

Research Questions

Does fragment portion affect the rate of regeneration in planarian?
Does the presence of a head affect regeneration rate?

Background

What are Planaria?

- Planarians are a model organism used to study regenerative medicine, tissue regeneration, and even used in degenerative brain tissue studies.



Regeneration of planarian and previous research:

- Due to the chemical gradient and neoblasts present in planarians, they contain the ability to regenerate any part of their body (Gurley et al, 2008).
- Early studies contained conflicting results stating both that fragment size does effect rate of regeneration (Scharoff, 1934) and that it does not (Buchanan, 1933).
- The reinvestigation of these studies found that fragment size does not dictate rate of regeneration (Brondsted, 1954).

Predictions

Smaller fragments will have a larger growth rate than larger fragments.

In addition, the presence of the head of the planaria will increase the growth rate.

Method

Procedure

- The planarias were allowed to adjust for the weekend in separate petri dishes
- After 3 days, the planarias were separated into 3 controls, 15 experimental 25%, and 16 experimental 75% groups.
- The 15 experimental 25% worms were surgically cut approximately 25% away from the head (see figure 1) and the 75% tail was put into a separate petri dish and became the third experimental group. The 16 75% worms were surgically cut 75% down from the head (see figure 1) and the 25% tail was separated into its own petri dish and became the fourth experimental group.
- The planaria were weighed every other day for a total of three measurements

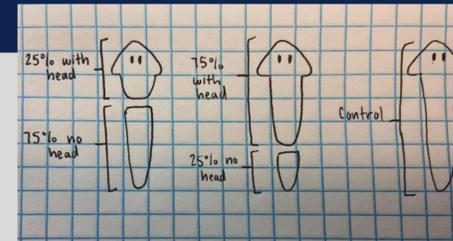


Figure 1: Surgical cuts to planaria

Primary Measures

- The planaria were weighed in milligrams by taking the measurement of a weigh boat, then placing the planaria on the weigh boat using a disposable transfer pipet. Using the pipet, all the water and water droplets from the weight boat to get a precise measurement.



Figure 2: Measuring specimens.

Results

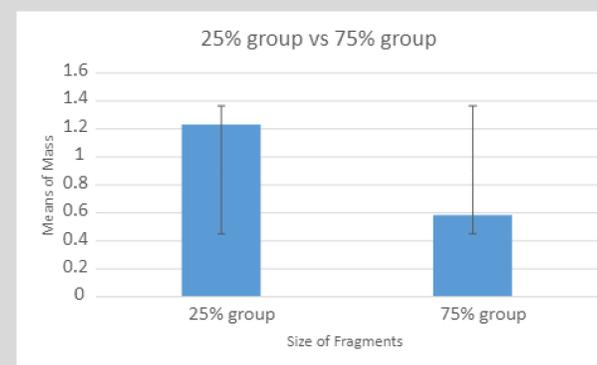


Figure 3: Means of mass of small and large fragments.

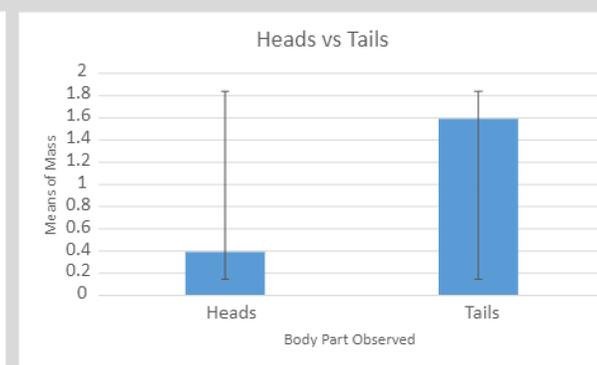


Figure 4: Mean of mass between heads vs tails.

Discussion

Summary of Findings

- No statistical significance was found between the growth rate of smaller and larger fragments
- There was statistical significance found in the rate of regeneration between the heads and tails.

Implications

- The increased knowledge of regeneration and the pathways and mechanisms behind neoblasts give insight into further research on regeneration of human tissue.
- The regeneration of the brain and nervous system of planaria also gives insight to the regeneration of neurons which has yet to be successful in experimentation.

Why? Further Research

- β -catenin drives the pathways of neuroblast regeneration. A 2008 study found β -catenin markers became present faster in the growth of the head (12 hours) than in the growth of the tail (24-48 hours) of a planaria (Gurley et al, 2008).
- Further research may now use this method of measuring growth using weight as it was found to replicate results from a previous experiment of faster head growth (Gurley et al, 2008).

References & Thanks