



“Ant-icipating the Future”: Surveying Ants in Urban Environments

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Introduction

Formicidae, commonly known as ants, are the most abundant members of the hymenoptera order. Myrmecology or the study of ants is the future of biology. Myrmecologists have discovered that through activities such as the construction of underground nests and foraging tracks, ants are largely responsible for the redistribution of organic and inorganic materials within soil profiles. Similarly research has shown that ants are natural predators to common pests², and that certain species of ants are known to harbor antibiotic producing bacteria that control garden parasite populations.³ It is believed that there are over 1 quadrillion individuals and around 15,000 named species, yet little is known about the true ecological impacts and benefits of ants. The majority of myrmecology based research has focused on ants in tropical and rainforest environments, but less so on urban ants, especially those found in New York city⁴.

The goal of this project was to conduct a rudimentary assessment of ant fauna in urban settings. We set out to determine the best ways to survey ants in different habitat types found in urban environments. For our research we focused on ant presence in various sites within Prospect Park and Green-wood Cemetery. This work shed light on the specific species of ants that were present in these locations in Brooklyn, the types of habitats they favored, and the methods that worked best to collect them.

Methods

Selecting Sites

Walking surveys and Google Map aerial assessments were conducted and three sites were chosen within each Prospect Park and Green-wood cemetery in Brooklyn, NY. In Prospect Park Longmeadow, Bandshell, and the Boathouse were selected; in Green-Wood Cemetery Battle Avenue, Valley water, and Dell pond were selected. Within these sites an intersection of meadows areas, paved areas, and wooded areas were surveyed. Measurements of coordinates, temperature, and canopy cover were calculated using a compass, weather, and Canopyapp⁵.



Figure 1: Labeled map of our sites at Prospect Park

Figure 2: Labeled map of our sites at Green-Wood Cemetery.

Surveying Ants

Three methods were used for collecting ants sticky traps, aspirators, and Berlese Funnels. Homemade sticky traps were laid using four 40 x 5 centimeter long cardboard or plastic pieces. Each trap was covered in scorpion tape and tanglefoot. These sticky traps were then placed around areas that were hypothesized to have the highest ant abundance. In all of the habitats traps were placed within 1 ft of one another.

In the wooded areas, sticky traps were laid in areas with at least 50% canopy cover; in meadowed areas, traps were placed in grassy areas with little, to no canopy cover; in paved areas with little, to no canopy cover; in paved areas with little, to no canopy cover, sticky traps were placed along sidewalks and roadways independent of canopy cover percentage. The traps were held down with golf tees, flagged, then left outside for 24 hours. Aspirators were then used in 3 randomly selected areas for 5 minute intervals. A soil and leaf litter sample was also collected from each habitat.



Figure 3: Laying down sticky traps at Dell Water.



Figure 4: Aspirating ants at Prospect Park.

Species Identification

After ant collection was completed, samples from each method were then taken back to the laboratory to be quantified and identified using Dr. Eleanor’s Book of Common Ants of NYC.

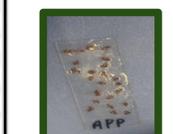


Figure 5: Looking for ants through filtered leaf litter sample



Figure 6: A slide of collected and surveyed ant specimen found by aspirating in Prospect Park.

Research Questions & Hypotheses

What is the most effective way to survey ants in Urban Environments?

Hypothesis: Sticky traps will be the most effective way to collect ants in Prospect Park and Green-wood Cemetery.

Nested Question 1: Which method of collection is most efficient within each habitat?

Hypothesis: More ants will be captured through the use of sticky traps

Nested Question 2: What is the diversity of ant species present in Prospect Park and Green-wood Cemetery?

Hypothesis: There will be a greater abundance of Pavement ants than any other species within each site.

Results

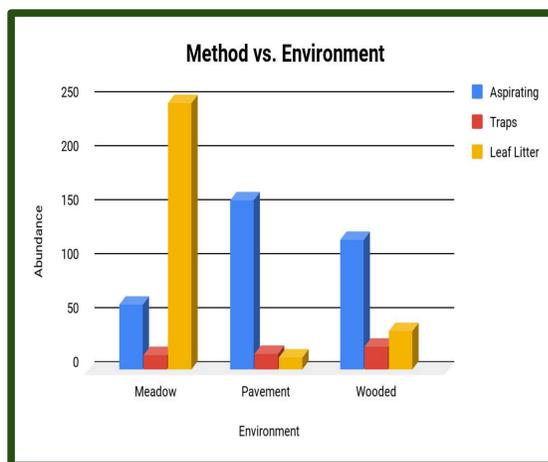


Figure 7: Compares the relative success of each method of collection within each environment.

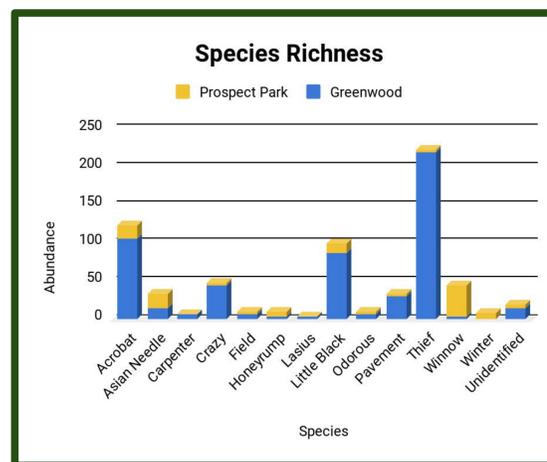


Figure 8: Compares the abundance of each species in Green-Wood Cemetery to that of Prospect Park.

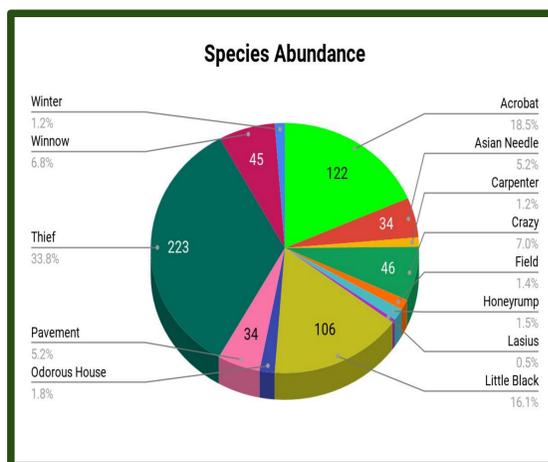


Figure 9: Illustrates percentage of the various species of ants recovered in Prospect Park and Green-Wood Cemetery. Thief ants represented 33% of the species found.

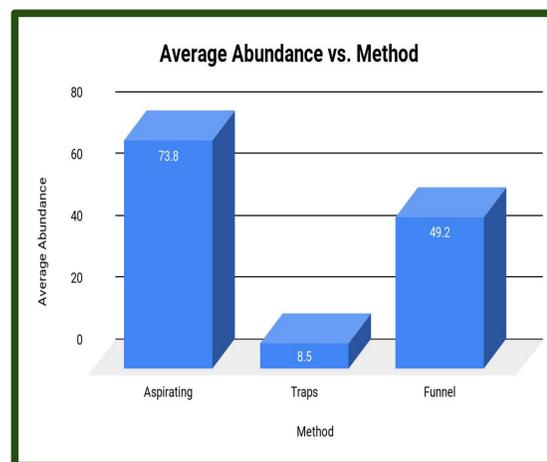


Figure 10: Represents the average amount of ants that were recovered using each method. On average, aspirating captured the most ants.

Discussion

Surveying Ants in Urban Environments

Conducting a study outdoors and in public areas poses several limitations. On one hand the active method of aspirating proved to be effective for collection, although it was limited to the sampler’s stamina during the sampling period as the process became tiring after ample time was spent. Aspirating also proved to be a source of biases as the sampler would often only choose areas where they could see ants to sample from. On the other hand the more passive method of laying sticky traps was more vulnerable to disturbances by people passing by in our sites as well as other factors like the weather and small mammals. A combination of both active and passive collection, leaf litter sampling provided consistent data throughout our research. Though we hypothesized that the use of sticky traps would be most effective across all habitats, our data did not support this hypothesis. Figure 7 shows that sticky trap sampling was the least effective method along meadowed and wooded habitats. Though the data in figure 7 shows leaf litter sampling as the most successful method in meadowed areas, this data was skewed by one day where an abnormally large amount of ants were recovered using this method in Green-Wood Cemetery. Figure 10 shows that on average aspirating produced the most ants followed by leaf litter sampling than our sticky traps.

Species Abundance

Since Prospect Park and Green-Wood Cemetery are both in urban environments, we hypothesized that *Tetramorium caespitum* (pavement ants) would be the most common species of ant that we would find. Figure 9 shows that our hypothesis was not supported. *Solenopsis molesta* (thief ants), *Monomorium minimum* (little black ants), and *Crematogaster cerasi* (acrobat ants) were the species that were most abundant in our survey.

Future Studies

Our work in surveying ants this summer will be useful to future myrmecology research as it provides an initial account of the populations of native and invasive ant species found in our sites in Brooklyn, New York. This information can be used to determine methods of controlling identified pests as well as promoting helpful species. In the future, researchers may find baiting the ants with sugar rich foods will aid in their collection process. Additionally, future researchers would benefit from using more modern microscopes and performing this study over a longer period of time.

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