



# CALIFORNIA STATE SCIENCE FAIR 2014 PROJECT SUMMARY

<b>Name(s)</b> <b>Hunter C. Crawford-Shelmadine</b>	<b>Project Number</b> <b>J1706</b>
<b>Project Title</b> <b>Bioluminescence: The Lights under the Sea</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective is to determine how exposure to light affects how bright bioluminescent dinoflaggelettes glow and how exposure to increased acidity in the water affects how bright they glow.</p> <p><b>Methods/Materials</b> Fourteen vials of dinoflaggelettes were ordered and labeled. Three environments were set up and placed under a florescent light 24/7 to reverse the day/night cycle so I can test during the night. The light-only vials (2) were placed in a clear glass; the dark-only vials (2) were covered in foil and placed in a box, the light/dark vials (2) rotated every 12 hours between the two. All 8 vials testing for impact of acidity were placed in the light/dark environment. The vials were: control (2), one drop of vinegar (2), 2 drops (2), 3 drops (2). The pH was tested and recorded. The brightness data was recorded up to 4 times a day in a pitch black setting for 5 days.</p> <p><b>Results</b> The trend for the dinoflaggelettes in the dark-only environment and the light/dark environment was that their luminescence peaked up to a value of 6 at the beginning of the day and dropped back down to 0 by the end of the day. The light-only cycle organisms stayed at the mid-range (3-4) of brightness throughout most of the day and dropped to 0 at night. Surprisingly, the dark-only dinoflaggelettes produced the brightest and most consistent luminescence. Exposure to light actually suppressed their luminescence. All organisms affected by any increase in acidity died after the first 12 hours.</p> <p><b>Conclusions/Discussion</b> My first hypothesis was partially correct, as the luminescence of the dinoflaggelettes in light/dark environment organisms reached a 6 (the brightest glow), but so did the dinoflaggelettes in the dark-only environment. In fact, the dinoflaggelettes in the dark-only environment were recorded at a 6 more times than the others. My second hypothesis was correct, as the dinoflaggelettes were negatively affected by increased acidity and did not glow as bright and died quickly. These results show that exposure to light does not increase luminescence but actually suppresses their ability to glow. They also show that increased ocean acidification will easily harm dinoflaggelettes. This research calls for further studies on the impact of ocean acidification on other bioluminescent organisms.</p>	
<b>Summary Statement</b> This project is a study of how exposure to light and an acidic environment impacts the luminescence of dinoflaggelettes.	
<b>Help Received</b> My mentor suggested that I combine my two ideas into this project and gave suggestions to improve my graphs. My mom printed the display labels and helped me get the materials I needed for this project.	