



**CALIFORNIA STATE SCIENCE FAIR  
2007 PROJECT SUMMARY**

<b>Name(s)</b> <b>Jeremy E. Creighton</b>	<b>Project Number</b> <b>S1509</b>
--	---------------------------------------

**Project Title**  
**Does Topical Application of the Rubefacient *C. frutescens* Increase Thermogenesis?**

**Abstract**

**Objectives/Goals**  
To determine if cayenne (*capsicum frutescens*) increases temperature of the feet with topical application. When A person 'feels hot' in a specific area, is their temperature really affected?

**Methods/Materials**  
I selected nine healthy subjects to be tested. The bare footed subjects were seated on a bench. Body and foot temperatures were recorded along with room temperature. Subjects put one of their feet in the 80 degree cayenne-water and the other foot in the 80 degree control water. After five minutes temperatures were recorded (every 5 minutes) for the next 30 minutes including room, body, and water temperature. In the next phase, feet were taken out of the water, dried off, and socks were put on. After 5 minutes, temperatures were taken every 5 minutes for 20 minutes.

**Results**  
While in water, cayenne foot had a 2 degree average increase in thermogenesis compared to control. After wearing the sock the cayenne foot continued to keep itself warmer than the control foot by an average 1.1 degrees. Cayenne also increases body temperature by 1.5 degrees, while the foot was in the water; and by 0.9 degrees wearing the sock.

**Conclusions/Discussion**  
Based on my tests, I can conclude that the topical application of the rubefacient *Capsicum Frutescens* will increase thermogenesis of the foot. I based my conclusion on the cayenne's ability to increase thermogenesis according to how many degrees higher the cayenne foot was than the control. The #Hot# feeling is more than a sensation. Many of the subjects had an increase in thermogenesis before they noticed a sensation.

Capsicum is the active stimulating ingredient in this rubefacient. I have seen how it draws blood to the skins surface upon application, making the skin red. Cayenne increases blood flow by thinning the blood and expanding the capillaries. The hot substance, capsicum is a natural oleoresin belonging to a group called capsaicinoids. The capsaicinoids open cell membranes in a manner which allows calcium ions to flood into cells causing a sensation to be felt.

To give further support to my conclusion, additional experiments were done on feet out of water after a sensation was felt (6 hrs.) The cayenne foot temp. increased 8 degrees. I also did a few tests on the tongue and ear. I found applying cayenne to the ear gave immediate results:a 12 degree increase in temp.

**Summary Statement**  
Topical application of the rubefacient *Capsicum Frutescens* increases thermogenesis of the foot through capillary dilation and increased circulation by a maximum of 2 degrees; and has a greater effect if tested on a sensitive location.

**Help Received**  
Thanks fo my sister Audrey for her suggestions on this project. Thank you to Charlotte Creighton my Master Herbalist consultant.