



CALIFORNIA STATE SCIENCE FAIR 2016 PROJECT SUMMARY

Name(s) Khushi T. Parikh	Project Number J1513
Project Title The Effect of the Timing of Light Exposure on the Circadian Cycles of Dinoflagellates	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of my project was to determine if the circadian cycles of an organism could be artificially altered using a timed light source without having a negative impact on the mental, behavioral, and physical health of the organism.</p> <p>Methods/Materials 8 containers of dinoflagellates as bioassays, 4 closets equipped with a light source and a light timer which were programmed to turn on and off at different times of the day, self-built light measurement device using a light sensitive chip (the TSL237), an Arduino board, and C++.</p> <p>Four closets with different light cycles were used to alter the circadian rhythms of the different groups of dinoflagellates. The first group was the control, the second group had a phase shift back, the third group had a phase shift forward, and the fourth group had a complete reversal of the timing of the control group. Each day, I recorded the amount of bioluminescence produced by each container of dinoflagellates at very specific times in the day (their nighttime) by agitating them. Since the bioluminescence produced by the dinoflagellates was at a very low intensity, I had to build and program a special light measurement device.</p> <p>Results My results indicate that the control group was the most consistent and had the highest average out of all of the groups. However, the other groups did survive and even did thrive. The third group had the highest peak out of all of the groups, including the control, and had the highest average out of Group 2, 3, and 4. The fourth group had an average and peak just below the average and peak of Group 3. Group 2 had the lowest average and peak.</p> <p>Conclusions/Discussion The main conclusion of my experiment was that my hypothesis was unsupported, and it is possible to artificially alter the circadian cycle of an organism using a timed light source and maintain the physical, mental, and behavior health of the organism. This knowledge will be very helpful to us when NASA decides to send people to Mars, which has a 24 hour 39 minute cycle. It would be important to know how bodies would react to an altered light cycle so the journey can be efficient and safe.</p>	
Summary Statement I used a custom-built light measurement device and the bioluminescence property of dinoflagellates to measure the effects of an artificially altered circadian cycle on organisms.	
Help Received I received help from my teacher and research on the internet to build the light measurement device.	