



CALIFORNIA STATE SCIENCE FAIR 2017 PROJECT SUMMARY

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Project Title The Effect of the Wavelength of Light on the Growth Rate of Cyanobacteria and Its Survival In a Martian Atmosphere	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of this experiment was to test in what wavelength the cyanobacteria <i>Cylindrospermum</i> (Substitute for <i>Chroococidiopsis</i>) grows best and whether these wavelengths had an effect on the survival rate of cyanobacteria in a Martian atmosphere. The Martian atmosphere aspect was introduced because of a NASA statement that mentioned that <i>Chroococidiopsis</i> could be important in the colonization of Mars.</p> <p>Methods/Materials The experiment consisted of two parts, Experiment A and Experiment B. Experiment A consisted of cell culture placed in incubators under six colored LED lights and incubated. After incubation, cell counts were recorded using a hemocytometer. Experiment B was a follow through of Experiment A that used the wavelength with the best growth rate to prolong the survival of the bacteria in a Martian atmosphere. The control was a culture left in Earth conditions while two other cultures (sunlight and LED) were placed in two airtight plexiglass cubes and introduced to a ratio of gases that matched the Martian atmosphere. Materials: Cell culture, Alga-Gro Medium, Erlenmeyer flasks, incubators, LED bulbs, microfuge tubes, microscope, hemocytometer, plexiglass sheets, and vacuum pumps.</p> <p>Results The results of Experiment A showed that the cyanobacteria samples exposed to longer wavelengths grew faster than samples placed under short wavelengths. The results of Experiment B showed that although the LED light increased initial survival compared to cell sample beneath the sunlight, this was followed by a rapid death due to lack of resources in the closed cubes. The results indicated a positive effect of longer wavelengths of light on growth rate, but that those same wavelengths reduced the survivability in a Martian atmosphere as it increased rate of decay.</p> <p>Conclusions/Discussion The results of Experiment A supported the hypothesis that predicted an increase in growth rate underneath longer wavelengths of light. The results of Experiment B opposed the hypothesis that predicted that the longer wavelengths would prolong the bacteria's survival as the results showed that long wavelengths increased the rate of decay. The results fulfilled the objective in terms of obtaining data on the effects of different wavelengths on growth rate/survivability. The information furthers the knowledge of growth patterns in cyanobacteria and this could be used to prolong survival of cyanobacteria on Mars.</p>	
Summary Statement We found, by measuring the cell counts over time, that longer wavelengths increase the growth rate of the cyanobacteria, but also increased the rate of death of the cyanobacteria in a Martian atmosphere.	
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