



**CALIFORNIA STATE SCIENCE FAIR  
2003 PROJECT SUMMARY**

<b>Name(s)</b> <b>Lisa S. Rotenstein</b>	<b>Project Number</b> <b>J1325</b>
<b>Project Title</b> <b>Using Earth Derived Antibiotics to Effectively Inhibit Staphylococcus aureus</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Antibiotic resistance ever-growing problem in the scientific community. In terms of financial cost, over \$122 million are spent each year. An important part in solving this problem is to find new remedies. I experimented with using earth-derived antibiotics such as Echinacea, salt, and clay to inhibit <i>S. aureus</i>. I hypothesized that while the area-specific salts and clay will kill some bacteria, they will not be as effective as the Bacitracin and Novobiocin, and the Echinacea will kill a significant amount of <i>S. aureus</i>, being nearly as effective as the Novobiocin and Bacitracin.</p> <p><b>Methods/Materials</b> I used the Kirby Bauer method to measure effectiveness of the antibiotics by dividing an agar plate into four sections, then swabbing the nose of a human subject and evenly distributing the substance onto the agar. I placed a specific substance in center of each section, and measured its zone of inhibition, recorded my measurements, and placed the plates upside down in an incubator heated to 37 degrees Celsius. I repeated my measurements for 4 days, and had 4 rounds of experiments, with 7 different agars containing different substances in each round of experiments.</p> <p><b>Results</b> Novobiocin had steady zones of inhibition that grew at about 0.2 or 0.3 cm per day. Bacitracin had small zones of inhibition that were not constant and sometimes did not exist at all. Salt and clay showed inconsistent, miniscule zones of inhibition. Echinacea did not always have a constant zone of inhibition, but it was large when it did exist.</p> <p><b>Conclusions/Discussion</b> Area-specific clays and salts did not work effectively in inhibiting the growth of <i>S. aureus</i>. They never showed performance on a consistent basis. Echinacea somewhat worked though slightly under the performance level of Novobiocin. Echinacea does not meet inhibition standards on a regular basis. The results set forth were averages, not reflecting the findings that Echinacea occasionally did not inhibit the bacteria at all. This may have been caused by the subject used for samples during the 2nd and 3rd sets of experiments being sick (not known at time of swabbing) and leads to the conclusion that Echinacea will only kill healthy, normal <i>S. aureus</i>, only preventing illness. My hypothesis was correct in stating that the salts and clays will not kill a significant amount of bacteria and partially correct in saying that Echinacea will be nearly as efficient as Novobiocin and Bacitracin.</p>	
<b>Summary Statement</b> Using earth-derived antibiotics to effectively inhibit <i>Staphylococcus aureus</i> , thereby tackling the problem of antibiotic resistance	
<b>Help Received</b> Used incubator and laboratory at Medea Creek Middle School, Dr. Keith Garb helped provide agar and antibiotic disks, Jillian and Gretchen Waldron used as swabbing subjects	