



**CALIFORNIA STATE SCIENCE FAIR  
2009 PROJECT SUMMARY**

<b>Name(s)</b> <b>Chiara J.E. Ricci-Tam</b>	<b>Project Number</b> <b>S0831</b>
<b>Project Title</b> <b>Eutrophication Control by Chemical Limitation of Usable Phosphorus Sources</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective is to determine whether phosphate removal (via formation of a patina on iron wool) is significant enough to limit an algal bloom and thereby serve as a potential method for the treatment of eutrophication caused by excessive phosphate concentrations. I hypothesized that if steel wool is applied to a sample of eutrophic water, it will react with the phosphoric acid present in that water to form an iron phosphate patina, thereby decreasing the phosphate concentration in the water and thus limiting the algae population.</p> <p><b>Methods/Materials</b> An algae sample taken from the UC Davis Arboretum (Putah Creek) and cultured; from that original sample, four source samples were created (labeled A through D). There were tested for phosphate concentration using ammonium molybdate and stannous chloride reagents (with a spectrophotometer used to read absorbencies), then each source sample was split into two equal samples (with the variable labeled 1, and the control labeled 2). On the variable sample of each pair, a massed piece of steel wool was inserted, and in the control sample, a piece of glass wool of roughly the same mass was inserted (with all treatments lasting for 20 minutes). Afterwards, the phosphate concentrations were measured using the same method as before, and from the absorbency data collected, phosphate concentration was calculated.</p> <p><b>Results</b> There was no consistent trend from the data to support the hypothesis that there would be a significant decrease in phosphate concentration. This was also evidenced by the fact that, once removed from the samples, the iron wool pieces soon rusted.</p> <p><b>Conclusions/Discussion</b> The probable reason for the failure of a phosphate patina to form is that the method of iron phosphate patina formation is industrially used under conditions of high temperature, high acidity, and high phosphoric acid concentration, as well as in the presence of certain accelerating chemicals; all of these conditions were not present in the samples tested. This study would be next continued by simulating freshwater conditions (chemical concentrations, etc.) and attempting to alter them either as little as possible or in such a way that the alterations could be reversed so as to have a patina formed on some form of iron with a high surface area. If this could be achieved, the next step would then be to apply the treatment to an algal bloom sample and measure its effects on the algae population.</p>	
<b>Summary Statement</b> My project was designed to test whether an iron phosphate patina would form on steel wool under conditions of neutral pH, room temperature, and relatively low phosphate, with a focus on a potential application in eutrophic freshwater lakes.	
<b>Help Received</b> Used school lab equipment under supervision of my advisor, Mrs. Jeanette Coburn; Prof. Howard Ono, Prof. Steve Blumenshine, and Prof. David Zellmer of California State University, Fresno (CSUF) answered questions related to project design	