



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Matthew P. Goldklang	Project Number S1116
Project Title Red Tide Sensitivity to Ocean Acidification	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The goal of this project was to develop a tank in which I could study the effects of ocean acidification on the dinoflagellate <i>L. polyedra</i>, and then study the effects of ocean acidification on this species.</p> <p>Methods/Materials Materials: Tank Development: Omega mass flow controllers, manifold, computer, LabView, Li-cor Li-820 CO₂ analyzer, Qubit O₂ analyzer, Liqui-cel, sterile filtered seawater. <i>Lingulodinium polyedra</i> Culture. Equipment: microwave, steam sterilization bags, portable hand lamp, temperature controller, electronic thermometer, pH meter, Bunsen burner, aluminum foil, photomicroscope, microscope, hemocytometer. Equipment Purchased Sterile: cotton wool, gloves, pipettes, droppers, laboratory glassware, media bottles. Procedures: Tank Development: A tank program was developed using LabView, a computer programming system, to produce gas compositions for future ocean acidification projections. <i>L. polyedra</i> Culture: <i>L. polyedra</i> was serially cultured. Its growth curve was characterized. Then, it was cultured at varying carbon dioxide levels. Cell counts were done on a hemocytometer. Dry mass was taken and size and shape were observed under a photomicroscope.</p> <p>Results Tank Development: The tank had a sustainable gas output with minimal variability as shown with a R² value of 0.9577. The input CO₂ levels matched relatively well with the output data and met the specification. <i>Lingulodinium polyedra</i> Study: There was an increase in growth rate of <i>L. polyedra</i>, incubated with and without media, when cultured at higher CO₂ levels. The overall increase in organic matter production was 32%. Along with an increase in dry mass production, <i>L. polyedra</i> underwent a size increase and morphological change at 1453 ppm CO₂. The increase in size ranged on average between 10-30 μm and was statistically significant (T-test p<0.05).</p> <p>Conclusions/Discussion Tank Development: A tank was successfully developed that reproducibly models ocean acidification and its future implications with CO₂. The tank will be used for future experimentation on the effects of ocean acidification. <i>Lingulodinium polyedra</i> Study: The species demonstrated a significant change in growth rate under higher CO₂ conditions. Along with an increase in growth rate, <i>L. polyedra</i> demonstrated a statistically significant increase in mass and size, and change in cell structure, under elevated CO₂ levels.</p>	
Summary Statement The effect of ocean acidification on <i>L. polyedra</i> .	
Help Received Used lab equipment at Scripps Institution of Oceanography	