



**CALIFORNIA STATE SCIENCE FAIR  
2017 PROJECT SUMMARY**

<b>Name(s)</b> Nosheen F. Hossain	<b>Project Number</b> <b>S2307</b>
<b>Project Title</b> <b>The Effect of X-ray Radiation on Developmental Neurogenesis in the Species Manduca sexta</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective of this project was to determine if radiation emitted by an X-ray machine had the capability to decrease the natural process of neurogenesis (growth and development of nervous tissue) in Manduca sexta.</p> <p><b>Methods/Materials</b> Eight Manducas in the instar 5 larval stage were split into a control group and an X-ray group. Manducas from the X-ray group were irradiated using an X-ray machine. On day 1, two Manducas from each group were injected with bromodeoxyuridine (BrdU). After allowing them to sit in room temperature for two hours and then anesthetizing them for 20 minutes, the brains were dissected out and placed in microcentrifuge tubes filled with Carnoy's fixative solution. The processes were repeated with the four remaining Manducas on day 3. Finally, all brains were viewed under a microscope with 20x magnification.</p> <p><b>Results</b> Qualitative analysis of BrdU staining on each brain indicated that there was a lower amount of staining on Manducas in the X-ray group compared to the control group for both days. The BrdU is a marker that stains newly proliferated cells from the time of injection. This signifies that radiation resulted in decreased cell growth in the brain.</p> <p><b>Conclusions/Discussion</b> The results affirmed my hypothesis that radiation inhibits neurogenesis in Manduca. During a Manduca's larvae phase, neurogenesis rapidly occurs in preparation for its pupae stage. This was observed in the control group. However, in the X-ray group, this normal pattern of growth was not detected. The findings satisfy my objective of determining radiation's effects on developmental neurogenesis. It also contributes knowledge to the field of zoology about radiation's effect on arthropodal development.</p>	
<b>Summary Statement</b> By using a staining method to identify newly generated neural cells, I found that X-ray radiation inhibits cell proliferation in the species Manduca sexta.	
<b>Help Received</b> I conducted my research at professor Megumi Fuse's lab in San Francisco State University. I received help from a graduate student, who mentored me in conducting the experiment and aided me in putting together a procedure.	