Effects of Alcohol on Planarian Regeneration

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ABSTRACT

Upon being dissected, Planaria have the unique ability to regenerate. In order for us to be able to witness regeneration of Planaria, we look for the growth of photoreceptors. Now this regeneration ideally occurs in spring water but we wanted to test what kind of environment can rather negatively or positively influence the speed of this regeneration. We decided to test the effect of alcohol mixed with spring water on the environment of the planaria. Our results showed that it took both groups all 24 days to completely regenerate all of the planaria. Now if you look into detail on our 24 day log book, you will see that the rate of regeneration for both groups were relatively close. Therefore, alcohol or our solution of alcohol did not have relatively any effect on the regeneration speeds of the planaria.

INTRODUCTION

Planarians are free-living nonparasitic organisms most often found in rivers, streams, and ponds(King). Based off our lab in class we know that planarian have auricles and photoreceptors located on their head. We also know that they are negatively photoactive which means that they are sensitive to light. In this lab, we also found out that planarian don't bleed because they do not have a circulatory system. Planarians also do possess muscles which line the inner wall of the body in longitudinal, diagonal, and circular orientations (King). The mesenchyme of the planarian body is populated with numerous undifferentiated pluripotent cells, known as neoblasts. Neoblasts account for 25–30% of all cells in the planarian body and every tissue is ultimately derived from these cells. The capacity of this cell type to self-renew, rapidly proliferate, and migrate to sites of injury gives planarians the unmatched ability to regenerate(King). We are further studying this ability to regenerate and the effects that alcohol has on this ability. Many studies have been done on this and these previous studies discovered delayed development in planarian exposed to alcohol during head regeneration(Soong). We hypothesize that when adding alcohol to our dishes, our planarian will regenerate more slowly than the planarian not exposed to alcohol.

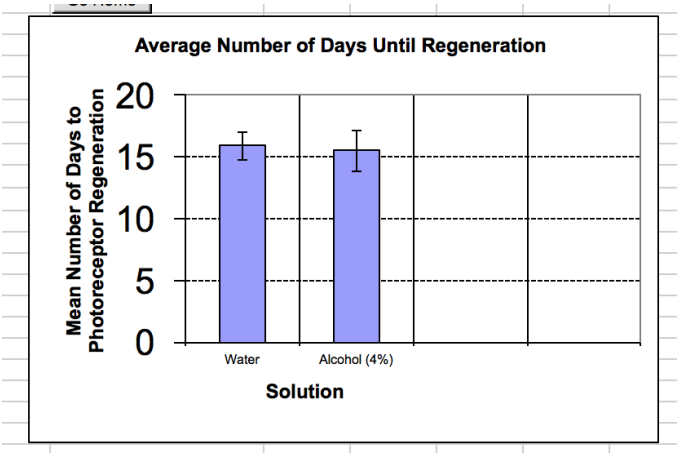
METHODS

Further researching Planaria, we tested on their abilities of regeneration and the type of environment that would rather speed up or slow down regeneration time upon dissecting the heads of these Planaria off. For this experiment, we decided to test the effect of alcohol on the environment. To test this we had ten petri dishes each filled with 2 mL of spring water which served as the control group being that it is the ideal environment for their regeneration. We had another 10 petri dishes filled with 2 mL of our solution of alcohol. Initially for the first 7 days we used 25 mL of alcohol mixed with 574 mL of spring water. This instead of helping the regeneration process, it killed off the planaria. To adjust, each petri dish then contained 1 planaria that had been dissected and our solution consisted of 12.5 mL of 4% alcohol solution into 487.5 mL of spring water which then we removed the 2 mL to place into each petri dish. The 10 petri dishes filled with the alcohol solution served as the experimental group. We stored these dishes in container in lab and over the course of 17 days, we checked each petri dish every other day and recorded which petri dishes had Planaria that had photoreceptors being that is a

sign of regeneration. Now to ensure that the dishes were not dirty and contaminated the environment, we changed the water out of the petri dishes every other day. For the environmental conditions, it remained constant for both groups being they both were stored in an open container in a room temperature environment. After all planaria had signs of photoreceptors, we used a program called Statbook to find the mean number of days to photoreceptor regeneration

RESULTS

Over the course of 17 days with our new concentration of alcohol, the mean number of days to photoreceptor regeneration for the control group was 15.9 days. The mean number of days to photoreceptor regeneration for the experimental group was 15.5 days. As you can see the means for both groups was only 0.4 days off of each other.



(Graph of Mean Number of Days to Photoreceptor Regeneration for both groups)

	Water	Alcohol (4%)	
MEAN	15.9	15.5	
S.D.	1.100504935	1.649915823	
N	10	10	0
1	14	14	
2	16	13	
3	16	13	
4	17	17	
5	16	17	
6	17	17	
7	16	17	
8	17	15	
9	14	16	
10	16	16	
11			

(Table information recorded for number of days to regeneration per planaria)

DISCUSSION

After reviewing the results of our experiment, it's clear to see that the data is too close to determine if alcohol is detrimental to regeneration speed or if it helps. This could be because we

may have used to small of concentration of alcohol to cause any effect on the environment. As you can see the initial dosage was too high so we presume that something in between these two dosages would show results. Now according to Jonathan Soong in his experiment with alcohol and planaria, he determined alcohol does have an effect on regeneration speeds (Soong). In his experiment he used 1% of an ethanol solution which showed results. Another possible reason we didn't render results could be because of the type of alcohol we used. If we decided to continued this research, our next study would continue with alcohol. This time however, we would use a solution concentration somewhere between our two solutions that we used. This way we could see exactly where we need to adjust the alcohol concentration.

REFERENCES

King, Stephen M. "Planarian." Planarian - an Overview | ScienceDirect Topics, www.sciencedirect.com/topics/medicine-and-dentistry/planarian

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