



# CALIFORNIA STATE SCIENCE FAIR 2007 PROJECT SUMMARY

<b>Name(s)</b> <b>Jeremy A. Fuster</b>	<b>Project Number</b> <b>J1415</b>
<b>Project Title</b> <b>GSI II: A Gram Stain Investigation: Catalase and Coagulase: The Search for Staphylococcus aureus</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My objective was to see if the gram-positive cocci in clusters that I cultured from commonly-touched school surfaces during my Science Fair project last year were staphylococcus aureus, and if so, whether or not they were resistant to antibiotics. My hypothesis is that most, if not all, the bacteria will be harmless and sensitive to antibiotics.</p> <p><b>Methods/Materials</b> First, using a sterile swab, I swabbed the two surfaces which cultured the most bacteria last year: computer mouse and toilet flush handles. The swab was smeared on an agar plate and incubated for 2 days. The bacteria colonies that grew on the plate were observed. Each colony type was gram-stained. Those that were gram-positive cocci in clusters were re-plated on fresh agar plates; an oxacillin disc was added to the agar plate, and incubated for two days. The plates were observed for a ring of growth inhibition around the oxacillin disc. Bacteria from the agar were tested for catalase by smearing bacteria on a microscope slide and adding a few drops of hydrogen peroxide to it. Bubbling indicated a positive catalase test and that the bacteria were staph bacteria. The bacteria were also tested for coagulase. Both slide and tube coagulase tests were done. Rabbit plasma was added to a smear of bacteria on a slide. If clumps formed, the bacteria were coagulase-positive. In the tube test, bacteria were added to rabbit plasma in a test tube and incubated. If the plasma solidified, bacteria were coagulase positive and therefore staph aureus.</p> <p><b>Results</b> All gram-positive cocci in clusters tested catalase-positive, but all of them tested coagulase-negative. This showed them to be staph species, but not staph aureus. Out of the 12 plates, only one staph species was resistant to oxacillin, showing no ring of growth inhibition around the disc.</p> <p><b>Conclusions/Discussion</b> The most common bacteria found on the two surfaces were gram-positive cocci, and most were staph species, as proven by the positive catalase test. Since all of my coagulase tests were negative, none of the bacteria I isolated were S. Aureus. Coagulase is an enzyme that allows S. Aureus to break down body tissue and cause disease. My hypothesis was correct. The staph I found was coagulase-negative, and most likely staph epidermidis, a usually harmless bacteria commonly found on the skin. I was also glad to see that only one of my gram-positive cocci samples was resistant to oxacillin.</p>	
<b>Summary Statement</b> My project is about discovering whether the bacteria on commonly touched school surfaces were S. Aureus, and whether they were sensitive to antibiotics.	
<b>Help Received</b> Father taught me how to perform catalase and coagulase tests and how to take pictures through a microscope. Kaiser Permanente Laboratory in Panorama City provided me with sheep blood agar plates, rabbit plasma, and oxacillin discs.	