



CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

Name(s) Moshe M.P. Parnas	Project Number J2212
Project Title Effect of Reversing Magnetic Fields on Darkling Beetle Larvae	
<div>Objectives/Goals Earth's magnetic field has periodically reversed polarity, some believe that it has begun a process of slowly reversing. Since this isn't in recorded history, it is unknown what effect pole reversals will have on living organisms, especially those that use the Earth's magnetic field for migration. The project's purpose is to determine if reversing magnetic fields will have an effect on the activity of mealworms.</div> <div>Abstract 20 Mid-sized mealworms were placed into each of 2 small aquariums with 1 inch of bran flakes for bedding. A transparent 1-inch grid was placed on the bottom of 2 tanks, aligned so the center of the grid marked the equator between 2 reversible and opposing magnetic fields of strong bar magnets. Slices of apple were placed in the center for moisture. The magnetic poles in tank 1 were reversed every 2 weeks for 4 weeks. The control tank's magnets were not reversed throughout the test. The locations of the larvae were recorded every 3-4 days. As an alternate control, a tank with no magnets inside was observed and recorded. Procedures were repeated 4 times, each with new mealworms.</div> <div>Methods/Materials 20 Mid-sized mealworms were placed into each of 2 small aquariums with 1 inch of bran flakes for bedding. A transparent 1-inch grid was placed on the bottom of 2 tanks, aligned so the center of the grid marked the equator between 2 reversible and opposing magnetic fields of strong bar magnets. Slices of apple were placed in the center for moisture. The magnetic poles in tank 1 were reversed every 2 weeks for 4 weeks. The control tank's magnets were not reversed throughout the test. The locations of the larvae were recorded every 3-4 days. As an alternate control, a tank with no magnets inside was observed and recorded. Procedures were repeated 4 times, each with new mealworms.</div> <div>Results Although 19.5 % of the larvae were not visible at recording times, after 6 reversals of the magnetic fields, of the larvae that were visible, 56% preferred to be located near the south pole, while 44% were located north of the center line. The control that had no magnets and was aligned with the Earth's magnetic field, 55% of the visible larvae were located near the south magnetic pole throughout the test. In the control group that had magnets throughout the test, 60% of the visible larvae preferred to locate themselves near the south magnetic pole.</div> <div>Conclusions/Discussion Overall, 15% more of the visible mealworms located near a south magnetic pole, 60% of the visible mealworms in the control with non-reversing magnetic poles were found located near the south magnetic pole. The control without magnets showed that the mealworms preferred to be in the middle right under the apple through a slight preference for the Earth's south magnetic field. Every time the poles were reversed the mealworms slowly migrated to the south, in spite of the apples being in the center. In every case more larvae preferred to be located near the south magnetic pole throughout the tests. When Earth's magnetic field has fully reversed, the results suggest that the mealworms might have difficulty navigating to sources of food and moisture.</div>	
Summary Statement To determine whether a reversed magnetic field has an effect on darkling beetle larvae, the larvae were placed into a container with opposing magnetic fields that were reversed every two weeks as their movements were recorded.	
Help Received My parents for providing me with all the supplies needed for this project, my science teacher, Mr. Schuyler for inspiring me to like science and for his great ideas for this project, Chabad Hebrew Academy for providing my entrance fee, Mrs. Stanley for teaching me about statistical analysis, Mrs. Sniffen for the	