



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Mark T. Nakata	Project Number S2207
Project Title Use of Surfactants in Mosquito Control: A Continued Study of Surface Tension	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this project is to investigate how non-toxic surfactants affect the surface tension of water and to determine if any of these surfactants can be used as an effective weapon against mosquitoes by reducing the surface tension enough to sink mosquito eggs.</p> <p>Methods/Materials I constructed a single beam balance. I used the balance to record the number of drops of water needed to pull a needle out of the container containing a solution of water and surfactant at 20° C. I added sodium bicarbonate, glycerin, and vinegar in 10 tsp/ml increments from 0 to 10 tsp/ml and ran 5 trials at each increment. I then dropped a small amount of chicken egg whites into the solution at every increment and recorded if it sank. I then re-ran the experiment at 38° C. Finally, I collected real mosquito eggs, larvae, and pupa and re-ran a simplified version of my experiment to test if they sank at 36° C.</p> <p>Results I converted the number of drops into surface tension and found that surface tension decreased and then leveled off due to the critical micelle concentration. The egg whites did not sink at room temperature; however, there was some downward movement at 38° C. The mosquito eggs and pupa did not sink with added surfactant, but the larva did show some difficulty in swimming up to the surface when enough surfactant was added.</p> <p>Conclusions/Discussion The experimental partially supported my hypothesis. The surfactants reduced the surface tension of water linearly and then leveled off when the critical micelle concentration was reached. Although some downward movement was seen in the egg whites and larva at higher temperatures, the results show that sodium bicarbonate, glycerin, and vinegar are not effective in mosquito control. Thus, I was unable to find a cheap, safe, nontoxic mosquito insecticide. Mosquitoes cause over 3 million deaths per year; thus, it is imperative to find cheap readily available materials that can be used to control mosquitoes without harming plants and animals.</p>	
Summary Statement My project explores how non-toxic household surfactants affect the surface tension of water and examines whether any of these surfactants can be used in mosquito eradication by lowering the surface tension enough to sink mosquito eggs.	
Help Received Mother helped assemble backboard; Mr. Hunt, my biology teacher lent me laboratory supplies and gave me advice; Father helped pay for everything.	