



**CALIFORNIA STATE SCIENCE FAIR  
2013 PROJECT SUMMARY**

<b>Name(s)</b> <b>Alap A. Sahoo</b>	<b>Project Number</b> <b>S0523</b>
<b>Project Title</b> <b>Effects of E. coli Restriction Enzymes on Lambda Phage DNA</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The goal of my project was to determine whether E. coli restriction enzymes are adapted to attack the DNA of the lambda phage, a traditionally E. coli virus that is harmless to humans. I predicted that the restriction enzymes would cut pieces of the viral DNA similar in size to parts of the virus essential to the phage's life cycle.</p> <p><b>Methods/Materials</b> I tested my project by running preprepared, purchased digests of lambda phage DNA and three different restriction enzymes 4 different times, on 2 six-lane gels, in a gel electrophoresis system. I used two E. coli enzymes # Eco1301 and EcoRI # as well as HindIII (as a ladder). After running the gels through the system, I removed them and dyed them with methylene blue dye. I then took two measurements of the band lengths that appeared # one with a large quantity of dye, and one with a much smaller amount. I then used the lengths of these bands # indicative of the distance traveled by the various DNA pieces restricted by the enzymes # to calculate the pieces produced.</p> <p><b>Results</b> After calculating the lengths of each piece, I calculated confidence intervals around each piece. However, I decided to throw out my data from the first measurement, because it left out a significant amount of DNA, and stuck with my second measurement. The results from the second measurement were not very strong # not many of the confidence intervals matched important sections of the lambda phage, such as the head or the piece that codes for lysis.</p> <p><b>Conclusions/Discussion</b> I did not receive much support for my theory from the gels # the restriction enzymes do not seem to be cutting out pieces of the viral DNA similar in size to crucial sections of the phage, proving my hypothesis incorrect. However, this does not disprove my adaption theory, as the restriction enzymes may have adapted different tactics to attack the viral DNA. Further research will focus on finding exactly where on the lambda phage the restriction enzymes cut.</p>	
<b>Summary Statement</b> My project seeks to determine whether E. coli restriction enzymes have adapted to attack the DNA of the lambda phage virus.	
<b>Help Received</b> My former science teacher David Atkinson assisted with the running of the gel electrophoresis system.	