



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

Name(s) Jonathan Tabb	Project Number J2119
Project Title Can Planaria Be Used as an Alternative Toxicology Model?	
<p style="text-align: center;">Abstract</p> <p>Objectives The objective was to test if the planaria <i>Dugesia dorotocephala</i> could be used as a model to predict toxicity.</p> <p>Methods Planaria were cut in half and tails were placed into petri dishes with treatments of 6 different pesticides or an herbicide, and their regeneration was observed for 10 days. The photoreceptors in the head of the planaria were used as a way to judge if the planaria had regenerated. Then a dilution series of a pesticide and an herbicide were used to test effects of using higher and lower concentrations of the original treatments.</p> <p>Results Glyphosate and pyrethrins were the most toxic treatments and killed the planaria on day 1. Bifenthrin and cypermethrin killed the planaria by day 2. Pyrantel pamoate treated regenerated the quickest and were fully regenerated by day 9 which was similar to the untreated planaria. Deltamethrin and tetramethrin treated regenerated more slowly than untreated planaria but were still able to regenerate. Dilution series of glyphosate and deltamethrin showed more concentrated treatments killed the planaria, middle concentrations slowed the regeneration and more dilute treatments had no effect.</p> <p>Conclusions Planaria were able to be a model of toxicity because they are an organism that rapidly regenerates its parts. When cells are rapidly growing during regeneration, they are more sensitive to compounds that are toxic or that affect their growth. They were also a good model because photoreceptors in the head of planaria can be easily seen and used as a physical feature of head regrowth to judge regeneration. The treatments that were more toxic or were stronger blockers of cell growth affected planarian regeneration more while those that were not as toxic to cell growth slowed down regeneration but did not kill the planaria. The quick regeneration of planaria allows the effects of toxic compounds to be seen in a few days. Many planaria can be grown quickly, and they are also easy to take care of and cheap to maintain. These features make planaria a good substitute for screening toxic compounds instead of using animals.</p>	
Summary Statement As measured by the time it took to regenerate, I found that planaria could be used as an alternative model to test for toxicity.	
Help Received My mom who is a scientist taught me how to do a dilution series and supervised me during the testing.	