



CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

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Project Title Antibacterial Effects of Solid Copper on Waterborne Bacteria	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals I came across an article about people in India who are throwing copper and silver coins into their rivers. They believe copper and silver coins will be able to disinfect their polluted water systems. I designed an experiment to test the antibacterial effects of copper in water. After researching, I hypothesized that solid copper might have a moderate effect in reducing the amount of bacteria in contaminated water, and would not contribute an excessive amount of copper ions to the water.</p> <p>Methods/Materials I followed sterile procedures, using disposable, serological pipettes and Coliscan Easygel. I tested samples of aquarium and creek water. I compared control samples in every trial. In the experimental cups, I placed either a new penny or a piece of copper pipe fitting. I then tested to see if either the copper pipe fitting or the penny had any effect on the bacterial content of the water.</p> <p>Results The results of the five trials and 66 plates showed the control samples contained thousands of coliform and noncoliform colony forming units per 100 ml, which sometimes included E. coli. Most of the control samples contained so many colony forming units they were too numerous to count. Samples treated with a copper penny had significantly lower bacteria counts, but still contained bacteria. After 24 hours, samples containing a copper pipe fitting were completely sterile. The water samples which held a penny had a concentration of approximately 3 ppm of copper. The samples containing a pipe had concentrations of between 4 and 10 ppm copper.</p> <p>Conclusions/Discussion According to these results, copper appears to have a significant antibacterial effect on waterborne bacteria. Unfortunately, copper ions leach into the water at levels far above the acceptable limit (1.3 ppm) for drinking water. Some animals have a very high tolerance for copper, so farmers could conceivably place a copper pipe in drinking water troughs to help reduce or eliminate bacteria. It might also be possible for a copper pipe piece to be used to eliminate bacteria in drinking water for human consumption on an emergency basis, but the practice of throwing copper coins into bodies of water should be stopped. Throwing copper coins into drinking water sources may lead to problems with copper contamination for years to come.</p>	
Summary Statement This project tested the antibacterial effects of solid copper on waterborne bacteria in creek and aquarium water and the resulting copper concentrations.	
Help Received Thanks to my parents for their time and patience. Thank you to my science teacher for guidance and supervision.	