



**CALIFORNIA STATE SCIENCE FAIR  
2006 PROJECT SUMMARY**

<b>Name(s)</b> <b>Jane Chen; Susanna Shin</b>	<b>Project Number</b> <b>S0404</b>
<b>Project Title</b> <b>The Effect of Radiation on the Genetic Transformation of the pGLO Gene in Monera: Phase 2</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> This project was designed to test whether or not genetic transformation of the pGLO gene was possible in species of Monera after they were mutated by varying degrees of radiation exposure. By doing this experiment, one can see how mutations caused by radiation affect the creation of recombinant DNA in bacteria.</p> <p><b>Methods/Materials</b> Results from a previous experiment (Phase I) show that Escherichia coli was able to express the Green Fluorescent Protein while Lactococcus lactis was unable to express the Green Fluorescent Protein. Phase I served as the control for Phase II because Phase I was not affected by any factors during the process of genetic transformation. In this experiment, both bacteria were exposed to beta and gamma rays for fifteen minutes. Then, using a genetic transformation procedure, the pGLO gene, originally derived from the jellyfish Aequorea Victoria, was inserted into plasmid of the bacteria. The bacteria were then allowed to grow for three days. Bacteria that underwent successful genetic transformation were able to express the Green Fluorescent Protein that codes for the glowing of the bacteria colonies under an ultraviolet lamp. This bioluminescent trait, as well as the resistance to ampicillin, are two visible traits of a successful genetic transformation of the pGLO gene in the bacteria.</p> <p><b>Results</b> The Escherichia coli exposed to beta and gamma rays for fifteen minutes and the Lactococcus lactis exposed to the beta rays for fifteen minutes were able to express the Green Fluorescent Protein. The Lactococcus lactis that was exposed to gamma rays was unable to express the traits of the pGLO gene.</p> <p><b>Conclusions/Discussion</b> In conclusion, radiation does affect the genetic transformation of the pGLO gene in Monera. The Escherichia coli exposed to fifteen minutes of beta and gamma radiation and the Lactococcus lactis exposed to fifteen minutes of beta radiation were able to successfully express the Green Fluorescent Protein by creating a recombinant DNA. On the other hand, the Lactococcus lactis exposed to fifteen minutes of gamma radiation was unable to express this gene. This is due to the fact that the radiation altered its DNA plasmid of the bacteria in a way that would alter the specific nucleotide sequence necessary for the precise cut into its DNA by the restriction enzymes and for the insertion of the pGLO gene.</p>	
<b>Summary Statement</b> This project examines the effect of varying degrees of radiation on the genetic transformation of the pGLO gene in bacteria.	
<b>Help Received</b> Used lab equipment at Centennial High School	