



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Mariah R. Erlick	Project Number S1307
Project Title Inducing Photoreactivation in E. coli	
Abstract Objectives/Goals The objective is to test whether E. coli survival through photoreactivation can be increased by a brief exposure to ultraviolet light prior to a longer exposure. Methods/Materials Groups of K-12 E. coli were exposed to one of three conditions: No UV light, 30 minutes of UV light, and five minutes of UV light followed by 30 minutes of UV light. These groups were each broken up into two groups, one exposed to an hour of visible light after the final 30-minute exposure to UV, one not exposed. Five plates of E. coli were used for each of the six conditions in five trials, for a total of 25 plates for each condition. Plate coverage was evaluated based on histograms of digital photographs. Results Exposing the strain that received visible light to the extra five minutes of UV light showed a 16.3% increase in survival of 6.8% plate coverage, while exposing the strain that received no visible light showed only a 5.3% increase of 1.9% plate coverage. Conclusions/Discussion In this project, photoreactivation, a type of DNA repair, was evaluated by controlling whether bacteria were exposed to visible light or not. Constitutive production of photolyase or other enzymes responsible for photoreactivation were triggered with a shorter UV exposure prior to a longer exposure. My results are also applicable to diseases such as Xeroderma Pigmentosum, which can be treated by introducing photoreactivation into human cells. They are applicable in the field of water purification, as they indicate that decontaminating water infected by E. coli is more effective with a long, single exposure than several shorter exposures.	
Summary Statement Photoreactivation, a DNA repair system, can be induced by a short exposure to ultraviolet light prior to a longer exposure, which may be important in treatment of diseases such as Xeroderma Pigmentosum, as well as water purification.	
Help Received Clint Smith helped with statistical analysis. Dr. Carla Longchamp provided medical information on Xeroderma Pigmentosum.	