



CALIFORNIA STATE SCIENCE FAIR 2009 PROJECT SUMMARY

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Project Title Scents of Direction	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Our underlying goal of the entire project was to find a non-toxic, environmentally safe, pheromone based ant repellent.</p> <p>Methods/Materials We tested for the existence of each main pheromone (i.e. positive - "food-marking"; negative - "no entry"; panic pheromone) separately to observe its effect on the ants and to use this qualitative data as a foundation upon which to base the remainder of our experiments. To test, we used a trail bifurcation fork to study behavioral patterns in response to the variable stimuli placed upon the ants. Further hybrid tests matched first two at a time, then all three of the pheromones to judge comparative strength. Thirdly, we analyzed our observations and chose to further investigate each of our pheromones in a pest control scenario.</p> <p>Results Trends in our data proved the existence of the positive, negative, and panic pheromones - the first stage of our experiment. In the positive pheromone tests , a large initial number of ants crossed the positive pheromone paper while less crossed the control paper, showing that there was a force of attraction on the positive paper. The negative pheromone test showed that the negative pheromone existed because more ants consistently went up the control paper side. The panic pheromone was proven to exist because ant behavior changed drastically when they experienced a stress and once coming into contact with other ants, saw a spread in the panicked behavior. In testing pheromone strength, we found the negative pheromone to be stronger than the positive pheromone and the panic pheromone to be strongest - while ants were exhibiting behavior designated to the positive and negative pheromones, their instructions were easily overwritten by instructions from the panic pheromone.</p> <p>Conclusions/Discussion Thanks to the recent works of the University of Sheffield and other giants, we can see with new clarity the potential importance of pheromone zoology. We found that an elegantly simple solution to the balance issue between pest and human can be found in the ant's own glands, in the form of a foraging efficiency boosting negative pheromone. If this pheromone can be isolated and identified, we may usher in a new era of pest control, where the offenders are not harmed, and humans act as benign inhabitants of the world, not the sole rulers of it.</p>	
Summary Statement Using arrays of bifurcation forks and manipulative stresses, we tested the traits and existences of three pheromones of <i>Monomorium pharaonis</i> , their interaction in creating a system of communication, and their ability to replace ant poison.	
Help Received	