



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Eric M. Sefton	Project Number S1322
Project Title Can Doubly-Resistant Strains of Bacteria Be Produced by Incubating Singly-Resistant Bacteria Together?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective is to discover whether bacteria are able acquire resistances to two antibiotics, and if so, how much time does this process require.</p> <p>Methods/Materials E. coli bacteria, which had been treated so that it would acquire DNA, was incubated in one test tube with ampicillin, and in another with kanamycin. The contents of each tube was then spread on a plate containing the anitbiotic that the E.coli was supposed to be resistant to. A colony from each plate was sampled and placed in a test tube with its respective antibiotic. Next colonies from each plate were put in the same test tube, which had both antibiotics. After overnight incubation, the contents of each test tube was spread in serial dilution on a gridded plate containing both antibiotics, so that the samples remained seperate.</p> <p>Results After a night of incubation, there was growth on the plate with both anitbiotics, as well as in the test tubes containing the sampled colonies. In the test tubes with the sample colonies there was visible proof of doubly-resistant bacteria. On the gridded plate, 20 doubly-resistant colonies grew at the highest concentration of solution. At all lower concentrations, there was no growth. Further incubation did not yield greater growth.</p> <p>Conclusions/Discussion The results prove that the creation of doubly-resistant bacteria happens at an alarmingly rapid rate, but yields many fewer colonies than when singly-resistant bacteria is created. With only one night of incubation in a test tube, and then another night of incubation on a plate, twenty colonies grew in one grid. Compared to the hundreds of colonies grown with one night of incubation of singly-resistant colonies on a whole plate. These results support the startling danger that we as a society put ourselves in when we misuse antibiotics. There needs to be a shift in the attitude that doctors, patients, and famers have about antibiotics, in order to safegaurd our society from bacteria that cannot be killed.</p>	
Summary Statement My project concerns the speed and ease with which bacteria are able to acquire multiple resistances to antibiotics.	
Help Received Father helped supervise experiment and provided materials and work space, in addition to advice on procedure.	