CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)

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Project Number

22536

Project Title

The Effect of Pollutants on the Reproductive Cycles of Daphniidae magna

Abstract

Objectives/Goals

Objective: To determine whether the presence chemicals commonly found in pollutants is a factor t forcing daphnia to switch from asexual reproduction to sexual reproduction. Should the previous objectiv| prove successful, to then determine the percentage of successful reproduction at each concentration of each chemical.

Methods/Materials

Method: A daphnia magna environment was set up with optimal conditions for asexual reproduction.t 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),l (NH(4))(2)SO(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 thenl 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 tt experimentally derived data were once again introduced to the daphnia, and the percentage of successfull| reproducing daphnia was recorded.

Results

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%

Conclusions/Discussion

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 tes| subjects die in the water sample. However, I feel that if the water has already deteriorated to that point, the

Summary Statement

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.

Help Received

Dr. L. Bartrom and Ms. G. Corbet provided chemicals; Dr. L. Bartrom provided scale; Mr. P. Hunt provided microscope

Preliminary