



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

Name(s) Annabelle Hsieh	Project Number J1510
Project Title How Temperature Stressors Affect Organelle Movement during the Light to Dark Cycle of Pyrocystis fusiformis	
<p style="text-align: center;">Abstract</p> <p>Objectives To study the effect of temperature on organelle movements in Pyrocystis fusiformis during light (peripheral organelles) to dark (central) transition.</p> <p>Methods The Pyrocystis fusiformis control group was maintained at room temperature, whereas two experimental groups were exposed to 15 C and at 30 C respectively. The organisms were photographed with an inverted microscope at 30-minute intervals for up to 2 hours. Pyrocystis cells were categorized in stages of organelle retraction from a peripheral (A), intermediate (B,C) to a central position (D). The percentage of each group relative to the total cells observed was calculated</p> <p>Results Cold temperature (15 C) slowed down the movement of organelles. At the final time point only 20% of Pyrocystis were in Group D, compared to 37% in the control. High temperature (30 C) sped up the transition, by the second time point 61% were in Group C vs. 20% in the control. No increase in dead or damaged cells (Group X) was observed.</p> <p>Conclusions Cold temperatures (15 C) decreased the movement of organelles toward the nucleus whereas warm temperatures (30 C) increased it. This is likely due to the effect of temperature on the metabolism. Thus, low temperatures slow down the light to dark cycle transition and delay bioluminescence. At high temperatures (30 C) faster movement of the organelles promotes bioluminescence. The shifts in temperature did not cause cell death in the observed time frame, suggesting that pyrocystis can survive brief temperature shifts to 15 and 30 C.</p>	
Summary Statement I showed that cold temperatures slowed down organelle movement and hot temperatures sped up organelle movement during the light to dark cycle transition in Pyrocystis fusiformis, therefore delaying or speeding up bioluminescence.	
Help Received Dr. Chris Buser, PhD provided the materials and the laboratory space needed to carry out my experiment. He also taught me how to use the microscopes and camera.	