



**CALIFORNIA STATE SCIENCE FAIR  
2011 PROJECT SUMMARY**

<b>Name(s)</b> Natalie J. Wu-Woods	<b>Project Number</b>  31760
<b>Project Title</b> Separating Plant Essential Oils Components Using Thin Layer Chromatography and Testing Their Effect on Bacterial Growth	
<b>Objectives/Goals</b> Based on my experiments from the last two years testing the effects of plant essential oils on the growth of E. coli, I decided to expand on my previous research and separate individual components of the complex mixture. My thought was that there could be specific compounds within the essential oil causing the antibacterial effects. <b>Abstract</b> <b>Methods/Materials</b> TLC Silica gel 60 F254, Petri dish, Top Agar, E. Coli bacteria (Red), Lab glassware, LB broth, Hydrodistillation apparatus, Incubator, Toluene, Ethyl acetate, Plant Essential oils, Paper disc (Sterile), Bunsen burner, Chemical Hood. <b>Results</b> Oregano and Thyme had the same major component based on TLC analysis. Cinnamon, Sagebrush and White Sage had different components. The major spot on Oregano and Thyme was the antibacterial sub-component. The other three plant essential oils had different antibacterial sub-components. <b>Conclusions/Discussion</b> I have developed a new method for rapidly finding the sub-compounds of plant essential oils that act as antibacterial substances. Using this method I have found that different plants contain different sub-components and some of these components have antibiotic properties. The compounds in Oregano, Thyme, and Cinnamon all move similarly in the toluene and ethyl acetate solvent. The major sub-components we found in these oils all have antibacterial properties. Using this new method, we have discovered a potentially new compound in California Sagebrush. This compound migrates much slower in the solvent and is therefore probably different from the compounds found in Thyme, Oregano and Cinnamon. The California Sagebrush compound has potent antibacterial properties. White sage also has a sub-component that has not been described. It migrates at almost the top of the TLC plate and can only be seen at extremely high concentrations of oil. Sagebrush and White Sage essential oil didn't work well in the original disc diffusion assays, but one of their sub-components has antibiotic properties. Oregano had the greatest amount of antibacterial properties probably due to a large amount of carvacrol and thymol, these compounds have already been found, but never by this method before.	
<b>Summary Statement</b> Isolated compounds from plants that inhibited growth of E. coli.	
<b>Help Received</b> Used lab equipment at Inscent, Inc. under the supervision of Dr. Woods.	