



**CALIFORNIA STATE SCIENCE FAIR  
2016 PROJECT SUMMARY**

<b>Name(s)</b> Louis Lee; Vincent Lok	<b>Project Number</b>  36879
<b>Project Title</b> <b>Therapeutic Potential of Lactobacillus acidophilus to Mitigate Escherichia coli Infection in Artemia</b>	
<p align="center"><b>Abstract</b></p> <p><b>Objectives/Goals</b>          Improve Artemia (brine shrimp) survival by coincubation with common strain of Lactobacillus to solve dilemma of bacterial disease and antibiotic resistance in aquaculture</p> <p><b>Methods/Materials</b>  <b>Culturing E. coli and Lactobacillus</b>          A 1.8% Lactobacillus, 3% laboratory grade salt solution was prepared from Lactobacillus (Phillips Digestive Health Support; Bayer) and NaCl (Sodium chloride; Sigma). Competent E. coli were grown in 100 milliliters of LB broth (Difco) that was prepared accordingly.</p> <p><b>Lysing Bacterial Samples</b>          Samples were lysed overnight in a 4% solution of pectinase (Carolina) and 4% cellulase (Carolina) and then subjected to rapid freezing in a dry ice and 92% isopropanol bath and rapidly heated in a water bath at 40 °C. Samples were then centrifuged at 10000 rpm for 10 minutes and the supernatant was separated from the lysate, which formed a clump of debris at the bottom. The supernatant and lysate were both resuspended in 3% NaCl solution.</p> <p><b>Treating Brine Shrimp</b>          An average of 20 brine shrimp were aliquoted into each well of a 6 well plates. The shrimp were treated with 0.5 mLs of a bacterial solution and the volume of each well was raised to 10 mLs using a 3% laboratory grade salt solution. Mortality was measured at 0, 12, and 24 hours post E. coli challenge.</p> <p><b>Results</b>          The E. coli challenge significantly decreased survival rates. The groups that were cotreated with live probiotic Lactobacilli displayed no increased survival rates. However, Artemia treated with the probiotic 6 hours prior to the E. coli challenge displayed increased a much higher survival rate than Artemia simultaneously treated with the E. coli challenge. Cells of L. acidophilus and E. coli were lysed and divided into supernatant and lysate components and used as treatments for the brine shrimp. Both lysed components of the probiotic and E. coli decreased the vitality of the brine shrimp.</p> <p><b>Conclusions/Discussion</b>          These results affirm that prior inoculation with the probiotic Lactobacillus acidophilus is necessary for Artemia survival and validates a novel, inexpensive method to solve the dilemma of bacterial disease and antibiotic resistance in aquaculture.</p>	
<b>Summary Statement</b> We successfully conferred E. coli protection to brine shrimp using a common probiotic, Lactobacillus acidophilus.	
<b>Help Received</b> We designed and performed the experimentation without receiving any outside help.	