



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Kyle R. Rothschild-Mancinelli	Project Number S0424
Project Title The Effects of UV Radiation on Supercoiled DNA: A Three Year Study	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective was to determine whether UV radiation was strong enough to nick or break supercoiled DNA in vitro and in vivo. Specifically I tested to see how much damage the DNA backbone would have after exposure to UV radiation in vitro and in vivo, and its correlation to the survival of the exposed cells. This experiment could act as a template for effects of UV radiation on the human skin cell.</p> <p>Methods/Materials In 2007 I showed that solar radiation could nick and break isolated pUC19 plasmid. In 2008, I exposed pUC19 under a UV hood to test whether the DNA damage occurred at certain sequences. This year, I exposed pUC18 under a UV hood both in live Escherichia coli and as an isolated plasmid in order to begin to understand the effects on a live organism. The E. coli were killed rapidly although a few cells survived to 60 minutes. I also isolated plasmid DNA from exposed cells.</p> <p>Results Gel electrophoresis revealed that nicking of the DNA increased with exposure time in vivo and in vitro. Also, as the exposure time increased, the survival of the cells decreased.</p> <p>Conclusions/Discussion As exposure time increased, less DNA was extracted probably due to further breakage of the DNA backbone. I conclude that nicking directly correlates to the number of cells surviving. Any cells surviving at 60 minutes might have been self-shaded or possibly had survival mechanisms.</p>	
Summary Statement I tested to see how much UV radiation would inhibit the growth of exposed Escherichia coli cells and damage the DNA backbone in vivo and in vitro.	
Help Received Used lab equipment at NASA Ames Research Center under the supervision of Dr. Lynn Rothschild	