



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Natalie J. Wu-Woods	Project Number J1738
Project Title The Effect of Essential Oils from Plants Used by Native Americans on the Growth of Bacteria	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals I predict that the oil extracts from plants used by Native Americans will inhibit the growth of bacteria (E. coli) on agar plates and a liquid culture.</p> <p>Methods/Materials I am using the method called hydrodistillation, this uses steam to take the oil out of the plant. After hydrodistillation I measured the amount of oil I collected. I tested the essential oils at different concentrations -- 50% and 100%. I punched out small discs of filter paper with a paper hole puncher. Then I used a micropipette to put ten microliters of one diluted oil onto the paper disc, which soaks in right away. Next, is putting my paper disc onto a plate with bacteria in it. I have an agar plate and will put a 100 microliters of the bacterial culture from step 2 onto the plate. I will use a spreader to spread the bacteria and then I will place the disks containing the essential oils onto the plate. The plates will be placed into an incubator at 37 degrees Celsius. After 20 hours of incubation, I measure how much the disc with herbal oils inhibited the growth of the bacteria. I measure the distance of the clear ring from the paper disc that does not have bacteria growth, record data and take pictures.</p> <p>Results Black sage, sagebrush, willow leaves, California rose hips, and toyon didn't work at all, while white sage had an inhibition ring about 1mm big. The positive control gave me a huge 15mm ring, while, the negative control, gave me absolutely no ring. We then tested if the essential oil was killing the bacteria by placing the oil in tubes of bacteria and media, and see if the water was clearer, the same, or cloudier. The average of Control, or bacteria in media, after 30 minutes in a shaking incubator was 0.790 after starting out at 0.404. The white sage had an average of 0.285, black sage was an average of 0.258, and sagebrush was 0.245, Oregano; 0.246, and lastly, Cinnamon at the average of 0.280 for 30 minutes in the shaking incubator.</p> <p>Conclusions/Discussion In Conclusion, my project demonstrated that extracts of native plants do kill bacteria and could have worked quite well as medicine for the Native Americans. Black Sage, White Sage, and Sagebrush would be effective medical treatments for bacterial infections. Compound of these essentials oils might even be useful to new types of medical treatments that might even be able to save lives.</p>	
Summary Statement I tested if oils from plants used by Native American as medicine really work by measuring their affect on growth of E. Coli.	
Help Received Used lab equipment at Inscent, Inc. under the supervision of Dr. Daniel Woods.	