



**CALIFORNIA STATE SCIENCE FAIR  
2009 PROJECT SUMMARY**

<b>Name(s)</b> Aaron F. Crasnick	<b>Project Number</b> <b>J2411</b>
<b>Project Title</b> <b>Can Learned Behavior Be Transferred in Planaria by Regeneration or Consumption of Cells, and if so, Which Works Better?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> I tested whether a planaria's learned behavior turning left in a T maze could be transferred through either regeneration or consumption of cells and, if so, which worked better. My hypothesis was that the learned behavior would be transferred between planaria by both methods, but that the transfer would be more effective with regeneration.</p> <p><b>Methods/Materials</b> I placed 20 randomly selected planaria in 2 Petri dishes (10 per dish), for the controls. I screened 30 planaria for the tendency to turn right in a T maze. 20 of these planaria I trained to turn left in the maze using operant conditioning (mild shock). After each group was trained so that they turned left, I cut 10 of these planaria in half and allowed them to regenerate. I cut the control in the same manner, allowing them to regenerate. I ground up the remaining 10 planaria and fed them to the 10 right-turning planaria. I ground up 10 random planaria and fed them to the control group. After allowing for rest and regeneration, I reintroduced the planaria to the maze without a stimulus.</p> <p><b>Results</b> Before the planaria were cut, the trained planaria turned left 92% of the time, compared to 61% in the control group. After regenerating, they turned left an average of 79% of the time, compared to an average of 43.5% in the control. Before they were ground up, the trained planaria turned left 75% of the time, compared to 48% in the control. The consuming planaria turned left 73% of the time, compared to 52.25% of the controls.</p> <p><b>Conclusions/Discussion</b> In conclusion, my data revealed that the memory of a learned behavior could be transferred both through regeneration and consumption of cells. Overall, the consumption method worked much better than I had anticipated, and the regeneration method worked well also. I believe that the regenerated planaria developed an entirely new CNS with the synapse intact, but that the regeneration was not complete at the time of final testing.</p>	
<b>Summary Statement</b> My project investigated whether a learned behavior could be transferred both by regeneration or consumption of cells, and which would work better.	
<b>Help Received</b> My parents helped me buy the materials for my project and they gave me encouragement when the project took longer than I expected.	