



# Cockroach Biodiversity in NYC

Adrian Natera, Brandon Rodas, Savannah Smith & Vincent Joralemon



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DNA Learning Center DNA Learning Center West Harlem DNA Lab

## Abstract

In this Urban Barcode Project, our goal was to test the biodiversity of cockroaches in New York City in three locations across two seasons (fall and winter). We wanted to see if it was possible to capture an invasive cockroach species such as the Japanese cockroach during the winter. We tested this by collecting cockroaches from various places: our homes and our school both inside and outside. We hypothesized that the Japanese cockroach would be more common in more extreme temperatures such as winter than the other species of cockroach because of the fact that it can withstand those conditions better than native species can. Our objective was to develop a understanding of the cockroach species found throughout the city, and to use that information to measure the biodiversity of cockroaches found in NYC. Based on our results we did not identify a large biodiversity of roaches. In fact we did not retrieve any DNA from an invasive species and but only from the most commonly found roach in NYC, the German cockroach.

## Introduction

New York City is home to millions of roaches. The most commonly seen roaches are the German cockroach and the American cockroach. However, there are an invasive species of cockroaches that have reached the streets of New York they go by the name of "Periplaneta japonica" also known as Japanese cockroaches. The Japanese cockroach isn't like the American cockroach or the German cockroach. The Japanese cockroach has the ability to withstand temperatures that the other cockroaches can not. Our group was extremely fascinated by this invasive species and wanted to see if we could retrieve any through the seasons of fall and winter. The purpose of our project was to test the biodiversity of roaches in the city in various locations. We hypothesized that that the Japanese cockroach would be more common in more extreme temperatures such as winter than the other species of cockroach because of the fact that it can withstand those conditions better than native species can. If we were able to identify other species besides the German and American cockroach we could have discovered another invasive or possibly dangerous species of cockroach.

## Materials & Methods

Our group went around New York City and collected 30 cockroaches from different locations in the city using traps that have the ability to trap roaches and insects of all shapes and sizes. In our collected samples, we only used the cockroaches found to barcode. We conducted this test throughout the fall, winter, and spring to test the biodiversity of cockroaches throughout the three seasons.

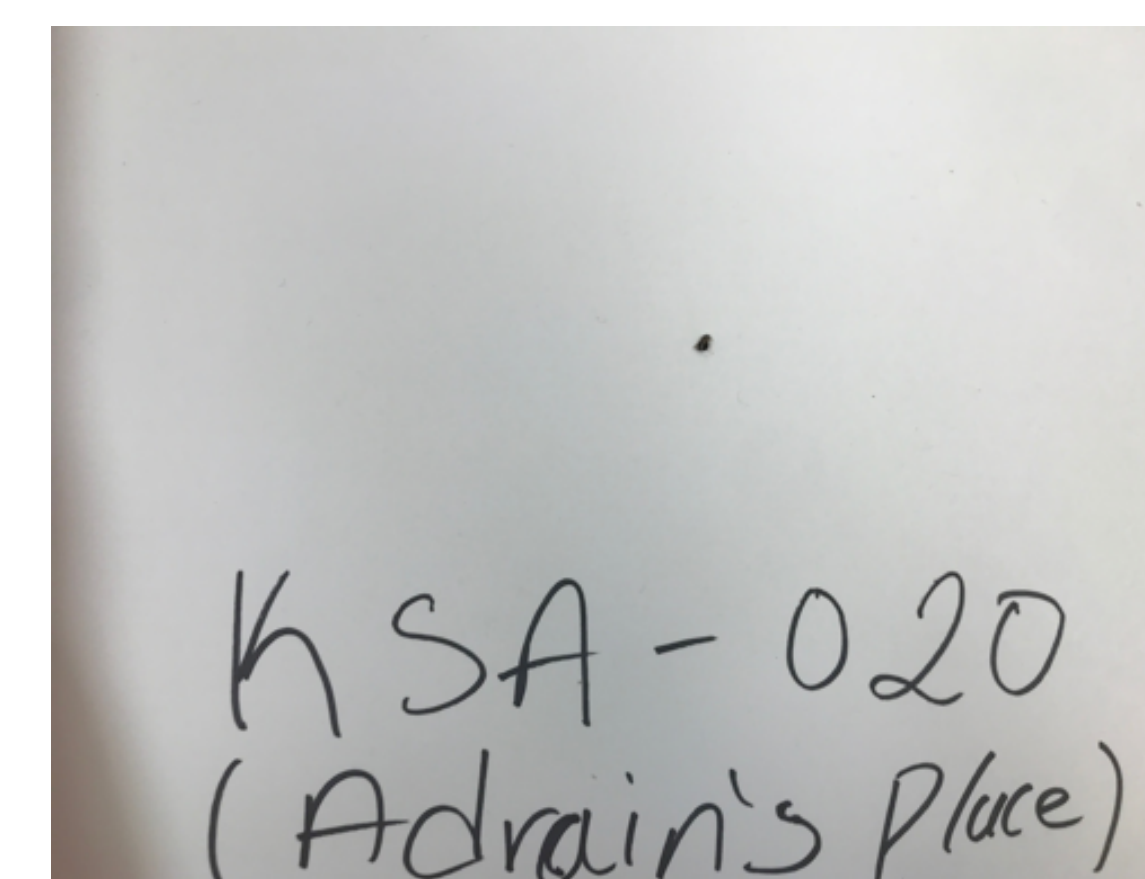
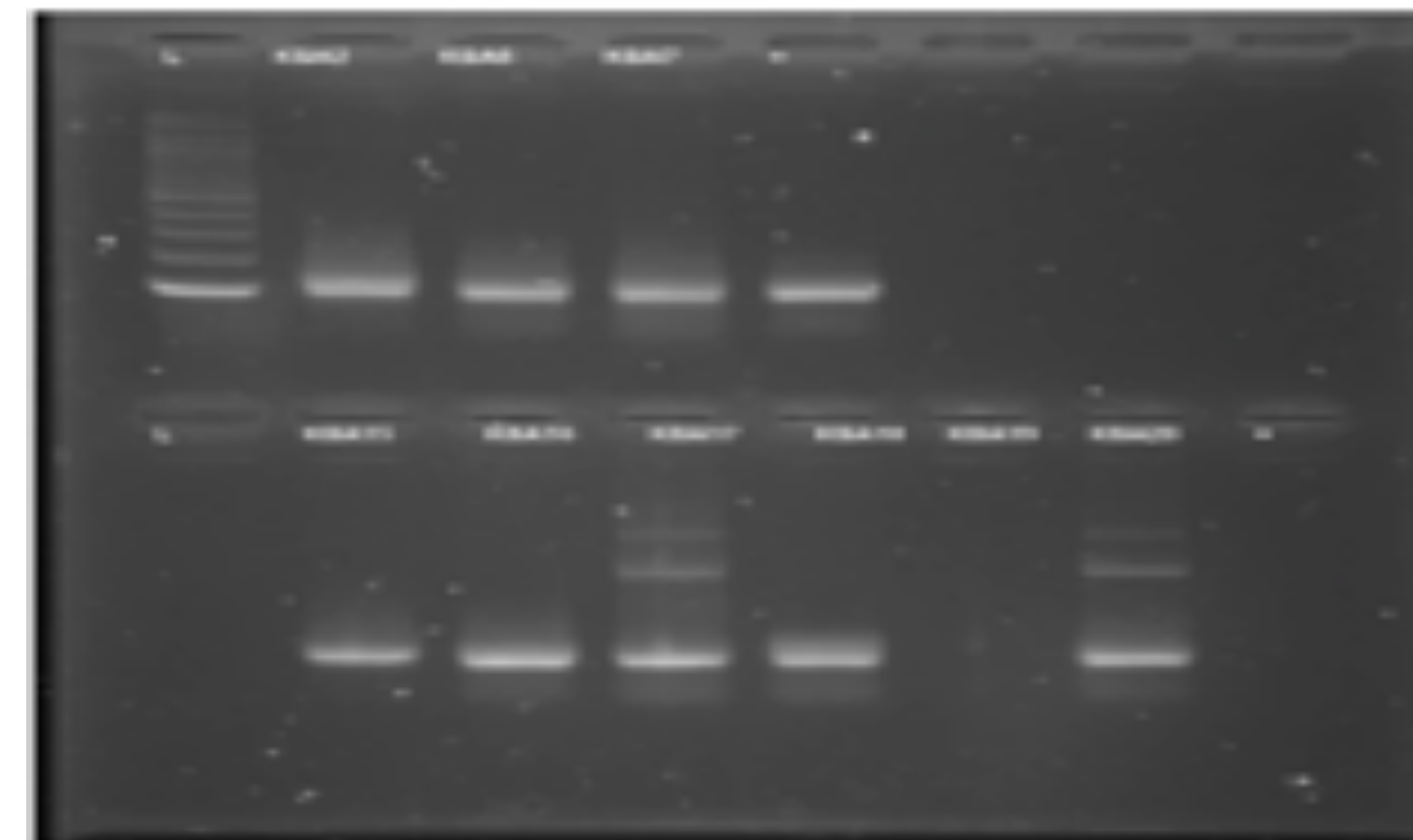
After we obtained all of the roaches that we needed we reserved them by freezing the roaches preventing the DNA from decaying. We then take a piece of the roach leg afterwards to extract the DNA.

In order to process the roaches DNA, we had to get the sample and **extract the DNA**. Once we've extracted the DNA, the next step was to make copies of the DNA using a methods called PCR. Afterwards, we use gel electrophoresis to see what DNA we got back. Then, we use Sanger sequencing to receive the actual sequence of the DNA.

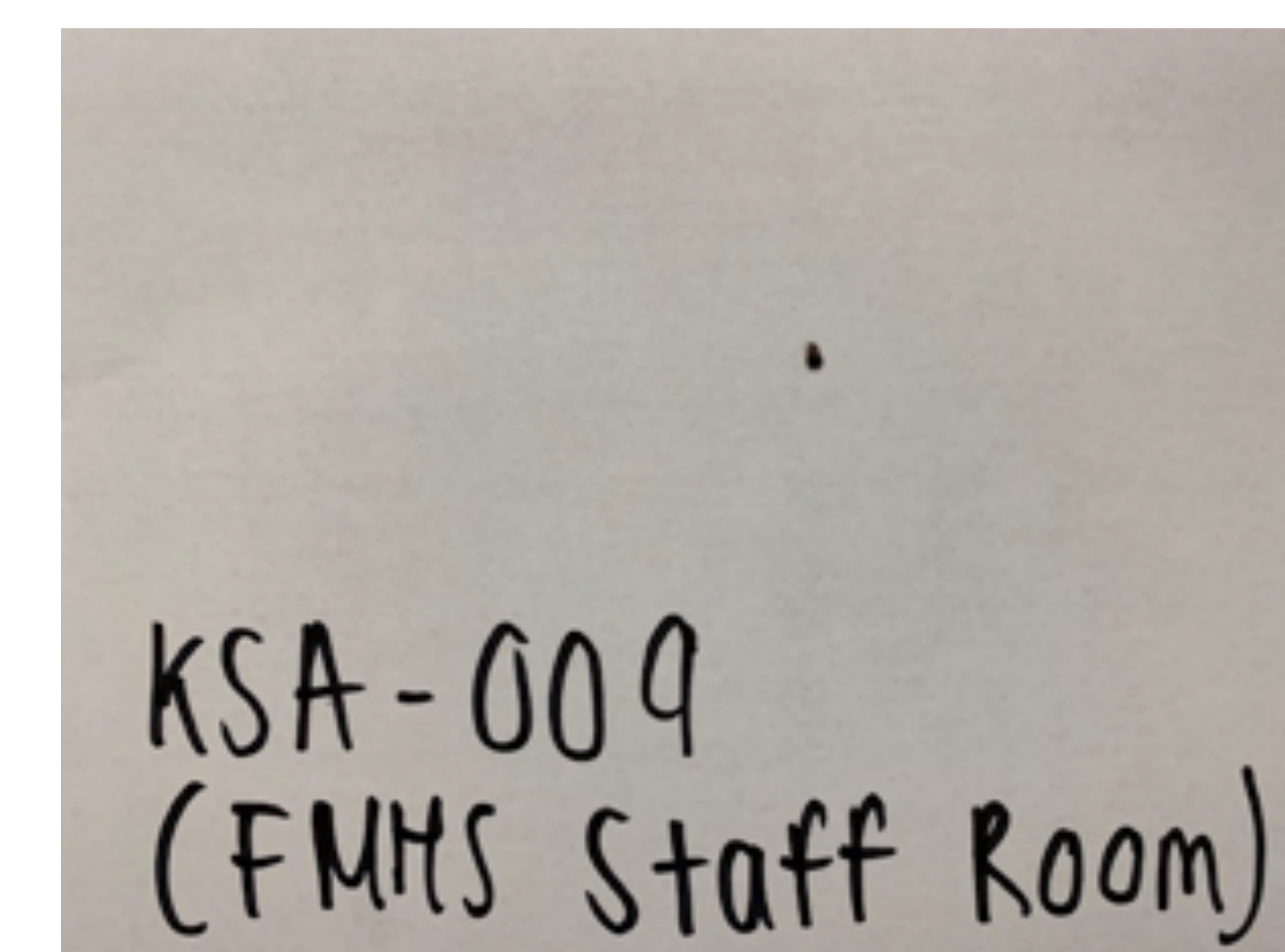
Once we received our letter sequence we ran the DNA sequence through a program called **BLAST**. This program let us know what exact species our roach samples were by comparing it to a whole list of other roach species around the world. The program also lets us know if there was any biodiversity in the roaches that we collected.

## Results

| Sample Number | Species Expected | Species Found | E Value |
|---------------|------------------|---------------|---------|
| KSA017        | German Roach     | German Roach  | 5e-97   |
| KSA020        | German Roach     | German Roach  | 2e-113  |



## Tables & Figures



## Discussion

We were not able to answer our question of discovering the "Periplaneta japonica" also known as Japanese cockroaches in our research of the biodiversity of cockroaches in New York City. Our results demonstrate that we were only able to get 2 viable DNA samples out of our 20 samples of cockroaches. Due to the fact we can infer that our process of DNA testing had an error that affected the result of our copied DNA. The two viable DNA samples that our group received shows that the cockroaches were from the German cockroach species. These results confirm that German cockroaches are most common in NYC as previously stated in our introduction that both American and German were the most common types of species. Our group concluded that the error that was encountered during our lab testing was the extraction of the cockroach samples. As it was difficult to break down the physical cockroach leg in the test tubes as the exoskeleton of the insect species are very durable and we experienced a hard time trying to break it apart in the lysis. We can infer that because the cockroach leg was not properly broken apart, we couldn't get the significant amount of cell components. For the future, we can make sure that the cockroach sample is properly broken down by choosing a different body part of the cockroach, so there is better DNA. We will also do all four season of the year, instead of two, to have a more accurate result and have a better chance of getting the Japanese cockroach species.

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