



**CALIFORNIA STATE SCIENCE FAIR  
2014 PROJECT SUMMARY**

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| <b>Name(s)</b><br>Montana A. Sprague   | <b>Project Number</b><br><br>34148 |
| <b>Project Title</b><br>The Magnetic Personality of Butterflies  |                                    |
| <b>Objectives/Goals</b><br>The objective of the project was to investigate whether or not Painted Lady butterflies can track magnetic fields to find food. Painted Ladies migrate to central Illinois every August from various locations, at approximately the same time as Monarch butterflies. The hypothesis was inspired by the belief of some scientists that the Monarch butterfly, a cousin of the Painted Lady, uses the magnetic fields of the earth to migrate. Since Painted Ladies migrated in a similar pattern as the Monarchs, it seemed logical that they might also navigate using magnetic fields. The background research has shown that most migratory creatures use some form of magneto-reception for navigation, even to places they have never been before. If butterflies have that capability, it is conceivable that their internal navigation system might lead to the development of new technology. Also, by understanding the basis of migration patterns, people could possibly help save endangered butterflies by being able to predict their destinations. |                                    |
| <b>Abstract</b><br>The objective of the project was to investigate whether or not Painted Lady butterflies can track magnetic fields to find food. Painted Ladies migrate to central Illinois every August from various locations, at approximately the same time as Monarch butterflies. The hypothesis was inspired by the belief of some scientists that the Monarch butterfly, a cousin of the Painted Lady, uses the magnetic fields of the earth to migrate. Since Painted Ladies migrated in a similar pattern as the Monarchs, it seemed logical that they might also navigate using magnetic fields. The background research has shown that most migratory creatures use some form of magneto-reception for navigation, even to places they have never been before. If butterflies have that capability, it is conceivable that their internal navigation system might lead to the development of new technology. Also, by understanding the basis of migration patterns, people could possibly help save endangered butterflies by being able to predict their destinations.         |                                    |
| <b>Methods/Materials</b><br>This project required the construction of six butterfly enclosures made from chicken wire. Each enclosure contained six butterflies and a plate of assorted fruit. In three of the cages, a grade N48 neodymium earth magnet was placed under the plate, while the other three cages (control group) had no magnet. The butterflies were allowed to feed on the fruit plates for one week, after which the fruit plates were removed. Then, an empty plate and a box were placed in each of the six enclosures, with a magnet under three of the boxes. The number of butterflies that flew within 20 centimeters of the box confirmed how many tracked the magnets.   |                                    |
| <b>Results</b><br>The results of this experiment clearly supported the hypothesis. The butterflies in the cages with magnetized plates tracked the food up to five times more frequently than the others. These results lead one to conclude that butterflies do in fact tend to track magnetic fields.  |                                    |
| <b>Conclusions/Discussion</b><br>In conclusion, the butterflies were certainly drawn to the magnets, supporting the hypothesis. While other researchers have drawn similar conclusions in the past, the outcomes were attributed to other variables, such as color, smell, or sight. With these variables removed from consideration, it is reasonable to conclude that Painted Lady butterflies are indeed capable of tracking magnetic fields.   |                                    |
| <b>Summary Statement</b><br>This project investigated whether or not Painted Lady butterflies can track magnetic fields to find food.  |                                    |
| <b>Help Received</b><br>Carol Boggs, PhD, who during the course of this experiment left her position as a professor at Stanford University to accept a Department Director position at the University of South Carolina, read the initial project proposal and provided helpful information regarding the behavior of butterflies.   |                                    |