

## CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

| Name(s)  | Project Number               |
|--|------------------------------|
| James C. Bowden  |                              |
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|  |                              |
| Project Title  | 35638                        |
| Antibiotic Resistance by Repeated Exposure   |                              |
| Antibiotic Resistance by Repeated Exposure   | h = 0                        |
|  |                              |
| Abstract   |                              |
| Objectives/Goals   | colined S anidarmidia        |
| This study investigated the development of antibiotic resistance in the bacteria from natural mutation caused by repeated exposure.  | Scolland S.epiderinidis      |
| Methods/Materials  | $\bigcirc$                   |
| Of the many materials used to conduct this study, the key materials used for the nutrient agar, E.coli culture and S.epidermidis culture (screened for contamination)  | sexperiment were TSA,        |
|  |                              |
| water, and sterilization tools such as 70% isopropyl alcohol.<br>After all of the materials had been gathered, the TSA was mixed with water and<br>bacteria, and a quality control was run on the cultures of E. coli and S. epidemic<br>itself. Media was poured into the plates, and after the gel had solidified, the bac<br>with Luria broth into the plates and labeled. Ampicillin solution-soated filter pa<br>plates and the plates were incubated for 24 hours, and then refrigerated until ne<br>zones were measured and recorded, and then bacteria from the edger of the inhi<br>up with a swab, and inoculated on a new plate. This process was uppeated for ea<br>end of the experimental process, everything used was enher thrown out in the b<br>autoclaved | l autoclayed to kill any     |
| bacteria and a quality control was run on the cultures of E deli and S epidemic  | lis along with the agarose   |
| itself. Media was poured into the plates, and after the gel had solidified the bac   | teria were inoculated along  |
| with Luria broth into the plates and labeled. Ampicillin solution-soaled filter pa   | aper disks were put into the |
| plates and the plates were incubated for 24 hours, and then refrigerated until ne  | xt use. The inhibition       |
| zones were measured and recorded, and then bacteria from the edges of the inhi-  | bition zones were picked     |
| end of the experimental process, everything used was either thrown out in the h  | ich of 5 exposures. At the   |
| autoclaved.  | 10-mazaru trasm or           |
|  |                              |
| Over the course of 5 exposures to ampicilling both basteria did indeed gain resist<br>gradually. However, the S.epidermidis gained resistance faster than the E.coli.<br>E.coli plates on average were reduced by 10.9 mm from exposure 1 to 5, while<br>S.epidermidis plates on average fell by 20.5 mm from exposure 1 to 5. The E.col<br>resistance, while about 78% of the S.epidermidis cultures were fully resistant by  | stance to the antibiotic     |
| gradually. However, the S.epidermidis gained resistance faster than the E.coli.  | The inhibition zones of the  |
| E.coli plates on average were reduced by 10.9 mm from exposure 1 to 5, while<br>S anidermidis plates on average for by 20.5 mm from exposure 1 to 5. The E of  | the inhibition zones of the  |
| resistance, while about 78% of the S endemidis cultures were fully resistant by  | v exposure 5                 |
|  |                              |
| The data supported the hypothesis in that it confirmed that repeated exposure de resistance in E.coli and S.epidemids, but opposed the prediction that E.coli we first. The results propose that lower concentrations of antibiotic make it easier f   | pes lead to antibiotic       |
| resistance in E.coli and S.epidermides, but opposed the prediction that E.coli we  | ould develop resistance      |
| first. The results propose that lower concentrations of antibiotic make it easier f  | or bacteria to develop       |
| resistance, and that an unknown factor such as the resistance methods or capabi<br>S.epidermidis in turn made it more resistant.   | ity to produce biomins of    |
| Stepiderinidis in turn indepit inor resistant.   |                              |
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| Summary Statement  |                              |
| This project studied the effects of repeated exposure to ampicillin on the antibio<br>E.coli and S. pidemaidis, and determined that repeated exposure does cause an  | increase in antibiotic       |
| resistant bacteria   | increase in antibiotic       |
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| Help Received  |                              |
| Used lab equiment at Pierce College under the supervision of Karin Steinhauer  |                              |
|  |                              |