



**CALIFORNIA STATE SCIENCE FAIR  
2015 PROJECT SUMMARY**

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<b>Project Title</b> <b>Nature's Defenses</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective of this project was to test my hypothesis that tea tree oil will prove to be the most effective on the bacteria specimens that are commonly found on hands because of its common use in disinfectants. My goal was to find the most effective natural antimicrobial (I tested tea tree oil, garlic, turmeric, and raw honey) that could kill common skin flora.</p> <p><b>Methods/Materials</b> To test tea tree oil, raw honey, turmeric and garlic, I used <i>Bacillus Cereus</i> and <i>Staphylococcus Epidermidis</i> and flora from hand. I first cultured the bacteria on agar plates by streaking. After the bacteria was cultured, I applied the antimicrobials and measured the area around where the antimicrobial was placed (zone of inhibition). I recorded each step and the observations about the growth of the bacteria and the effect of each antimicrobial on the specimen. A variation of the Kirby Bauer method to measure the effect of the antibacterial on the bacteria was used. I used sterilized petri dishes, nutrient agar, the bacteria specimens, the antimicrobials, and the inoculating loops.</p> <p><b>Results</b> The results of my experiment proved that raw honey was the most effective against the bacteria specimen. Honey had an average of 93 millimeters zone of inhibition. The average area the garlic affected was about 46 millimeters. Turmeric was not as successful, having an average of 37 millimeters. Tea tree oil proved to be extremely inefficient against the bacteria, not causing significant inhibition of the bacteria, however, under a microscope, it was evident that the tea tree oil had made an impact on the bacteria only where it had been placed, but the impact could not have been seen with the naked eye.</p> <p><b>Conclusions/Discussion</b> The results did not support my hypothesis that tea tree oil would be the most effective. My findings show that natural antimicrobials could be used to treat both pathogenic and nonpathogenic bacteria and infections. In order to tell whether raw honey could be used in the hospital, further research would have to be done. Antimicrobial resistance is becoming more common, and these findings of natural ways to expel bacteria could be a possible solution to this problem.</p>	
<b>Summary Statement</b> I examined the effect of four antimicrobials against different skin flora, (bacteria found on hands	
<b>Help Received</b> The materials for the project were supplied by my dad, and he assisted me with the culturing of the bacteria	