



**CALIFORNIA SCIENCE & ENGINEERING FAIR  
2018 PROJECT SUMMARY**

<b>Name(s)</b> <b>Harsh Deep; Shounak Ghosh</b>	<b>Project Number</b>  38350
<b>Project Title</b> <b>The Effect of T4 Bacteriophages on Antibiotic Resistant Strains of E. coli</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Antibiotic resistant bacteria pose a serious threat in the 21st century. For example, certain strains of Staphylococcus have developed mutations that make them resistant to normal antibiotics. Specifically, MRSA superbug is one of many deadly antibiotic resistant bacteria that pose a serious threat to the public. Our experiment seeks to find a different way to solve this problem of antibiotic resistant bacteria, or superbugs, by using bacteriophages. We look at the effect of bacteriophages, viruses that specifically attach to bacteria, on antibiotic resistant strains of E.coli.</p> <p><b>Methods/Materials</b> For our experiment, we used 15 pre poured petri dishes, E.coli culture, bacteriophage culture, gloves, iodine, blank disks, tetracycline, bleach, 70% isopropyl alcohol, micropipettes, forceps, nutrient agar, a hockey stick spreader, and an incubator. Observing sterile technique, we prepared our E.coli by taking a small sample of the bacteria and growing it in a nutrient LB broth. After we had a sufficiently large population of E.coli, we used a micropipette to place 10 microliters on the each petri dish. Then, for the dishes that required antibiotics and bacteriophage we placed them using forceps and micropipettes, respectively.</p> <p><b>Results</b> The use of tetracycline alone yielded an average zone of inhibition of 21mm in diameter. The tetracycline and bacteriophage combined performed much better and yielded an average zone of inhibition of 29 mm in diameter. The average zone of inhibition of iodine was 29 mm in diameter. The tetracycline and bacteriophage when used together were 40% more effective than tetracycline by itself.</p> <p><b>Conclusions/Discussion</b> This supported our original hypothesis in which we predicted that when the bacteriophages and tetracycline were used in tandem, they would create the largest zone of inhibition. The real world applications of our experiment are tremendous. Bacteriophages provide an individualized approach to treating dangerous, antibiotic resistant bacteria with the possibility of saving millions of lives.</p>	
<b>Summary Statement</b> When bacteriophages are used in tandem with tetracycline, they yield a 40% increase in the zone of inhibition compared to tetracycline alone.	
<b>Help Received</b> Ms. Peng, a biology teacher, helped my partner and I by overseeing all the work done in the lab and helping us while prepping and pouring the plates.	