Shelter Island Ants

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Introduction

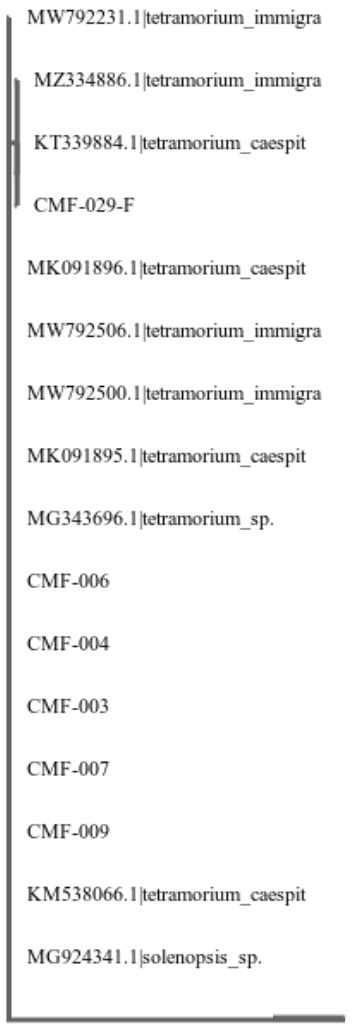
Over the past several years we have sampled ants at many different locations around Shelter Island determining 'typical' or expected ant species. This year we completed the survey collecting ants from three new locations. As always, we tested to determine which species are more common in the micro niches of the island. DNA Barcoding is made for a project like this, as it is difficult to tell ant species apart by their morphology, DNA sequence analysis is essential for an accurate species identification. Having a complete species map of the island allows us to map species migration due to human intervention and monitor species arrival due to climate or any other environmental changes. Results were compared to our past projects to verify past results and to monitor any changes.

Materials and Methods

Each student collected ants at a different location, photographing and documenting the collection site. Bait consisting of sugar was placed on a piece of paper and set out at a collection spot. Ants were documented in the lab using a microscope mounted camera and the DNA was extracted using the silica method and PCR performed using the COI primers. After successful DNA amplification was performed through Gel Electrophoresis, samples were sent away for DNA sequencing. DNA Sequencing was analyzed using a program named the DNA Subway for species identification and phylogenetic relationships.

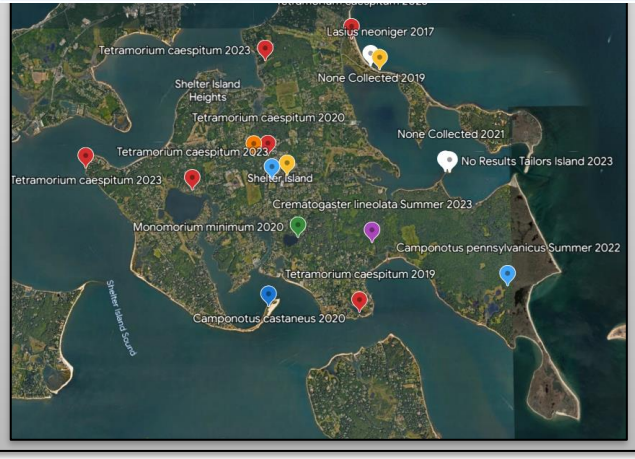
Results

To conclude this year's ant collection and barcoding, 2 species of ants were found and the whole island has been successfully mapped. *Tetramorium caespitum* had been previously found on the island, but the *Tetramorium immigra,* the seemingly more common species in North America, has not been mentioned in previous projects. Sample CMF-029 provided interesting results as it sorted identically with *Tetramorium caespitum* and *immigra.* Our project this year shows the importance of continuing annual monitoring of the ant population as it is affected by weather, humans, and other variables that can change their patterns. Additionally, we have confirmed suspicion that Taylors island (a tombolo) is isolated from ants as we have never found evidence any ant species.



Tables & Figures

Collection Site 2019	Species Identified	Collection Site 2020	Potential Species *No DNA Seq COVID	Collection Site 2022	Species Identified	Collection Site Summer 2022	Species Identified	Collection Site 2023	Species Identified
Rural Town Center	Lasius ants Monomorium minimum Camponotus castaneus Myrmica americana	Rural Town Center	Tetramorium caespitum Plus Unidentified Ants	Rural Town Center Fiske Field	Camponotus pennsylvanicus	Mashomack	Tetramorium caespitum	Deering Harbor Rural Town Center	Tetramorium caespitum
Deciduous Forest South Ferry	Tetramorium caespitum	Deciduous Forest Fresh Pond	Monomorium minimum Plus Unidentified Ants	Deciduous Forest	Aphaenogaster carolinensis	Mashomack	Crematogaster lineolata	West Neck Creek Deciduous Forest	Tetramorium caespitum
Beach Environment Ram Island	None Collected	Beach Environment Shell Beach	Camponotus castaneus	Beach Environment Taylors Island	None Collected			Beach Environment Taylors Island	None Collected



References:

"Mashomack Depends on Us." Mashomack Preserve, <https://www.nature.org/en-us/get-involved/how-to-help/places-we-protect/long-islandmashomack/>. Accessed May 2022
"Shelter Island." Wikipedia, 15 Dec. 2019, en.wikipedia.org/wiki/Shelter_Island. Accessed May 2022
"AntWiki." Www.Antwiki.Org, www.antwiki.org/wiki/Welcome_to_AntWiki. Accessed May 2022
"Temperate Deciduous Forest: Mission: Biomes." Nasa.Gov, NASA Earth Observatory, 29 Apr. 2019, earthobservatory.nasa.gov/experiments/biome/biotemperate.php.

"Places We Protect." The Nature Conservancy, www.nature.org/en-us/get-involved/how-to-help/places-we-protect/?s=11964. Accessed May 2022.

Sincerely, WilliDa25