



**CALIFORNIA STATE SCIENCE FAIR  
2012 PROJECT SUMMARY**

<b>Name(s)</b> Andy S. Meyers	<b>Project Number</b> <b>S1517</b>
<b>Project Title</b> <b>Algae: The Living Oil Factory</b>	
<b>Objectives/Goals</b> The objective is to determine whether a pressure cooker or microwave is more effective in breaking open the cell membranes of algae to release the oil to produce biofuel.	
<b>Abstract</b> <b>Methods/Materials</b> The algal strain <i>Tetraselmis chuii</i> was cultured in two closed photobioreactors. The algae was harvested using the filtering and settling methods. About 120 ml of algae was harvested for testing. Samples were heated for approximately 30 seconds in a microwave and for ten minutes in a pressure cooker. The processed samples were mixed with light petroleum distillate and centrifuged. The top layers were separated and analyzed.  Materials: Culturing: photobioreactor, algae in medium ( <i>Tetraselmis chuii</i> , distilled water, salt, algae nutrient, iron and manganese Harvesting - Filtering method: coffee filters and buckets Settling method: graduated cylinders and pans Extracting: microwave, pressure cooker, beakers, vials, metal container for pressure cooker	
<b>Results</b> 1) .5 ml of oil were derived from each of the pressure cooker and microwave samples representing 10% and 7.7% of wet biomass, respectively. 2) Observations of processed algae under a microscope and the centrifuged layers suggested that the cell membranes had been ruptured in all samples.	
<b>Conclusions/Discussion</b> 1. Culturing: No issues were incurred in culturing. Since culturing requires monitoring light, salt, pH, nutrients, and water and air temperature, it can be difficult. The <i>Tetraselmis chuii</i> is a hearty strain. 2. Harvesting: The filtering method could not be used because of the small size of the <i>Tetraselmis chuii</i> . The settling method worked but was time and space consuming. 3. Extracting: a. Both microwave and pressure cooker tests were successful in rupturing the cell and releasing the oil. b. Both the microwave and pressure cooker method can be used with #wet# algae which eliminates the step of drying. c. The pressure cooker was easier to use. The microwave was difficult to monitor as algae started to boil	
<b>Summary Statement</b> I researched extraction methods to obtain oil from algae as a potential source for a biofuel	
<b>Help Received</b> Dr. Steve Lyon explained harvesting methods; Used lab equipment at Cal Poly Pomona under the supervision of Professor Joelle Opotowski and Grad Student Diane Engler; Mother helped me prepare my board	