



**CALIFORNIA STATE SCIENCE FAIR  
2003 PROJECT SUMMARY**

<b>Name(s)</b> <b>Edward Lee; Varun Pulakanti</b>	<b>Project Number</b> <b>S0513</b>
<b>Project Title</b> <b>The Rust Identity</b>	
<b>Objectives/Goals</b> Our objective is to determine the factors that cause rust and determine whether or not nanobacteria/bacteria have a part in accelerating the rusting process.	
<b>Abstract</b>	
<b>Methods/Materials</b> Materials: Iron nails, Jars of equal size and volume, pH tester, soil sample, labels, distilled water, bleach, sand paper, strong disinfectant (any anti-bacterial agents)  Methods: 1. Get four glass jars and fill them with purified water. 2. In two of the jars, put bleach in the water to kill all the bacteria. 3. Then take sand paper and clean the nails to take any oil coatings off. 4. Next in the last two jars, put a pinch of dirt from the ground into them. 5. Then place one nail into each jar. 6. Then place one of each jar in the sun and shade. 7. Checked them twice every day and take regular recordings of the weight of the nails.	
<b>Results</b> Our experiment definitely showed these results as the water solution underneath the nails were beginning to show a red tinge, a by-product of the rust. Each day a couple of mg was lost off the nails. Also, we noticed pH change would be able to corrupt the rust. In our control group, we added a bit of HCL to a solution and noticed that the rust increased but the reddish tinge was destroyed. In effect, the nanobacteria that caused the rust most likely died off due to the pH change. Our experiment was pretty much controlled and our only improvement would be able to use a powerful electron microscope, hopefully from a mentor, to actually view the bacteria at work. Also perhaps a more sterile condition would be more suited for most likely more types of bacteria were present in our culture than we believed.	
<b>Conclusions/Discussion</b> Conclusion With respect with the data and observations we took, we concluded that many different environmental factors, simulated in the experiment, caused the process of rusting to occur. Our hypothesized factors of water, bacteria, and air all seemed to be represented by our experiment and one unknown factor, alcohol, was also concluded as a factor to create rust. The first factor obviously was the dissolved oxygen present in the atmosphere.	
<b>Summary Statement</b> Our project is determining the effectors of rust especially the role of nanobacteria in the rusting process,	
<b>Help Received</b> used lab equipment and supervision from Professor Garza-Lopez, received materials such as environmental jars from father's office	