



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Nicole T. D'Arcy	Project Number 22304
Project Title The Survival Rate of Bacteria Dependent on the Concentration of Antibiotics	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of this experiment is to determine the survival rates of bacteria in the presence of different concentrations of the antibiotic ampicillin. Ampicillin-resistant mutant was also tested for multi-drug resistance to tetracycline, nalidixic acid, and vancomycin.</p> <p>Methods/Materials Samples of mouth bacteria were streaked on plates with different concentrations of ampicillin and the surviving bacteria colonies counted. Ampicillin-resistant bacteria colonies were plated on tetracycline, nalidixic acid, and vancomycin and the colonies that grew were recorded.</p> <p>Results It was found that the bacteria have tolerance to low concentrations of antibiotics so that the survival curve has three parts: complete survival (0-0.05 µg/ml ampicillin), declining survival levels (0.05-1.0 µg/ml ampicillin), and complete death (5.0 µg/ml ampicillin and higher). The effective ampicillin dosage on this strain of mouth bacteria is 3.8 µl ampicillin/bacterial cell. The ampicillin mutants were also resistant to tetracycline, nalidixic acid, and vancomycin.</p> <p>Conclusions/Discussion Antibiotic resistance is increasing and has recently become a large problem in human medicine. Due to the overuse of antibiotics combined with the natural process of evolution, antibiotic-sensitive bacteria have been effectively eliminated and only the stronger bacteria that could not be killed by antibiotics are left. This experiment determined the effective concentration of ampicillin in killing samples of mouth bacteria and also demonstrated that multi-drug resistance is a valid concern because multi-drug resistance plasmids decrease the kinds of antibiotics that are effective on different bacteria strains. The hypothesis was shown to be correct for the antibiotic concentrations above 0.05 µg/ml ampicillin. Lower antibiotic concentrations were completely tolerated by the bacteria demonstrating that the bacteria has a degree of tolerance to antibiotics. There are three parts of the survival curve: complete survival, declining survival levels, and complete death.</p>	
Summary Statement The focus of the experiment is to determine the survival rate of bacteria in the presence of different concentrations of ampicillin.	
Help Received Dr. Karen Otteman allowed me use of her toxicology lab at the University of California, Santa Cruz for eleven days. Her student, Tessa, supervised my experiment in the lab. Dr. Hoernschemeyer provided advice about presentation and layout of my lab report.	