CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

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Project Number

35899

Project Title

Exploring the Learning Behavior of Pogonomyrmex barbatus Ants in the Absence of Pheromonal Cues

Abstract

Objectives/Goals

Our objective was to find if pogonomyrmex barbatus ants are able to remember their surroundings by going through several trials without the help of pheromonal cues

Methods/Materials

There will be 20 pogonomyrmex barbatus ants, each separated in 2 groups (group A, group B). Group A will be in a choice chamber that contains two choices (sides) and a center, each individually separated by a wall. The North side of the choice chamber contains 0.5 ml of honey, while the South side has nothing. after the honey is inserted the ants will be put at the center and then the walls will be removed from the chamber, allowing the ants to choose a side. when the ants finish deciding (the North side of the chamber is the right choice since the ants will want to acquire food due to hunger) the data will be recorded where each ants were (North or South), and the ants will be removed to a separate container for us to clean out the pheromonal cues with a watered paper towel(the honey will be always at the North side). This will be done 5 trials for 5 days (these trials will be the learning process for the ants). Group B will be kept in a 5 degree C container with food (apple)(group B is not able to learn) while group A under goes these trials for 5 days. On the 6th day group A and B will go though 5 trials.

Results

The raw numbers show that for the trained group of ants (group A), more ants chose the side with the foods during the experimental runs, whereas the untrained ants (group B) were evenly dispersed. We examined this data using chi square analyses. In all but one trial for the trained ants, the chi square test proved to be significant. Every trial for the untrained ants had an insignificant chi square value. We also performed a T-test for the two populations. The calculations proved the t test value was also significant.

Conclusions/Discussion

the results from the experiment supported our hypothesis that ants can comprehend and retain information about their environment and make appropriate future decisions without pheromonal cues. Both the chi square and the t test analyses showed that their behavior in consistently choosing the chamber with honey was not likely due to chance. From this, we inferred that the ants were able to process and commit characteristics of the environment to memory after previous exposure.

Summary Statement

The capacity of a group of pogonomyrmex barbatus ants to learn its environment without pheromonal cues

Help Received

Jane Zhou helped us understand the use of a T-test

Preliminary