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Principles of Biology 002

Lab

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How Well Termites Follow a Thick Pen Line as Opposed to a Thin Pen Line

Introduction

Termites and other invertebrates are important indicators of the overall health of an ecosystem. Studying these animals can be a window into a world that is often looked over, and can provide insight into things otherwise missed. Termites, like ants, follow the pheromone trails of other termites, and it has been discovered that the ink in some pens release a similar pheromone (Chen, et al. 1998). Pheromones are an important part of the life of invertebrates, and understanding them can shed more light on the world of termites. This experiment is testing for termites will travel farther on a thicker pen line as opposed to a thinner one. The purpose of this is to determine how much of the pheromone is necessary for the termites to be able to follow it. If the termites were to spend more time on the thinner line, it could indicate that they do not need too much of the pheromone to follow it. If the termites tend to travel the same distance on both of the lines, it could indicate the the density of the pheromone does not matter.

Methods

To conduct this experiment two containers were selected and paper was placed in both of them. On one of the papers, a thin line was drawn with ballpoint pen, and on the other one a thick line is drawn with the same pen. Using a pencil and ruler, centimeter marks were made alongside the line in order to accurately measure the distance the termite traveled. Next, one termite was placed in the container with the thin line and another termite was placed in the container with the thick line. Both termites were placed at the start of the line at the same time. Once the measurement was gathered, the termites and the paper were removed, and the process was begun again. A total of eight termites were used for the experiment. The papers were switched each

time to avoid exposure to pheromones from other termites, and the pencil was used because it does not release the same pheromone.

Results

The results of this study show statistical significance between the thick line and the thin line as shown in figure 1. The termites tended to lose track of the line and then find their way back, or turn around and double back across the line. The centimeters were counted either way, as long as the termite was directly following the line.

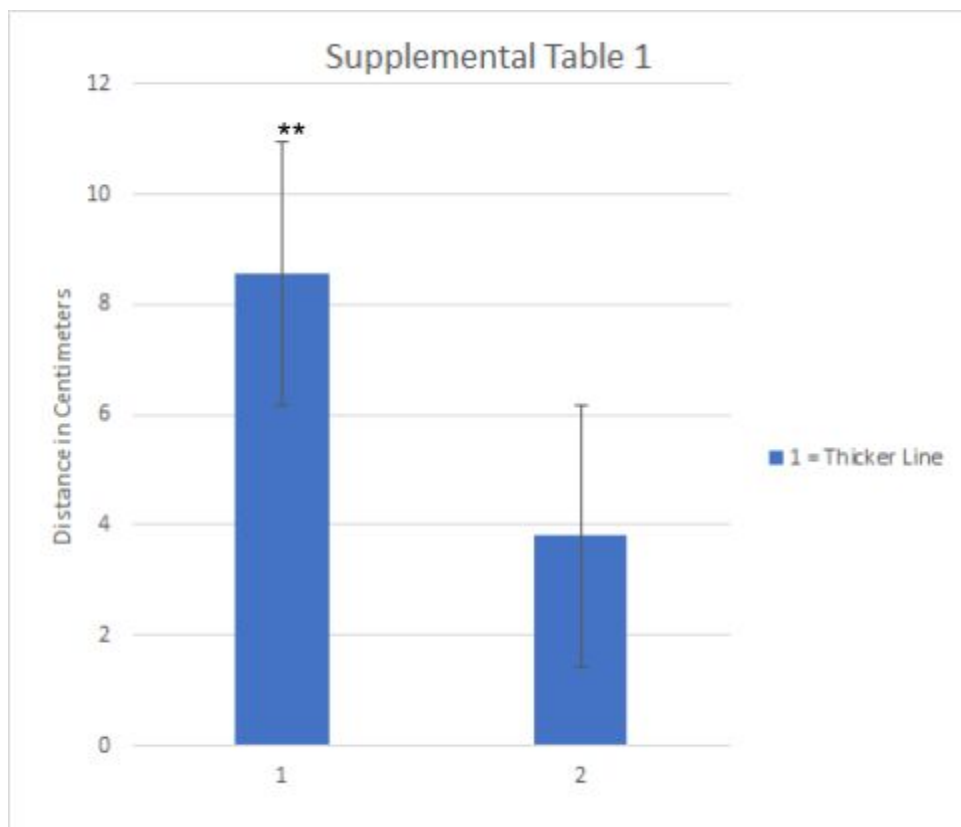


Figure 1

1. Footnote: There was statistical significance indicated by the data

P-Value= .126

2. Footnote: Statistical significance is shown by the asterisks

Discussion

There was significant variability in the data, but also a strong indication that the termites were able to follow the thicker line for longer. While this information does not conclusively prove anything, it supports the hypothesis that termites need a higher concentration of the pheromone in the pen in order to detect and or continue to follow it. It is important to note that much of the time, the termites would get distracted or possibly lose the scent, but then find their way back to the line. It is possible that the shorter distances were caused by the termites being stressed or tired, as two termites went in two different containers at once and then swapped places after the paper had been replaced. It is also important to note that while the congealed data shows statistical significance, the individual scores of the termites are extremely varied. If this were to be further explored, it could easily be discovered that the density of the pheromone has no effect on the termites ability to follow it. Further research could potentially look at termites in their natural habitat to see whether the pen ink has any effect on them there, or simply test a larger sample size.

Reference

-Chen J, Henderson G, Laine, A. R (1998) Isolation and Identification of 2-Phenoxyethanol from a Ballpoint Pen Ink Trail- Following Substance of *Coptotermes formosanus* Shraki and *Reticulitermes* Cell. 98-105