



# CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

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<b>Project Title</b>  <b>Effects of Ocean Acidification on Chaetoceros gracilis in the Monterey Bay</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives</b> Ocean water pH levels have been continuously rising since the Industrial Revolution due to the increased carbon dioxide gas in the atmosphere. The dangerous levels of carbonic acid in the ocean ecosystem may have an effect on the health of marine algae, such as diatoms. Marine diatoms account for the production of 25-40% of all air in the atmosphere and are essential to the marine food chain. My project sought to determine if a decrease in the pH of a medium containing the marine diatom <i>Chaetoceros gracilis</i> has an effect on the photosynthetic ability of the diatom.</p> <p><b>Methods</b> Using commercial buffers, I adjusted the pH of test tubes filled with distilled water, seawater medium, and the marine diatom <i>C. gracilis</i>. I then tested the photosynthetic ability of the diatoms over the course of four days by measuring the absorbance of each sample group with a spectrophotometer.</p> <p><b>Results</b> According to the data collected, a decrease in the pH improved the photosynthetic ability of <i>C. gracilis</i>, but only within a specific range. The diatoms in medium of 7.5 pH, sample group B, had the highest average absorbance value, which was 35.13% greater than sample group C's average absorbance and 42.36% greater than sample group A's. Sample groups A and C, with pH 8.2 and pH 7.0 respectively, had very similar average absorbance values for all days. Sample groups A and B had identical growth rates according to their exponential regression equations, whereas sample group C had the lowest growth rate of any sample group. Overall, <i>C. gracilis</i> appeared to perform photosynthesis well at a range from pH 8.2 to pH 7.5, with its greatest efficiency at 7.5 pH. As the pH decreases past 7.5, the photosynthetic ability of the diatoms greatly decreases.</p> <p><b>Conclusions</b> These findings indicate that, as the pH of the ocean continues to drop, <i>C. gracilis</i> may become more abundant in the Monterey Bay, potentially contributing to harmful algal blooms. Unanticipated algal blooms could wreak havoc on the Monterey Bay National Marine Sanctuary if measures are not taken to decrease the effect of ocean acidification on algae growth rates.</p>	
<b>Summary Statement</b>  I tested the marine diatom <i>Chaetoceros gracilis</i> , which is local to Monterey Bay, in mediums of different pH levels to discern what effect the decreased pH would have on the photosynthetic ability of the diatoms.	
<b>Help Received</b>  Mr. Jason Nicholson, my high school science teacher, provided me with lab space at my high school and equipment to perform my experiment. He also supervised my experiment while it was in progress.	