



Utilizing DNA Barcoding and Bioinformatics to Assess the Biodiversity of Ant Species in Forest City Community Park

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Abstract

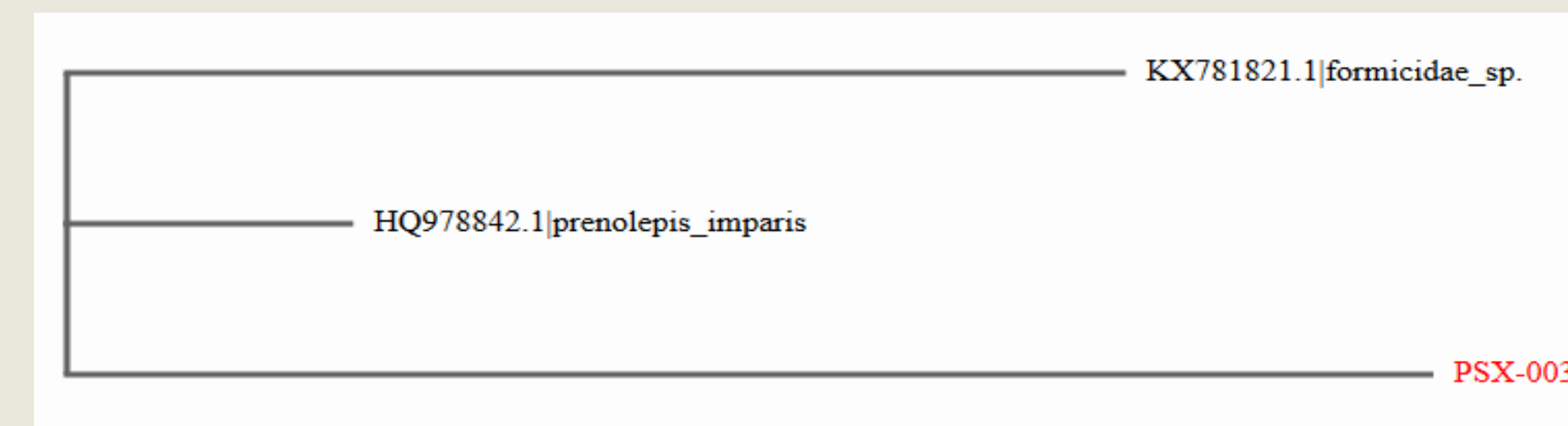
Forest City Community Park is located at Latitude 40-41'42" N and at Longitude 073-31'16", with an elevation of 10 meters. It has a pond that covers 6 acres, with a maximum depth of approximately 29 feet. The purpose of this study was to investigate the biodiversity of ant species in Forest City Community Park. Collection techniques included the use of a 3x3 quadrat made of PVC piping, a GPS smartphone App, and collection vials for preservation of specimens in 99.5% ethanol. Ants were collected from the various trails surrounding the pond. DNA Extraction and PCR were conducted during an open lab session at Cold Spring Harbor DNA Learning Center. DNA Subway was utilized to identify each species. 17 specimens were successfully barcoded. A total of 6 distinct species were found, all of which were ants belonging to the order Hymenoptera and family Formicidae. 8 specimens were identified as *Prenolepis imparis*, 6 as *Nylanderia parvula*, and one each of *Aphaenogaster rudis*, *Lasius claviger*, *Tetramorium caespitum*, and *Lasius neoniger*.

Sample ID #	Alignment Length	¹ Bit Score	² E Value	Identified Species	Order	Family
PSX-001	645	1137	0.0	<i>Nylanderia parvula</i>	Hymenoptera	Formicidae
PSX-003	679	1153	0.0	<i>Prenolepis imparis</i>	Hymenoptera	Formicidae
PSX-004	169	174	6e ⁻⁴¹	<i>Aphaenogaster rudis</i>	Hymenoptera	Formicidae
PSX-005	657	1168	0.0	<i>Lasius claviger</i>	Hymenoptera	Formicidae
PSX-006	592	650	0.0	<i>Nylanderia parvula</i>	Hymenoptera	Formicidae
PSX-007	618	1092	0.0	<i>Nylanderia parvula</i>	Hymenoptera	Formicidae
PSX-008	655	1164	0.0	<i>Prenolepis imparis</i>	Hymenoptera	Formicidae
PSX-009	681	1157	0.0	<i>Prenolepis imparis</i>	Hymenoptera	Formicidae
PSX-010	682	1189	0.0	<i>Tetramorium caespitum</i>	Hymenoptera	Formicidae
PSX-011	679	1159	0.0	<i>Prenolepis imparis</i>	Hymenoptera	Formicidae
PSX-014	656	1150	0.0	<i>Prenolepis imparis</i>	Hymenoptera	Formicidae
PSX-015	685	1146	0.0	<i>Prenolepis imparis</i>	Hymenoptera	Formicidae
PSX-016	651	1157	0.0	<i>Prenolepis imparis</i>	Hymenoptera	Formicidae
PSX-017	655	1168	0.0	<i>Lasius neoniger</i>	Hymenoptera	Formicidae
PSX-018	634	1131	0.0	<i>Nylanderia parvula</i>	Hymenoptera	Formicidae
PSX-019	655	1159	0.0	<i>Nylanderia parvula</i>	Hymenoptera	Formicidae
PSX-020	658	1175	0.0	<i>Prenolepis imparis</i>	Hymenoptera	Formicidae



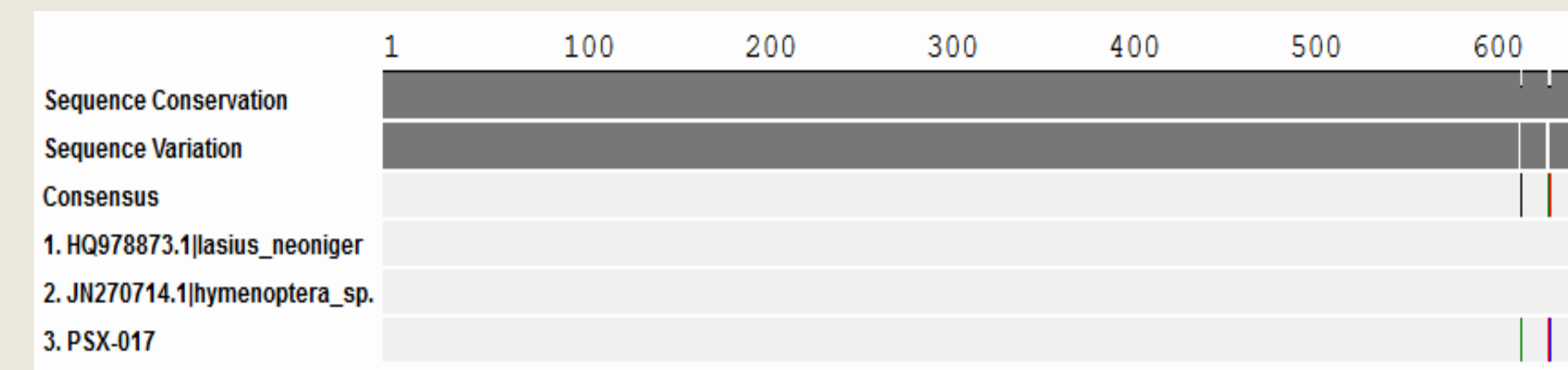
Prenolepis imparis
 PSX-003
 Kingdom: Animalia
 Phylum: Arthropoda
 Class: Insecta
 Order: Hymenoptera
 Family: Formicidae

	C	1	2	3
C	-	99.34	98.93	99.69
1	99.34	-	97.56	98.32
2	98.93	97.56	-	98.62
3	99.69	98.32	98.62	-



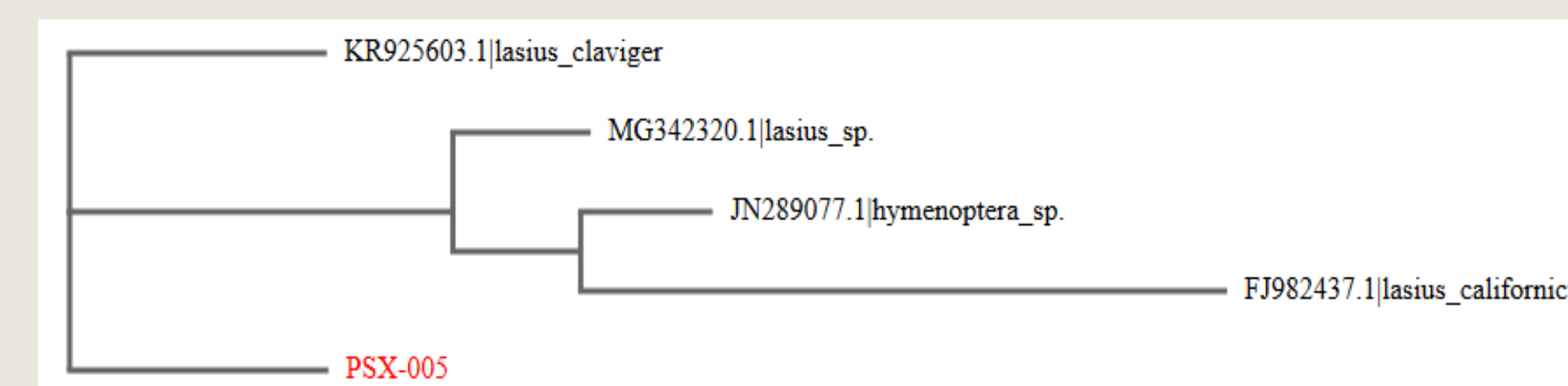
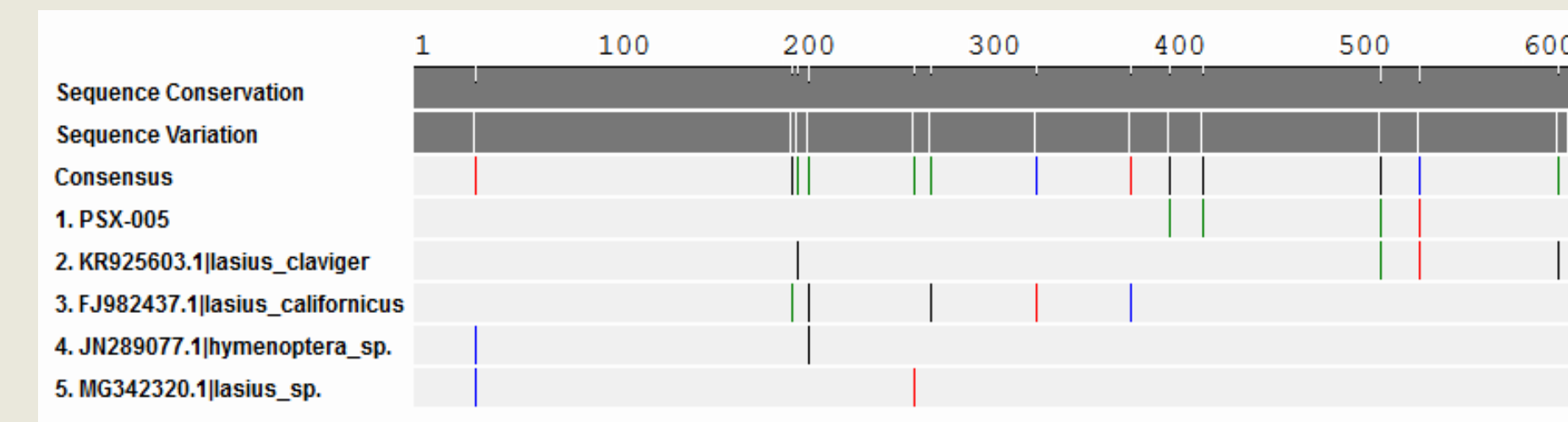
Lasius neoniger
 PSX-017
 Kingdom: Animalia
 Phylum: Arthropoda
 Class: Insecta
 Order: Hymenoptera
 Family: Formicidae

	C	1	2	3
C	-	100.00	100.00	99.78
1	100.00	-	100.00	99.54
2	100.00	100.00	-	99.54
3	99.78	99.54	99.54	-



Lasius claviger
 PSX-005
 Kingdom: Animalia
 Phylum: Arthropoda
 Class: Insecta
 Order: Hymenoptera
 Family: Formicidae

	C	1	2	3	4	5
C	-	99.46	99.39	99.23	99.54	99.68
1	99.46	-	99.39	98.62	98.93	99.05
2	99.39	99.39	-	98.62	98.93	99.05
3	99.23	98.62	98.62	-	99.08	98.88
4	99.54	98.93	98.93	99.08	-	99.52
5	99.68	99.05	99.05	98.88	99.52	-



Methodology

- A 3x3 quadrat made of PVC piping, and a GPS smartphone App was utilized.
- Ants were collected from obvious ant hills, or slowly rolling over small branches, leaves and detritus matter.



- Each collection vial was numbered.
- Specimens were placed in a freezer for 15 minutes, photographed and preserved in 99.5% ethanol.
- DNA Extraction and PCR were conducted.
- CO1 gene was used to compare sequence similarities with known species.



- The DNA Subway platform was then utilized to identify each species.

Discussion

The goal of this project was to investigate the biodiversity of ant species in Forest City Community Park. 17 specimens were successfully barcoded. A total of 6 distinct species were found, all of which were ants belonging to the order Hymenoptera and family Formicidae. 8 specimens were identified as *Prenolepis imparis*, 6 as *Nylanderia parvula*, and one each of *Aphaenogaster rudis*, *Lasius claviger*, *Tetramorium caespitum*, and *Lasius neoniger*. Forest City Community Park is a versatile habitat with the ability to support a variety of ant species.