



**CALIFORNIA STATE SCIENCE FAIR  
2009 PROJECT SUMMARY**

<b>Name(s)</b> Rebecca N. Tsai	<b>Project Number</b> <b>J1729</b>
<b>Project Title</b> <b>Rhus integrifolia: Investigating Antibacterial Properties of Leaves, Berries, and Bark</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> I am interested in microbiology. I heard myths about a local plant that is a member of the native coastal sage scrub community. The purpose of this project was to see if Lemonade Sumac leaf, berry or bark contained phytochemicals which might possess antibacterial properties.</p> <p><b>Methods/Materials</b> In this experiment, I tested Lemonade Sumac leaf, berry, and bark water soluble extracts. Each extract was boiled for 40 minutes and cooled. Culture plates were prepared with 2ml of plant extract and 2ml of creek water (the source of bacterial contamination) mixed into Coliscan Easygel media. One tenth dilutions of creek water were also tested and mixed with the extracts in Coliscan Easygel media. I plated positive controls and negative controls to show the creek was contaminated and the media and dilution water were sterile. I verified the pH level of each extract. I obtained creek samples and repeated my experiment twice more for the bark and berry extracts only, since these extracts showed greater antibacterial effects. All samples were incubated and observed after forty-eight hours. There were a total of 54 tests in three different trials.</p> <p><b>Results</b> The leaf extract did not show as great an impact on bacteria as the berry or bark extracts which demonstrated significant inhibitory effects. My last two trials included bark and berry extracts only. The number of non-Coliform colonies were remarkably low in the bark and berry extract plates. The total Coliform and E. coli numbers were significantly reduced low compared to the control plate numbers. Lemonade Sumac bark and berry extracts seemed to possess antibacterial properties.</p> <p><b>Conclusions/Discussion</b> The ability of the berry extract to reduce the number of bacterial colonies may in part have been due to its low pH level, pH 2.7, but the bark extract had a pH of 4.0. The bark extract may have been able to decrease bacteria numbers due to its high concentration of soluble tannins. Bark extract eliminated most E. coli colonies and nearly all the non-Coliform colonies. The types of non-Coliform colonies eliminated were not identified, but these colonies may have included pathogens.</p>	
<b>Summary Statement</b> The purpose of this project was to see if Lemonade Sumac (Lemonadeberry) extracts from leaf, berry, and bark contained phytochemicals which might possess antibacterial properties.	
<b>Help Received</b> Thanks to my mother and father who kindly drove me to locations numerous times to obtain plant samples, water samples and perform tests. Thanks also to my science teacher for guidance and support.	