



**CALIFORNIA STATE SCIENCE FAIR  
2002 PROJECT SUMMARY**

<b>Name(s)</b> <b>D. Clifton Huang</b>	<b>Project Number</b> <b>J1315</b>
<b>Project Title</b> <b>Spice Aromatherapy</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My objective is to determine if pungent smelling spices contain substances that can be carried in their vapors that can inhibit bacterial growth.</p> <p><b>Methods/Materials</b> 1.8 agar plates are swabbed with <i>S. marcescens</i>. 2.8 agar plates are swabbed with <i>B. subtilis</i>. 3.Crush each of the 7 variables: cinnamon, clove, garlic, horseradish, ginger,jalapeno chili pepper,and black pepper. 4.Invert all the plates so that the agar would now be on top and the lid would be on the bottom. 5.Place 20 grams each of the variable on the lid of one <i>S. marcescens</i> plate and one <i>B. subtilis</i> plate. 6.Record bacterial growth at 24 hours, 48 hours, and 72 hours.</p> <p><b>Results</b> Trial 1: There was prominent bacterial growth on the control and chili pepper plates after 48 hours and no bacterial growth on the horseradish, ginger, clove and cinnamon plates. Black pepper slows bacterial growth but does not stop it. Garlic stops the growth of <i>S. marcescens</i> but not <i>B. Subtilis</i>. Trial 2: The experiment failed because the week old sample bacteria had died. The lids on the test tubes were in too tight and did not allow air to enter. As these are aerobic bacteria, they needed oxygen to survive.</p> <p><b>Conclusions/Discussion</b> Since ancient times, spices has been used medicinally by many different cultures to ward off diseases. It has been applied topically, ingested, hung around the house or worn as a necklace. My experiment proves that certain pungent smelling spices contain antibacterial substances that are also carried in their vapors. Ginger, clove, cinnamon and garlic have potent antibacterial vapors. Garlic vapors are potent on some bacteria only. Black pepper vapors has antibacterial properties but not strong enough to stop it.</p>	
<b>Summary Statement</b> My project is to find out if the vapors of pungent smelling spices like clove, cinammon, garlic, horseradish, ginger, jalapen chili pepper, and black pepper can stop bacterial growth.	
<b>Help Received</b> Mr Hobbs, my science teacher and Mr Hughes, my English teacher helped me organize my thoughts and project. My parents funded my experiment.	