



CALIFORNIA STATE SCIENCE FAIR 2006 PROJECT SUMMARY

Name(s) Erin H. Welter	Project Number S1921
Project Title Termites Doing Geometry?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals This science fair project tested the hypothesis that termites determine the direction of their nest from the degrees of the angles found in their pheromone trails. The ink from the Papermate# was used to mimic the actual pheromone the termites laid down in their trails. The main experiments tested if the termites were capable of using the different angles in the trails to help find their way to and from their destination like ants do.</p> <p>Main Hypothesis: Do termites use the angles (geometry) of their pheromone trail to tell the direction of their food source or nest?</p> <p>Sub-Hypotheses: Can this species of termites follow the parapheromone found in a blue Papermate ball point pen? Do the termites follow the color blue? Do they use information from the geometry of their trail to find their nest (obtuse and acute angles)?</p> <p>Methods/Materials A series of experiments were conducted to develop the procedures for testing the effects of trail angle on termite orientation. Two types of inks were compared for their ability to generate artificial trails that the termites would follow. Using artificial trails, termites were presented with a choice of two different paths, which intersected the original path at different angles. The different angles were presented in two different categories: acute (43° and 60°) and obtuse angles (120°, 150°, and 158.5°).</p> <p>Results The termites were able to distinguish between trails made with the parapheromone from the Papermate pen, which allowed for construction of artificial trails of different angles. Termites selected all trails equally regardless of the angle from which they intersected the original trail. These results failed to support my hypothesis.</p> <p>Conclusions/Discussion Overall, the experiments showed that the termites do not use the angles of the trail to determine their orientation to their nest or food source. In other words, termites cannot do geometry. While the termites were able to differentiate between the parapheromone (Papermate blue pen) from the other trail odor (Bic blue pen ink), the choice as to the particular angle selected appears to be random or at least not significantly different at $P < 0.05$. Termites do not appear to be using the same cues as more advanced species such as the ants.</p>	
Summary Statement These experiments tested if termites were able to use the angles of their pheromone trails to determine the direction of their food source and nest.	
Help Received Dr. Vernard Lewis donated the termites; Father helped with data analysis and talking through the experiments; High school teacher helped with paper structure	