



**CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY**

Name(s) Maariyah Patel	Project Number J1423
Project Title Are You Sun Savvy? Protecting <i>Serratia marcescens</i> against Ultraviolet Radiation	
Abstract Objectives/Goals The purpose of my experiment was to observe the effects of short term ultraviolet light exposure on bacterial growth. I also wanted to determine whether sunblocks will protect the bacteria against damaging effects of UV light, and whether the physical ingredient, titanium dioxide, or the chemical ingredient, oxybenzone, in sunblocks is more effective in protecting bacteria against ultraviolet light exposure. I hypothesized that the longer the exposure to ultraviolet light, the less bacterial growth. I also hypothesized that the physical ingredient, titanium dioxide, would protect the bacteria better than the chemical ingredient, oxybenzone. Methods/Materials For each experiment, nutrient agar plates were streaked with diluted <i>Serratia marcescens</i> using a calibrated loop. Experiment 1- plates were labeled and exposed to UV light for a specified but differing time period. The control plate was not exposed to the UV light. After exposure, plates were incubated for 24 hours. Colony count recorded. Three trials were performed. Experiment 2- sunblocks tested had been selected so that their only difference in active ingredients would distinctly be titanium dioxide or oxybenzone. Titanium dioxide and oxybenzone sunblocks were each spread onto separate plastic wrap sheets, which were placed over the plates. Two controls were also created. The plates were exposed to UV light for specific time lengths throughout three trials. After exposure, plates were incubated for 24 hours. Colony count recorded. Results After incubation, <i>Serratia marcescens</i> not exposed to UV light were observed to have grown into distinct colonies. Bacterial growth decreased significantly with increasing time exposure. None of the bacteria exposed to UV light for 3, 4, or 5 minutes survived. I also observed that the titanium dioxide sunblocks protected at least 15% more <i>Serratia marcescens</i> than the oxybenzone sunblocks, irrespective of the time exposure. Conclusions/Discussion The results proved my first hypothesis partly correct. As the UV light exposure time increased, the bacterial growth decreased. However, it was not expected that <i>Serratia marcescens</i> bacteria exposed to ultraviolet light for 2 minutes would result in almost complete mortality. My second hypothesis was proven correct. From my results, I concluded that the titanium dioxide sunblocks were more effective in protecting <i>Serratia marcescens</i> against ultraviolet light than oxybenzone.	
Summary Statement In this experiment, I observed the effects of short term ultraviolet light exposure on <i>Serratia marcescens</i> , and determined that titanium dioxide is more effective than oxybenzone in protecting <i>Serratia marcescens</i> against UV radiation.	
Help Received I used the equipment at the LAC+USC Microbiology lab. My mother and father provided me guidance.	