



California Science Center  
**CALIFORNIA STATE SCIENCE FAIR**  
**2001 PROJECT SUMMARY**

<p><b>Your Name</b> (List all student names if multiple authors.) <b>Arunabh Batra</b></p>	<p><b>Science Fair Use Only</b></p>
<p><b>Project Title</b> (Limit: 120 characters. Those beyond 120 will be ignored. See pg. 9) <b>The Effect Of Iron Concentration on the Photosynthetic Rate of Phytoplankton</b></p>	<p><b>S0303</b></p>
<p><b>Preferred Category</b> (See page 5 for descriptions.) <b>3 - Biochemistry / Molecular Biology</b></p>	<p><b>Division</b> <b>S Junior (6-8) S Senior (9-12)</b></p>
<p><b>Abstract</b> (Include Objective, Methods, Results, Conclusion. See samples on page 14.) Use no attachments. Only text inside these boxes will be used for category assignment or given to your judges.</p> <p><b>Objective-</b> Our experiment was designed to examine the effect of variable Iron (III) concentration on the algae Chlamydomonas Reinhardtii.</p> <p><b>Hypothesis</b> - we expect the photosynthetic rate (represented as a measure of oxygen evolution and chlorophyll yield) of the algal sample to rise with a rise in Iron (III) concentration. The rate is expected to rise until the algal solution is over-concentrated with Iron (III), at which point it becomes toxic because of an acute demand for macronutrients (making them biolimiting ) and the photosynthetic rate drops abruptly.</p> <p><b>Methods</b> -The Algae was grown in a controlled environment with florescent light, allowing for both red and blue wavelengths of light until it reached maximum yield. The sample was then divided into three # one part with no iron added, one with .5-ppm iron added and the last with 500-ppm iron added. The two factors measure were a) Oxygen evolution # measured using a Clarke type oxygen electrode) Chlorophyll yield # measured using a spectrophotometer</p> <p><b>Observations</b> - In keeping with our hypothesis, it was observed that the sample with no Fe(III) added showed moderate oxygen and chlorophyll yield, the second sample with .5-ppm Fe(III) added showed the highest chlorophyll and oxygen yield, and the third sample with excess Fe(III) showed minimal yield.</p> <p><b>Results</b> - It was observed that the difference in chlorophyll content between the samples was much greater than the respective differences in oxygen. This is explained by the fact that the sample with moderate Fe added, consumed more of the oxygen produced in its photosynthesis dark reaction than did the sample with no Fe added. This result further supports our hypothesis because it suggests an increase in the Calvin cycle of the algae with added Fe - the increase in the Calvin cycle may directly be linked to an increase in Photosynthetic Rate. Also, there was a significant decrease in both oxygen and chlorophyll measurements for the sample of algae with excess Fe. It was thus concluded from these two results that moderate addition of Iron (III) to algae cultures in conducive to greater yield, and that excess concentration of Fe (III) is fatal to algal survival.</p>	
<p><b>Summary Statement</b> (In one sentence, state what your project is about.) examining the effects of varying iron concentration on the photosynthetic rate of algae.</p>	
<p><b>Help Received in Doing Project</b> (e.g. Mother helped type report; Neighbor helped wire board; Used lab equipment at university X under the supervision of Dr. Y; Participant in NSF Young Scholars Program) See Display Regulation #8 on page 4. Dr. Amit Gulati from Hamburg University helped in selection of the algae; Dr. Amla Batra from the University of Rajasthan and Dr. Robert Carlson from the University of Kent helped in the extraction and measurement of Chlorophyll; Mr. Robert Kucer supervised our experiment, discussed problems.</p>	