urban environments.

Introduction

- Ants stand to be a common terrestrial insect group, with the species inhabiting almost the entire world excluding Antarctica.
- They play a pivotal role in the ecosystem; influencing soil health, seed dispersal, and even acting as indicators of environmental change.
- In Westchester county, the most common ants are pavement ants, carpenter ants, odorous house ants, argentine ants, and pharaoh ants.
- Ants form colonies which can range in size from a few dozen ants to a highly complex colonies, which comprise millions of individuals, that can occupy a very large territory.
- DNA barcoding has recently been used to test the earth's biodiversity.
- Our group went to the Regeneron DNA Learning Center in Sleepy Hollow, NY to DNA barcode our samples.

Materials & Methods

- 27 ant samples were collected. 10 of them were collected from the Bronxville Park in in December 2024, and 17 of them were collected from the Bronx River Trail in June and July 2023.
- Samples collected from the Bronx River trail were donated from a recent student project at Iona University.

Materials & Methods cont.

- Bronxville park samples were collected using pecan cookies as bait and ants were collected in tubes of ethanol, and then refrigerated
- Ant samples were initially identified using a paper field guide and iNaturalist.
- DNA barcoding identified and confirmed the species of the ant samples
- The COI primer set LCO1490 / HC02198 / FormCOId_F / FormCOId_R was used to amplify DNA via PCR
- Gel Electrophoresis confirmed the presence of DNA
- DNA analysis and organization were carried out using the DNAsubway.org website and BLAST.
- Results from iNaturalist, Field Guide, DNA Subway, and BLAST were compared to determine the ant species



Figure 1: Ant microscopy imaging



Figure 2: Ant microscopy imaging



Figure 3: Map of the sample collection area. Bronxville Park 40°56'25"N 73°48'55"W and Bronx River Trail 40°49'38"N 73°53'06"W

Results

- Out of the 27 samples we DNA barcoded, 14 of these successfully yielded DNA identification results.
- Upon analysis of the samples, we found that almost all samples coming from Bronxville Park collected in December 2023, were *Prenolepis imparis* also known as the American winter ant.
- The 17 samples found in New Rochelle in June and July 2023, showed the diversity in ant species in Westchester during more ideal weather conditions.

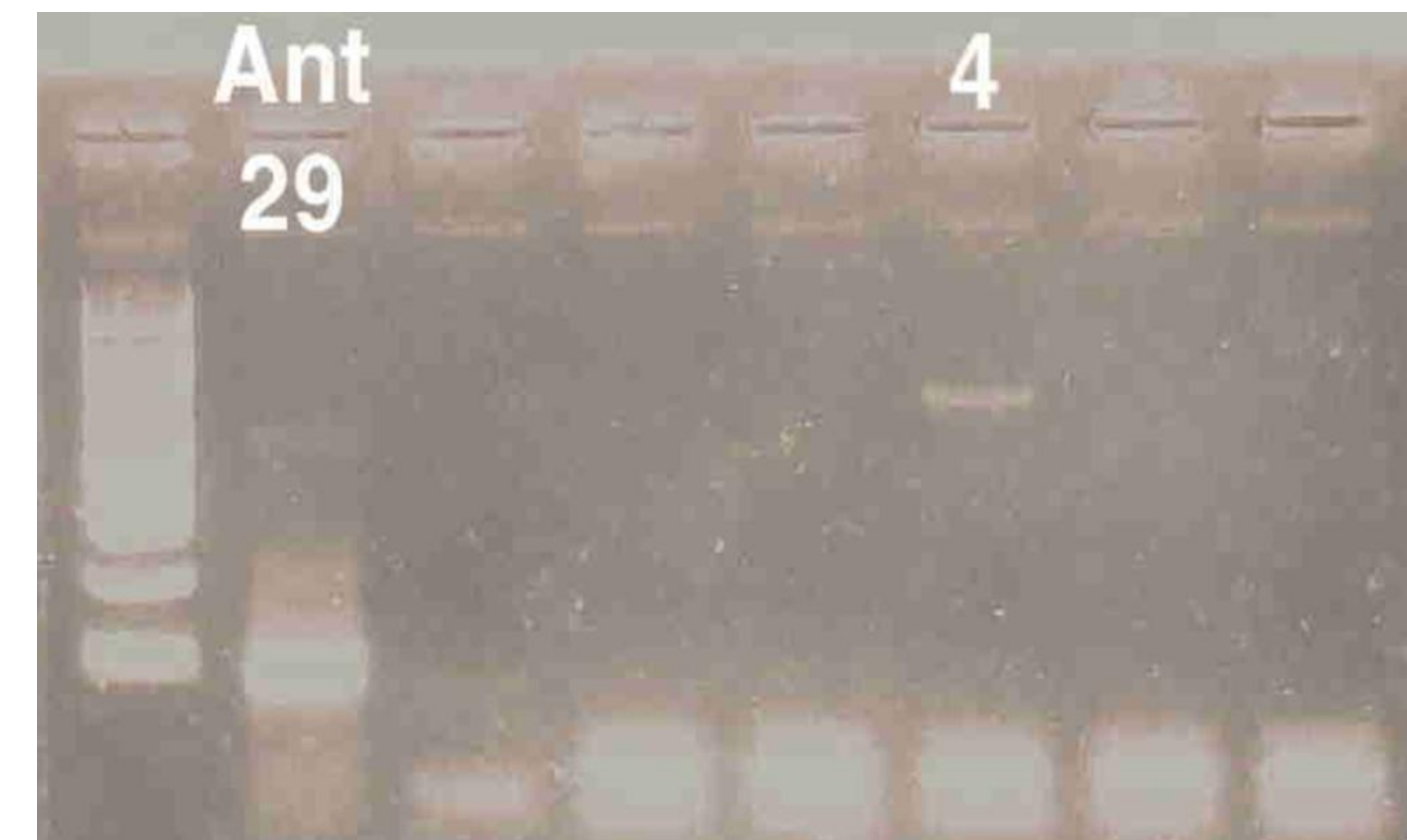


Figure 4: Gel electrophoresis results for several ant samples post COI Primer gene amplification

Ant Collection Location	Bronxville Park	Bronx River Trail
Number of Samples	10	17
Samples successfully DNA barcoded	10	4
Samples identified by iNaturalist coinciding with BLAST results	9	4

Table 1: Summary of ant samples with DNA barcoding and iNaturalist identification.

Bronxville Park (3 Species), collected in December 2023	Bronx River Trail (2 Species), collected in June and July 2023
1. <i>Tapinoma sessile</i> (Odorous House Ant)	1. <i>Camponotus pennsylvanicus</i> (Carpenter Ant)
2. <i>Prenolepis imparis</i> (American Winter Ant)	2. <i>Myrmica pinetorum</i> (Pine Furrowed Ant)
3. <i>Tetramorium caespitum</i> (Pavement Ant)	

Table 2: Summary of number of ant Species found in Bronxville Park and Bronx River Trail.

Discussion

- The prevalence of *Prenolepis imparis* (which was found during analysis of 8 out of 10 successfully DNA barcoded species) in Bronxville Park during December 2023 underscores the importance of environmental factors, such as temperature, in shaping ant biodiversity. We found two more species besides *Prenolepis imparis* in Bronxville Park: *Tapinoma Sessile* and *Tapinoma Sessile*.
- The ability of certain species to thrive in colder climates suggests adaptations of this particular species to cold that warrant further investigation.
- Additionally, we observed two species in New Rochelle in June and July 2023: *Camponotus pennsylvanicus* and *Myrmica pinetorum*.
- This study provides insights into ant biodiversity in Westchester County, shedding light on the interplay between environmental factors and species distribution.
- By integrating genetic analysis with environmental data, we have deepened our understanding of ant populations in these regions.

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