



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Kami E. Richardson	Project Number J1519
Project Title Liquid Gold: The Effects of Sunlight on Algae Based Biofuel Production	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Curious about a "Corn Fed" bumper sticker on a passing car, I decided to look into alternative fuels. The objective of my project is to determine how sunlight affects the lipids that algae produces, and what the optimum amount of sunlight would be to maximize algae lipids.</p> <p>Methods/Materials Algae was gathered, then separated into fifteen flasks of approximately six grams each. Baseline measurements were conducted using a vortex method and repeated on the first three flasks. The remaining twelve flasks were subjected to varying degrees of sunlight per day (4hr, 8hr, 10hr, 24hr), over a six week period, with lipid test measurement two weeks. Two grams of algae from each flask were crushed and acetone added to break down the cell walls. The liquid on the top was put on pre-weighed paper towels so that the water would evaporate, but not the oil. The old weight of the paper towel was then subtracted from the new weight to see how much oil the algae produced.</p> <p>Results The algae stimulated with eight hours of light produced the most amount of lipids, with a 0.233 gram average, which was 8.58% of the original weight. Contrary to the hypothesis, the algae stimulated with 24 hours of light a day produced the second worst average, 0.067 grams. Algae stimulated with ten hours of light a day produced 0.61 grams of algae on average.</p> <p>Conclusions/Discussion The quest to maximize the lipids produced by providing it with 24hrs of continuous light, proved counterproductive. When the algae is pampered at 24hrs, it doesn't need to provide as much oils for itself long term. When the algae is given minimal amounts of sunlight at 4hrs, it dies off quickly. Eight hours seems to be the ideal mid-point.</p>	
Summary Statement Optimal light conditions to maximize algae lipids for biofuel production.	
Help Received Dr. Dominique Mendola, Ph.D, UCSD, answered questions via email about how to grow algae and was encouraging me to continue pursuing alternative energy solutions.	