



# CALIFORNIA SCIENCE & ENGINEERING FAIR 2018 PROJECT SUMMARY

<b>Name(s)</b> Mason S. Dougherty	<b>Project Number</b> <b>J1704</b>
<b>Project Title</b> <b>Does the Expiration Date and Temperature of an Antibiotic Affect Its Effectiveness in Inhibiting Growth of B. subtilis?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective of this study is to determine if common antibiotics have the same effect in different temperatures and beyond their expiration date on Bacillus subtilis.</p> <p><b>Methods/Materials</b> Non-expired and expired amoxicillin, cephalexin, and clarithromycin; Bacillus subtilis culture, petri dishes with agar, incubator, personal protective equipment. Measured and compared the zones of inhibition, after 72 hours incubation, at different temperatures of non-expired antibiotics, and repeated, but excluded the different temperatures for the expired antibiotics.</p> <p><b>Results</b> Comparison of ten trials of expired antibiotics to ten trials of non-expired antibiotics at the following Fahrenheit temperatures: 39 degrees, 71 degrees, 80 degrees, 95 degrees, showed expired cephalexin and clarithromycin were equal to non-expired susceptibility levels. Amoxicillin proved to be intermediate in susceptibility in both expired and non-expired antibiotics. Temperature trials showed increased susceptibilities with increased temperatures in clarithromycin and cephalexin, but amoxicillin showed a decline from intermediate to resistant in susceptibility.</p> <p><b>Conclusions/Discussion</b> Increased temperatures showed equal susceptibility levels for clarithromycin and cephalexin, while Bacillus subtilis became resistant at higher temperatures while under the treatment of amoxicillin. This showed that the optimal storage temperatures for clarithromycin and cephalexin are warmer environments, while amoxicillin's effectiveness was reduced from intermediate to resistant at higher temperatures. Expiration dates of antibiotics showed that the posted expiration dates may not reflect the actual drug effectiveness on the treatment of Bacillus subtilis. This study may help us save money and resources in the manufacturing of antibiotics and in overall health care.</p>	
<b>Summary Statement</b> I measured the effectiveness of certain antibiotics at different expiration dates and temperatures on Bacillus subtilis.	
<b>Help Received</b> I performed the procedural components of this experiment myself. My project supervisor helped me understand safety procedures and sterile technique as it related to my project, as well as looping techniques.	