



**CALIFORNIA STATE SCIENCE FAIR  
2007 PROJECT SUMMARY**

<b>Name(s)</b> <b>Winter R. Patterson</b>	<b>Project Number</b> <b>J1919</b>
<b>Project Title</b> <b>Eye of the Gecko: Color Sight in the Dark of the Night?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Unlike most vertebrates, nocturnal geckos are born without any rods in their retinas, and must depend solely on their cones for nighttime vision. In daylight conditions, Hemidactylus frenatus can see shades of blues and greens. The purpose of my project was to find out whether these geckos could also see these colors in light conditions dark enough where humans and most vertebrates can not detect color.</p> <p><b>Methods/Materials</b> I designed a box that contained two tubes. One of the tubes was tagged with the color blue, and the other was tagged with a gray of the same intensity. If the gecko went through the blue tube a reward was given, but if a gecko went through the gray tube, the gecko would be placed back at the start of the box as many times as necessary until the blue tube was chosen. During testing the amount of light in the room was less than <math>10^{-2}</math> cd/m<sup>2</sup>. First the geckos had 16 nights of training to get accustomed to the box and the different tubes, and then they were given an additional 16 nights of testing.</p> <p><b>Results</b> In the 16 nights that followed training, I found that Gecko #1 chose the blue tube on his first attempt through the box each night 75% of the nights. Gecko #2 chose the blue tube on his first attempt through the box each night 62.5% of the nights. I also found that as the days progressed, both geckos' accuracy increased, even in the final few days of testing. In addition, I found that from nights 8-32, it never took either gecko more than 2 attempts to choose the blue tube.</p> <p><b>Conclusions/Discussion</b> From my results I can not conclude that nocturnal geckos can see color in minimal light. The percentage of times that the blue tube was chosen on the first attempt through the box each night was not significantly high, and do not support my hypothesis because I expected the percentages to be above 80%. However, I did find accuracy to improve over time, and with more trials, I may have found higher percentages in my results. An interesting result that came up was that it never took either gecko more than 2 attempts to choose the blue tube each night. This result informed me about a gecko's intellect rather than a gecko's sight. Hemidactylus frenatus, I learned, must have a memory capable of knowing that if one of the tubes is "wrong", then the other tube must be "right".</p>	
<b>Summary Statement</b> Can nocturnal geckos see color in light conditions low enough where humans and most other vertebrates can not?	
<b>Help Received</b> Mother bought supplies; Local reptile expert helped with background research.	