



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> <b>Grant King; Sarah Lamp; Matt Rhodes</b>	<b>Project Number</b> <b>S0820</b>
<b>Project Title</b> <b>The Effect of Light Frequency and Intensity on the Flora of Winogradsky Columns</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> This project is a microbiology experiment on the effects of light frequency and intensity on growing Winogradsky columns. A Winogradsky column is essentially a self-contained ecosystem that can be grown using pond mud and water, a sulfate source, and a carbon source. Since the ecosystems within them are carefully balanced, we tried to determine how temperature increases similar to those that might result from global warming would influence a typical pond ecosystem as well as if different frequencies of light actually influence chloroplast function to a measurable extent.</p> <p><b>Methods/Materials</b> In order to do this, we set up light bulbs of different frequencies and intensities (the independent variables) within self-contained boxes, and allowed the columns to grow within without outside influence. Our control group was 450 Lumens, and we periodically tested temperature and pH (the dependent variables). We also observed each Winogradsky column during these tests for any plant, algal and bacterial growth.</p> <p><b>Results</b> Through our experimentation, we found that acidity increased over time likely due to cellular respiration, while the higher the intensity, the higher the temperature. Algae growth overwhelms plant growth at 1600, though generally vegetation increases with intensity and decreases under color bulbs, and bacterial growth was strongest under the full light spectrum bulb.</p> <p><b>Conclusions/Discussion</b> These results were expected, though our columns in general exhibited less growth than predicted. In the future, we would be interested in determining at what temperature the algae growth exceeds plant growth as well why was bacterial growth hindered in some of the columns.</p>	
<b>Summary Statement</b> Our project tested the effects of various light frequency and intensity on a pond ecosystem to simulate global warming.	
<b>Help Received</b> Dr. Maholtra helped us with brainstorming and provided many materials from our High School; Used lab equipment at Cal Lutheran University under the supervision of Dr. Kenneth Long	