



**CALIFORNIA STATE SCIENCE FAIR  
2013 PROJECT SUMMARY**

<b>Name(s)</b> <b>Arantxa Ortiz</b>	<b>Project Number</b> <b>S1729</b>
<b>Project Title</b> <b>The Effects of Eugenol-based Natural Anesthetics on Nerve Conduction Velocity in Lumbricus terrestris</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The goal of this project was to determine whether natural anesthetics composed of Eugenol affected conduction velocity in earthworms. Since reflexes become slower under anesthetics and analgesics, it is hypothesized that the nerve impulses will be slower. <b>Methods/Materials</b> The Lumbricus terrestris are anesthetized in solutions of ethanol, clove oil, and cinnamon oil. After anesthetizing the earthworms each worm is stimulated with a glass probe and the action potentials that result are recorded by the computer software Audacity. Then when the impulse passes through each electrode (all of them are one inch apart) the difference in time is analyzed in order to calculate the conduction velocity. When comparing conduction velocity, the unanesthetized worms serve as the negative control while worms anesthetized with ethanol serve as the positive control. After this, 2 sample t tests are used to determine whether or not there is a difference in conduction velocity when using these Eugenol-based solutions. The materials used are 2 beakers, 1 graduated cylinder, 2 medium sized glass containers, tap water, two-channel input cable, cinnamomum cassia oil, cinnamomum vera oil, clove oil, 40% ethanol, ruler, Spikerbox, glass probe, styrofoam, Faraday cage, laptop, and Lumbricus terrestris. <b>Results</b> After conducting 2 sample t tests, the results contradicted the hypothesis that Eugenol-based natural anesthetics result in slower nerve impulses. Contrary to this, the t tests showed that the solutions with higher naturally occurring percentages of Eugenol resulted in faster nerve conduction velocities. However, Cinnamomum cassia (10% Eugenol) resulted in the slowest nerve impulses. <b>Conclusions/Discussion</b> From this research it can only be concluded that a higher percentage of Eugenol results in faster nerve impulses. However, the fact that anesthetizing earthworms with Cinnamomum cassia resulted in the slowest conduction velocities leaves room for further research. With this experiment it is impossible to ascertain which properties of Eugenol are causing the impulses to become faster. The increase in conduction velocity can not be attributable to the anesthetic and analgesic properties. In the future, a solution of Eugenol extract would allow for more accurate measurements of the effects of Eugenol, as it would exclude the effects of the other components of these anesthetics/analgesics.	
<b>Summary Statement</b> The project tests the effects of natural anesthetics and analgesics on nerve conduction velocity in earthworms.	
<b>Help Received</b> Kyle Shannon, Graduate Neuroscience student from UCSD provided counsel	