CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
Elena M. Tessler

Project Number
J1333

Project Title
A Bug's Life: The Effect of Alkalines and Acids on Bacterial Growth

Abstract

Objectives/Goals
The objective was to determine the effect of alkalines and acids on bacterial growth. I hypothesized that the strongest acid and the strongest base (the 10% concentrated solutions) would each inhibit bacterial growth the most.

Methods/Materials
Pure samples of Micrococcus luteus and Serratia marcesceus were obtained. 7 blood agar plates each were inoculated with the two types of bacteria. Then a 1%, 5%, and a 10% concentrated solution of the acid and the base each was created, and applied to 6 paper discs each. The paper discs were placed on the inoculated plates. The blood agar plates were then incubated, and the zone of inhibition around each paper disc was measured.

Results
Consistently in my testing, the strongest acid and the strongest base each inhibited bacterial growth more than the weaker concentrations of acid or base. Additionally, the 10% acid's zone of inhibition was usually slightly greater than that of the 10% base.

Conclusions/Discussion
My hypothesis was correct; the strongest acid and the strongest base proved more effective in the inhibition of bacterial growth. The bacteria in my experiment reacted this way possibly because they were sensitive to the increased level of H+ ions (as present in the acidic solutions), or the level of 0H- ions (as present in the basic solutions).

Overall, I believe my project was a success. I also believe my testing was relevant to real-life issues in the medical and scientific world. Scientists and medical experts are constantly trying to create the perfect antimicrobial agent to use when dealing with a certain bacteria. As each strain of bacteria is different, they each require a different agent. pH, acidity, and alkaline are important factors that must be taken into consideration when creating the perfect antimicrobial agent for a certain bacteria. Tests such as mine provide information on how a certain type of bacteria might react when introduced to an environment of extremely high or low pH, thus showing how strong acids and alkalines affect the bacteria's growth. This information can then be used to create the antibacterial agent.

Summary Statement
I determined the effect of alkalines and acids on bacterial growth by growing bacteria cultures and introducing them to strong acids and bases.

Help Received
Used lab equiptment at Pacific Union School under the supervision of Mr. Lane; Recieved guidance and supplies from pathologist Dr. Vogelsang of Mad River Hospital; Recieved pure bacteria specimens from biology teacher Mrs. Condit of Arcata High School.