

# Immune Response in Solitary / Social Bees

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## INTRODUCTION

- In most insects, there is a natural spike in metabolic rate when faced with an immunity challenge. (Ardia et al., 2012) Whereas, in honeybees, there is no metabolic alteration or difference in flight time. (Bordier et al., 2016)
- There is some evidence indicating that reduced immune response in honeybees could be due to their evolution of social behavior shifting the immune response from the individual to the group (López-Urbe et al., 2016)
- It is unclear if this lack of change could be attributed to the social life of honeybees, or if this is a trait unique to honeybees due to other parts of their biology. If the reduced internal immune response is due to social behavior, we will see a gradual decrease in internal immune response in bees that are more social, compared to solitary bees



Image 1. Squash Bee in Flower (Credit: K. Hunter)

This research aims to answer whether social behavior correlates with a reduced metabolic response during an immune challenge compared to solitary bees

## METHODS

Figure 1. Insertion of Nylon into Bee (Credit: K. Hunter)

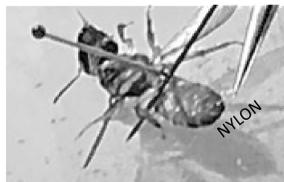


Image 2. Nylon Filament (Credit: K. Hunter)

### Specimens

- Bees were collected from mid-May to September 2-3 times a week
  - Care was taken to try to collect social and solitary individuals per week

### Holding and Preparation

- Once collected, they were kept in a 15ml tube and kept on ice for transportation

### Method of Research

- The individuals were then placed in a respirometer for one hour as a control
- After this initial hour, a nylon filament (immune challenge) was inserted and placed back on the chamber for an additional 4 hours
- The individuals then had the nylon removed and were frozen for future identification

## ACKNOWLEDGMENTS



Kate Hunter  
Graduate Student  
Mentor



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Lab PI



Header Image. Stock Imagery (Credit Flickr.com)



## RESULTS

- analyzed 42 total images using photoshop to annotate distance travelled of the liquid droplet which relates to total volume of O<sub>2</sub> consumed.
- 21 images were of the control 1 hour time period (Image 3 shows the final product of annotations)
- 21 images were of the treatment 4 hour time period (Image 4 shows the final product of these annotations)

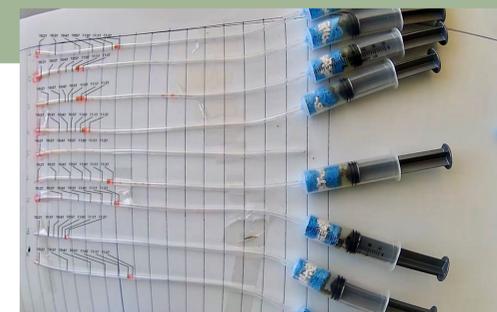


Image 3. Control Respirometer

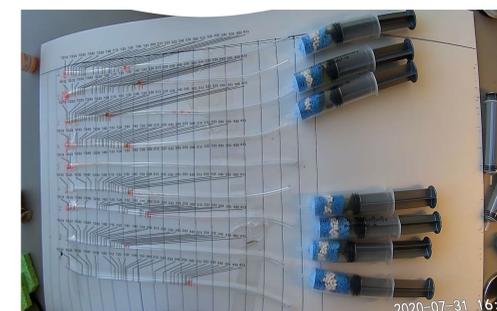


Image 4. Treatment Respirometer

## DISCUSSION / FUTURE ANALYSIS

### Discussion

- We showed that it is possible to measure metabolic rate using a simplistic metabolic chamber
- Personally, I gained experience in annotating and organizing data. I have also learned the method behind monitoring an organism's metabolic rate through a respirometer. I have enjoyed working with Kate in her research and being in this environment.

### Future directions

- There are still 4 control and treatment videos to watch and analyze
- Using a DNA barcode, we will eventually get the ID's of the individual bees
- After all videos have been annotated, and the bees are ID'd, we will analyze to match nylon filament to bee metabolic data



Image(s) 5. Stock Imagery of Known Collected Bees (Credit: Flickr.com)

## WORKS CITED

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