



CALIFORNIA STATE SCIENCE FAIR 2007 PROJECT SUMMARY

Name(s) Debra C. Chang	Project Number S1507
Project Title Reduction of Bioluminescence in Cypridina hilgendorfii by Varying Phosphate Concentrations	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of this study was to determine the effect of varying phosphate concentrations on the bioluminescence from a marine shrimp, <i>Cypridina hilgendorfii</i> (also <i>Vargula hilgendorfii</i>, sea firefly, or Japanese ostracod). This project targets the chemical reaction of luciferin and luciferase, the reactants that produces light.</p> <p>Methods/Materials Dried and powdered <i>Cypridina</i> was introduced in water solution of trisodium phosphate dodecahydrate in 0.005 g/mL, 0.01 g/mL and 0.015 g/mL. The control group was pure distilled water with no phosphate. Two mL of the phosphate solution and 0.05 g of ground <i>Cypridina</i> were placed in a cuvette. Four trials were done per concentration for a total of 16 trials. Photographs were taken during this entire procedure in a darkroom using a digital camera at exposures of 8, 10 and 15 seconds.</p> <p>Results Various attempts to accurately quantify the amount of light transmitted, such as using a sensitive light meter, did not yield usable results due to the source's dimness. It became necessary to quantify the emitted light by establishing a standard of brightness scale. The standard was determined by choosing the average brightness from the four untreated cuvettes in the control group. The results were determined by using the number of seconds of exposure needed to reach the light intensity of the standard.</p> <p>Conclusions/Discussion With increasing dosage, the time observed to reach standard brightness increased. Numerical analysis suggests that there is a simple, direct ratio between the amount of light emitted and time elapsed after initial mixing of the solution. A similar relationship appears to exist between dosage and amount of light transmitted. With the significant diminishment of light caused by the sodium phosphate, this study suggests that <i>Cypridina</i> can be used as a bio-indicator for phosphate pollution and possibly water quality in general.</p>	
Summary Statement This project examines the effect of phosphate, a common water pollutant, in varying concentrations on the bioluminescence of <i>Cypridina hilgendorfii</i> by targeting the reaction that produces light.	
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