



**CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY**

Name(s) Ashley N. Muirheid	Project Number S1414
Project Title How Does Water Treated with NaF Affect the Development of the Invertebrates Artemia, Daphnia, Paramecium, and Planaria?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals I hypothesized that water treated with NaF concentrations above the optimum fluoride level (.7-1.2 ppm) would affect the development of the invertebrates Artemia, Daphnia, Paramecium, and Planaria when exposed. Therefore, all specimens tested with concentrations of NaF below or within the desired level will show no adverse effects. My rationale for selecting the specific organisms was based on their susceptibility towards wastewater discharge. If a significant threat is posed on their survival by the presence of a fluoride compound, serious damage will result in the ecosystems upon which man is ultimately dependent.</p> <p>Methods/Materials Three colonies of each type of organism were used to eliminate any variations in consistency during experimentation. NaF concentration levels were tested at 1 ppm, 2 ppm, and 5 ppm, which reflect solution levels projected from the environment's accumulation of natural water runoff from water treatment facilities. The water in the control was left unaltered. To determine any effects on the mobility of the organisms, I designed a measuring instrument based on centimeters. To chart the food consumption of the Paramecium cultures, I used a Congo Red stain solution on the food source of the organisms. I viewed the Daphnia and Artemia eggs under a stereoscope to determine irregularities between the controls and fluoridated samples. To measure the heart rates in the Daphnia species, I counted the amount of beats within a time frame. At three viewing periods, I counted the fatalities for all organisms.</p> <p>Results For all of the species, the fluoride levels increased directly with the amount of fatalities, except for the Daphnia eggs, for which the results were inconclusive. All of the mobility rates were decreased as the sodium fluoride increased. For both the Daphnia species, their heartbeat rates slowed down and their phototaxis behavior changed, as the levels of fluoride in their water increased.</p> <p>Conclusions/Discussion I used statistical analysis to determine whether the difference between the control and the experimental groups was significant, or if it was due to chance alone, by using a t test as a probability guide for all of my results. Because I was able to reject the chance, or null, hypothesis, I could conclude that, 95% of the time, probability supported my results, as determined by varying fluoride levels.</p>	
Summary Statement My project investigates whether sodium fluoride in concentrations typically found in runoff from municipal water supplies affects the development of Artemia, Daphnia, Paramecium, and Planaria species in the environment.	
Help Received My science fair advisor graciously provided me with the majority of the materials that I needed to conduct my experiment. My father aided me with digital photographs.	