Classification Of Formicidae Found in Brooklyn

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Abstract

Our group went on a trip and collected ants to learn about ant biodiversity in Brooklyn. We thought we would find many different species of ants. Our main objective was to figure out how many types of ant species live around Brooklyn. We ended up finding four different species. We caught these ants by putting a slice of apple or a cookie every 5 meters. The apple was more efficient than the cookie. The four different ants species we identified were *Tetramorium caespitum, Pheidole tyysoni, Tapinoma sessile, and Camponotus chromaiodes.*

Introduction

There are more than 10,000 species of ants, according to (*National Geographic* -Ants n.d). We wanted to identify the ants we found in Brooklyn and their impact on human health. For example, ants are decomposers that feed on decayed materials and keep the environment clean (*The ecological importance of ants*). Additionally, according to "Physical Decomposers - Compost -ology", they also claim that ants prey on first-level consumers and may benefit the composting process by bringing fungi and other organisms into their nests. We should care about ants because ants provide a good balance by keeping environment healthy. They also aid to turn your soil by digging tunnels and turning over the dirt and also help in decomposition. Each ant help out the environment in its own way, yet they hold a negative effects and positive impact on us. Our hypothesis was that we would collect several types of ants in Brooklyn, New York and each of them will have its own unique features.

Materials & Methods

- The Materials we used in the lab were a pipette, tubes, incubator, centrifuge, gloves, freezer at -20℃, thermal cycler, and a water bath. The protocols that we use were DNA isolation, then amplify DNA by PCR, and finally gel electrophoresis. The first part is DNA isolation. The first step is to add lysis Solution.
- The second step is to grind up the solution then incubate for 10 minutes at 65°C. The third step is to centrifuge the sample which will separate the supernatant (contains the DNA) and the pellet, we then transfer the supernatant to a new tube. After centrifuge we add silica resin which cuts the DNA, then mix the silica resin. Then incubate for 10 minutes at 57°C, and centrifuge for 30 seconds. We then remove the supernatant to a new tube and add wash buffer. Repeat the third step,but centrifuge the tube for 30 second, and 8 second. After centrifuging the tube for 8 second remove the remaining supernatant, then add dH20 (distilled water) to the pellet and mixing it together with a pipette. Then incubate for 5 minutes at 57℃, centrifuge for 30 second. After centrifuge transfer the supernatant to a new tube and store at -20℃
  The second part is amplify DNA by PCR. Step 1 is to add PCR reagents then all your DNA. Step 2 is to amplify in thermal cycler and store at -20℃.
- The last part is gel electrophoresis. The first step is to pour gel and let it set for 20 minutes. The second step is to load the gel the electrophorese at 130 volts for 30 minutes.

Results

We had a total of 11 Samples. One of the most common ant species we found was *Tetramorium caespitum* and one that wasn't as common is a *Pheidole tysoni*. We found 4 different type of ants from our gathered information. The four different ants species we got were *Tetramorium caespitum, Pheidole tyysoni, Tapinoma sessile, and Camponotus chromaiodes.* The E-Value for all of them was 0 but one was different and it was the *Tetramorium caespitum* which had an e value of 2e-69. Most of the ants we got for our research were from Prospect Park, some classmates' backyards and outside our school near the trees.

Sample Number-#	Location Collected	Species Name	DNA- Subway data	Notes:
#1	40.625418 -73.994507	*Tapinoma sessile*	Bitscore: 1029 E-value: 0.0 Mismatch: 14	They are native to North America.
#2	40.652122464 -74.0012454987	*Tetramorium caespitum*	Bitscore:1191 E-Value-0.0 Mismatch-7	They are native to Europe but was introduce to the US in the 1700's.
#3	40.646439 -74.001942	*Tetramorium caespitum*	Bitscore:1231 E:0.0 Mismatch-3	Worker are expected to live 5 years.
#4	40.646439 -74.001942	*Tetramorium caespitum*	Bitscore:1086 E:0.0 Mismatch:31	Queen ants live longer.
#5				No DNA sequence
#6	40.6544829475 -73.9717948437	*Tetramorium caespitum*	Bitscore:269 E:2e-69 Mismatch:32	They are very adaptive to their environment.
#7				No DNA sequence
#8	40.6544992265 -73.9721167088	*Tetramorium caespitum*	Bitscore:1191 E:0.0 Mismatch:15	Usually make their homes in pavement
#9	40.6534573684 -73.9718270302	*Tetramorium caespitum*	Bitscore:1245 E:0.0 Mismatch:2	Breed in June-July.

Sample Number-#	Location Collected	Species Name	DNA- Subway data	Notes:
#10				No DNA sequence
#11	40.6553457241 -74.0045499802	*Tetramorium caespitum*	Bitscore:1007 E:0.0 Mismatch:27	
#12	Deleted	Deleted	Deleted	Deleted
#13	40.6552399125 -74.0043461323	*Camponotus chromaiodes*	Bitscore:1216 E:0.0 Mismatch:13	
#14	40.6552561912 -74.0044426918	*Tetramorium Caespitum*	Bitscore :1245 E:0.0 Mismatch:3	
#15	40.6552806093 -74.0044426918	*Pheidole tysoni*	Bitscore:1007 E:0.0 Mismatch:57	
#16	40.6491920924 -74.0020394325	*Tetramorium caespitum*	Bitscore:1041 E:0.0 Mismatch:15	

Discussion

- Our results show that *Tetramorium caespitum* is the most common ant that our team found in Brooklyn. Along with many different ants that we found that had its own unique features. This supports our hypothesis that we would collect different species of ants and each would have its own traits.
- The *Tapinoma sessile* ants are also commonly named odorous house ants and are native to North America. *Tapinoma sessile* ants are found in urban and natural areas to nest such as city parks, backyards, disturbed areas, around buildings, and in mulch and debris piles.
- The *Camponotus chromaiodes* or commonly called red carpenter ants. It also nests in hollows in dead wood in tree trunks near the base of living trees, including eastern red cedar and usually feeds on decayed materials. This can help our environment and ecosystem since it is an decomposer.
- The *Pheidole tysoni* are big-headed ants and are commonly found in sandy soils in the school yards. This species has both majors with big muscular heads and minors with smaller, roundish heads. We collected these ants here in Sunset Park High School.

Acknowledgements

We would like to acknowledge all of our teammates, Mr. Babauta and Ms. Wallner for the project idea readings, DNA barcoding resources, and allowing us to use the scientific tools to help us come to a conclusion with this particular research.

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