



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

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Project Title Assessing the Effects of Solar Ultraviolet Radiation on Aquatic Ecosystems Using a Supercoiled DNA Dosimeter	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals To test the effects of UV radiation on aquatic ecosystems. To do this I will use a DNA dosimeter made of the pUC18 plasmid and expose it to solar UV radiation underwater and on the surface while using DNA damage, specifically thymine dimer production and phosphate backbone damage, as a proxy for solar UV radiation damage in aquatic ecosystems.</p> <p>Methods/Materials On August 3, 2009 I tested this by exposing a DNA dosimeter made of the plasmid pUC18 1.5 m underwater in a hot tub, and on the surface. I measured the thymine dimer production and breakage of the DNA backbone. The controls were exposed under: Mylar, UV opaque and transparent plastic, and in the dark. I also tested the clarity of different water samples from around the Bay Area, and measured transmittance with a spectrophotometer in order to calculate the different dosages of UV aquatic organisms would receive at different depths.</p> <p>Results At 1.5 m below the surface, single-strand breaks and thymine dimer production was nearly half that of the surface. This means that in #clear# water, the strength of the UV is about half of what it is at the surface. The clarity test showed that ocean water had the lowest percent transmission of UV radiation when compared to distilled water, followed by the Lagoon water and hot tub water.</p> <p>Conclusions/Discussion My data suggest that UVB and UVA cause equal amounts of DNA damage, because when I took away the UVB reaching the DNA, there was half as much damage. It also suggests that as UV is increased on the surface of the Earth, damage to DNA will increase even in aquatic ecosystems.</p>	
Summary Statement To test the effects of UV radiation on aquatic ecosystems through using a DNA dosimeter made of the pUC18 plasmid and expose it to solar UV radiation underwater to test for thymine dimers and DNA phosphate backbone damage.	
Help Received Used lab equipment at NASA Ames Research Center under the supervision of Dr. Lynn Rothschild	