Wasp Biodiversity Analysis Of a Newly Developed Nature Area At Friends Academy

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Abstract:

A recently established nature area on the Friends Academy campus allowed us to investigate the biodiversity of the wasps in the newly found nature habitat. Research showed that wasps preferred to live in hot and dry climates and also to build their nest in overhangs such as shrubs, bushes, or trees (Orkin 2022). We hypothesize that in this newly made environment within the Friends Academy nature habit, we will find a variety of wasps through a BioBlitz. We went to the nature study area and set up a malaise trap to catch flying wasps. We left the trap out for a month and returned every 3-4 days to check the trap. We also used a sweep net to collect wasps manually. We preserved the wasps, and photographed using a microscope camera and identified them using DNA barcoding. We extracted DNA from the wasps, amplified it, checked the amplification and then finally sequenced it. The results that we obtained when doing so determined showed that there were 5 different species in the newly found area. This serves as a benchmark for future Biodiversity studies to show whether or not other wasp species will move to this nature area as the environment further matures with time.
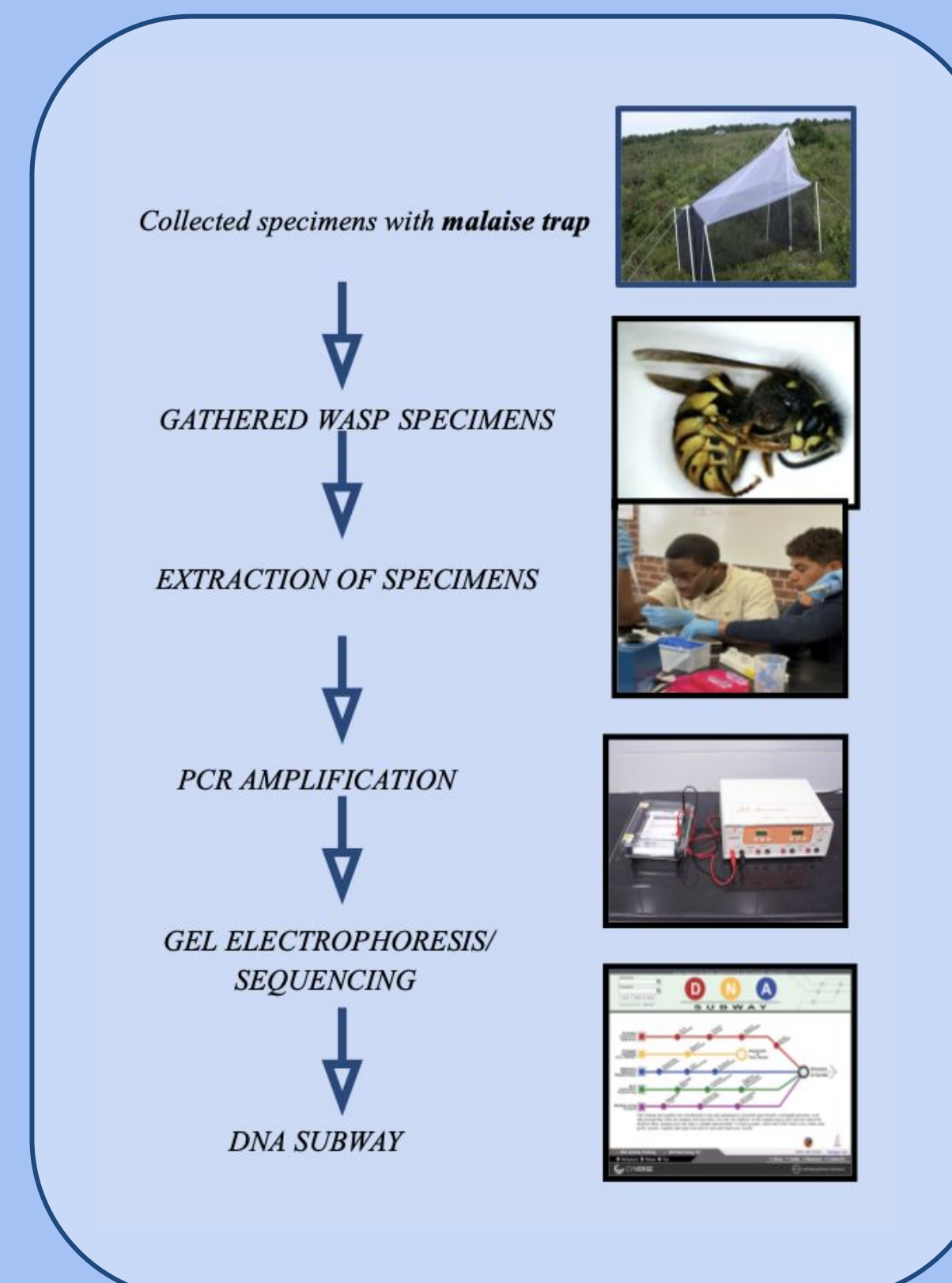
Introduction:

Due to the Forest school being a perfect environment for a high concentration of wasps, we wondered how many wasp species will the habitat be able to maintain over the years? By investigating the capacity of wasp this habitat is able to sustain, researchers can gain a further insight into wasp adaptation/evolution and how it changes over time. In particular, the forest school was ideal because there were a lot of trees, shrubs, and bushes which provided ideal places for nest-building. Given that in New York, there were over 90 species of wasps(NY Department of Agriculture 2022), it made the area we resided in a great center of biodiversity of wasp. We determined that our goal for this project was to establish a start in the identification of wasps for future projects which would greatly help identify the increase in wasp species within the habita over time. Furthermore, as this research on wasps has never been done before in this newly found habitat, we didn't know what results and findings we would come across and because of this it gave us an opportunity to investigate something new. We hypothesized that because it was still a very new habitat there would be fewer wasps and as the habitat grows and strengthens over time, we predict there will be a increase in species.

Materials & Methods

Collected specimens with **malaise trap**

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GATHERED WASP SPECIMENS

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EXTRACTION OF SPECIMENS

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PCR AMPLIFICATION

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GEL ELECTROPHORESIS/ SEQUENCING

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DNA SUBWAY

Discussion:

The chart at right summarizes the wasp species found within the newly formed environment at Friends Academy. One of these wasps, the *Vespula germanica*, builds its home with rotten wood and loves to live in shrubs. Given that the nature area at Friends Academy has many rotten tree trunks and wood sticks on the ground it makes it a perfect place for this wasp species. The *Mycetophila fungorum* prefers soil as a habitat. This gives even more reasoning to how this new habitat will be fit for many species of wasp. As time progresses and the habitat matures, this initial research can be utilized as a point of reference for measuring the evolution of the newly formed habitat.

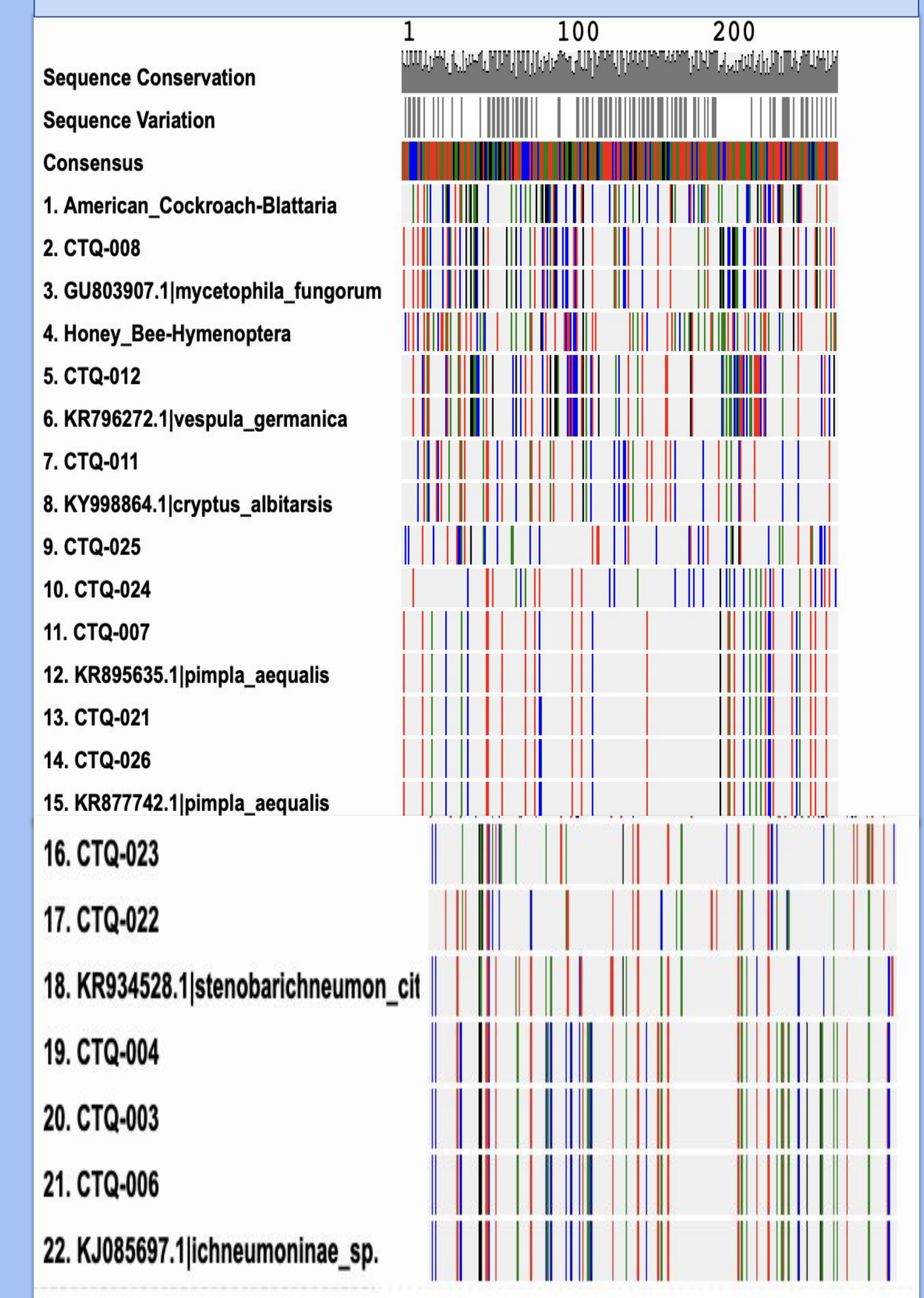## Results:

Figure 1:
Friends Academy Nature Habitat

Figure 3:Summary of Findings

Sample ID#	% similarity to closest match	Wasp Identification	Image
CTQ-003	100%	*Ichneumoninae sp.*	
CTQ-004	99.77	*Ichneumoninae sp.*	
CTQ-006	100%	*Ichneumoninae sp.*	
CTQ-007	100%	*Pimpla aequalis*	
CTQ-008	100%	*Mycetophila fungorum*	
CTQ-011	100%	*Cryptus albitarsis*	
CTQ-012	100%	*Vespula germanica*	
CTQ-021	100%	*Pimpla aequalis*	

Figure 2: MUSCLE alignment

MUSCLE alignment of sequences of our samples with known sequences

Sequence Conservation
Sequence Variation
Consensus
1. American_Cockroach-Blattaria
2. CTQ-008
3. GU803907.1|mycetophila_fungorum
4. Honey_Bee-Hymenoptera
5. CTQ-012
6. KR796272.1|vespula_germanica
7. CTQ-011
8. KY998864.1|cryptus_albitarsis
9. CTQ-025
10. CTQ-024
11. CTQ-007
12. KR895635.1|pimpla_aequalis
13. CTQ-021
14. CTQ-026
15. KR877742.1|pimpla_aequalis
16. CTQ-023
17. CTQ-022
18. KR934528.1|stenobarichneumon_cit
19. CTQ-004
20. CTQ-003
21. CTQ-006
22. KJ085697.1|ichneuminae_sp.

Acknowledgements:

References