



**CALIFORNIA STATE SCIENCE FAIR  
2002 PROJECT SUMMARY**

<b>Name(s)</b> <b>Christine H. Yang</b>	<b>Project Number</b> <b>S1434</b>
<b>Project Title</b> <b>The Effect of Pollutants on the Reproductive Cycles of Daphniidae magna</b>	
<b>Abstract</b> <b>Objectives/Goals</b> Objective: To determine whether the presence chemicals commonly found in pollutants is a factor in forcing daphnia to switch from asexual reproduction to sexual reproduction. Should the previous objective prove successful, to then determine the percentage of successful reproduction at each concentration of each chemical. <b>Methods/Materials</b> Method: A daphnia magna environment was set up with optimal conditions for asexual reproduction. Seven various chemicals found in pollutants were then obtained, and weighed out to make 200 mL of 0.1, 0.01, and 0.001 M concentrations of each. They were: $AlSO_4$ , $CrCl_3$ , $CuSO_4$ , $MnCl_2$ , $(NH_4)_2SO_4$ , $PbO$ , and $ZnSO_4$ . These chemicals were each put in a beaker and dissolved in water (half spring water and half daphnia tank water). A set number of daphnia was then introduced to each beaker, and observations on the chemicals' effects were made. The concentration was then increased/decreased as necessary. Once the concentrations that caused sexual reproduction were determined, they were retested to ensure the data's integrity. Finally, the solutions based on the experimentally derived data were once again introduced to the daphnia, and the percentage of successfully reproducing daphnia was recorded. <b>Results</b> The following are the concentrations that caused sexual reproduction, as well as the percent of daphnia that reproduced successfully: Aluminum Sulfate: 0.003 M, 16.7%; Trivalent Chromium: 0.0015 M, 16.7%; Copper Sulfate: 0.000078125 M, 25%; Manganese Chloride: 0.0025 M, 33.3%; Ammonium Sulfate: 0.0025 M, 25%; Lead Monoxide: 0.01 M, 8.3%; Zinc Sulfate: 0.0000625 M, 16.7%. <b>Conclusions/Discussion</b> Conclusion: This experiment showed that the presence of pollutants at certain concentrations is a factor in forcing daphnia to reproduce sexually. I believe that this data can be applied to the testing of water quality. Bioassays, which are one method of testing, center on the fact of mainly whether or not the test subjects die in the water sample. However, I feel that if the water has already deteriorated to that point, the environment may have already suffered greater effects than necessary from pollution. By observing instead whether or not there is sexual reproduction present, which is a sign of the daphnia's attempt to survive in adverse conditions, steps can be taken earlier, rather than waiting for the organisms to die.	
<b>Summary Statement</b> This experiment tested pollution as a possible factor in stimulating sexual reproduction in daphnia magna, and then explored the possibility of using this information as an indicator of water quality.	
<b>Help Received</b> Dr. L. Bartrom and Ms. G. Corbet provided chemicals; Dr. L. Bartrom provided scale; Mr. P. Hunt provided microscope	