



**CALIFORNIA STATE SCIENCE FAIR  
2006 PROJECT SUMMARY**

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<b>Project Title</b> <b>Climate Change and Coral Reefs: Trouble Ahead?</b>	
<b>Abstract</b> <b>Objectives/Goals</b> Oceans are becoming warmer and more acidic as the result of human activities like burning fossil fuels. This project investigates the effect of decreased pH and increased temperature on the ability of algal coral symbionts to use photosynthesis. The research may help to better understand coral reef bleaching events. <b>Methods/Materials</b> Three experiments were performed. In the first two experiments, the pH of the algal growth media was decreased by adding a chemical buffer or by adding gaseous CO <sub>2</sub> . In the third experiment, an electric heater was used to increase the temperature of the algal cultures. After changing the pH or temperature, the photosynthetic quantum efficiency of the algae was measured using a fluorometer. Other studies have demonstrated a strong relationship between lower quantum efficiency and environmental stress. <b>Results</b> Decreasing the pH of the algal cultures by the addition of a buffer solution or by adding gaseous CO <sub>2</sub> was very weakly correlated with quantum efficiency. Increasing the temperature of the algal cultures was very strongly negatively correlated with lower quantum efficiency. The relationship of increased temperature to lower quantum efficiency was so strong that it passes the Student's T Test at a 98% confidence level. <b>Conclusions/Discussion</b> Loss of coral reefs could gravely impact organisms that depend on them as a habitat or a source of food. Fisheries associated with coral reefs provide 25% of the fish catch in developing countries. Tropical oceans are already approaching the critical temperature of 34 degrees Celsius that compromises the photosynthetic mechanisms of algal coral symbionts. Developing an instrument capable of measuring quantum efficiency, temperature and pH in situ on a coral reef will be necessary to better assess the impact of climate change on coral reefs.	
<b>Summary Statement</b> This project investigates the effect of simulated climate change on the ability of coral symbionts to use photosynthesis.	
<b>Help Received</b> Fluorometer, incubator, laminar flow hood and incubator were provided by the Monterey Bay Aquarium Research Institute(MBARI). Algae cultures were furnished by the Bigelow Marine Laboratory, University of Maine.	