



**CALIFORNIA STATE SCIENCE FAIR  
2005 PROJECT SUMMARY**

<b>Name(s)</b> <b>Sanjit Datta</b>	<b>Project Number</b> <b>S0804</b>
<b>Project Title</b> <b>Operational Effects of Altered Abiotic Factors on Nitrifying Bacteria: Year 2</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> A way to easily determine the feasibility of any method of preserving water quality in a specific water body is critical for the large-scale implementation of the method. It has been proven that artificial addition of nitrifying bacteria to a water body can efficiently lower concentrations of ammonia, a highly toxic nutrient. A set of abiotic factors with respect to temperature, pH, salinity, and dissolved oxygen under which the bacteria can be expected to operate optimally would be instrumental in helping naturalists considering adding nitrifying bacteria to a natural water body make the decision whether to implement the system.</p> <p><b>Methods/Materials</b> The experiment was done by changing abiotic factors in tanks containing Nitrobacter and Nitrosomonas and water collected from Salinas de San Pedro, a salt marsh. The success of the bacteria was determined by testing concentrations of ammonia and nitrates. It was hypothesized that only salinity will have an effect on the bacteria and that the other three tested factors will not have an effect.</p> <p><b>Results</b> The results showed that this was incorrect. The two genera of bacteria in the Biozyme favored different conditions of abiotic factors. A higher temperature boosted the operation of Nitrobacter. Salinity had a very large effect on Nitrosomonas, but it barely affected Nitrobacter. Nitrosomonas also preferred a high dissolved oxygen content. Nitrosomonas showed a very small preference for a slightly alkaline environment over a slightly acidic one.</p> <p><b>Conclusions/Discussion</b> Overall, the optimum water body for the nitrifying bacteria to operate in would have a temperature of about 30°C, a pH between 8.0 and 8.3, a salinity between 22 and 27 ppt, and a dissolved oxygen content between 5 and 9 mg/L. It should be noted, however, that in almost all cases, the bacteria operated as it should under unfavorable conditions, although its processes were somewhat delayed.</p>	
<b>Summary Statement</b> I determined the optimum operating conditions with respect to abiotic factors for two genera of nitrifying bacteria.	
<b>Help Received</b> Mother, father, and sister helped make board; Worked at Cabrillo Marine Aquarium under Linda Chilton; Participant in SCAS Research Training Program; Participant in high school research course.	