



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Ross C. Johnston	Project Number J1316
Project Title To Bloom or Not To Bloom? Is Iron the Key Nutrient in the Growth Rate of Phytoplankton?	
Objectives/Goals My goal is to determine if iron added to coastal ocean water, slough water and river water changes the growth rate of phytoplankton.	
Abstract Methods/Materials Materials:(6)5-gallon plastic bottles; coastal ocean water; Elkhorn Slough water; Aptos Creek water;(9)65mg iron tablets; microscope; microscope slides\covers; eyedroppers; plastic cups; plastic well trays; CO(2) and O(2) Test Kits. Methods: Collected 2 bottles of water from each of the locations (ocean, slough, river); Collected and recorded salinity and temperature data from each of the sites; Observed samples from all bottles of water under the microscope and counted the numbers of phytoplankton; Added one iron tablet to one bottle of beach water, slough water and river water; Kept one bottle from each collection site as a control; Made and recorded daily observations; Repeated experiment by collecting a second sample of each water type, again keeping three bottles as controls (one bottle from each source) and adding iron as a variable to the second group of three bottles. Made visual observations of second plankton bloom. On a third trial, conducted O(2) and CO(2) quantitative tests.	
Results The day after I added the iron tablets (less than 24 hours), I saw a dramatic change in the water samples containing iron. Microscope observations confirmed that the water turned vibrantly green in the bottles to which iron was added because of an increase in phytoplankton. An increase by Day 2 was shown in the three iron-added water bottles. On Day 4, I observed a decrease in the phytoplankton numbers. I followed the same procedure for my second sample collection; it also resulted in the iron-added water showing an increased phytoplankton growth rate. On my third sample trial, I repeated the experiment and quantified O(2) and CO(2) levels.	
Conclusions/Discussion The only variable between the control and experimental waters was the addition of the iron tablet; I conclude that iron is the key nutrient in the growth rate of phytoplankton because, without iron, photosynthesis cannot occur. Without photosynthesis, carbon dioxide will not be removed from the atmosphere and global warming will continue to increase; A second and third trial experiments with water from the same three sites reconfirmed that phytoplankton bloom when exposed to iron; therefore, iron is a key nutrient controlling phytoplankton growth.	
Summary Statement Iron is the key nutrient in the growth rate of phytoplankton.	
Help Received I interviewed Dr. Kenneth Coale (Moss Landing Marine Labs); My dad drove me to each of the sample sites.	