Planaria Regeneration and Patterning Lab Write-up*

Introduction to Stem Cells and Planaria Lab

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Abstract

Planaria (Genus Phylum) is a remarkable invertabrate that has the ability to regenerate within a few days of being halved. Planaria are of key interest to biologists because their signaling pathways involved in development is highly similar to humans. The process by which the Planaria are able to split and recreate vital appendages is hypothesized to be linked to calcium homeostasis. This lab exposes Planaria to PZQ (Praziquantel) to further understand the planaria's re-formation process.

Contents

*The authors are grateful to Katie Reichard for being our shepard.

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1 Introduction

This Lab investigated the link between PZQ and regeneration in

1.1 Planria

Planaria have been used in many research settings with studies ranging from drug tolerance studies (Raffa and Valdez (2001)), memory transfer (Hartry, Keith-Lee, and Morton (1964)), and ... They have been most notably studied for their neoblast system which is ....

1.2 PZQ (Praziquantel)

Praziquantel, often shortened to PZQ, is a drug created by GSK and Pfizer... It is most notably used as an antiparasitic drug discovered in (Wikipedia contributors (2021)).

Although not directly related to this lab, there is a body of research investigating parasites slowly evolving to become drug resistant to PZQ. In a 2016 study by a group of researchers from Portugal studying Schistosomiasis, a parasitic disease that kills 280,000 annually, investigated the difference of resistant parasites versus non resistant parasites. What they obsereved was a morphological difference between the two groups (Pinto-Almeida et al. (2016)).

1.3 Lab Setup

The Planaria were provided by the Reed Biology Department. Planaria were This lab used a dissection microscope to aid in

1.4 Data

Data was collected in this lab on a daily basis from February 3rd to Feburuary 10th (see (**ref?**)(tab:watch-schedule) for the watch schedule). Observations were performed using a dissection microscope (See figure)

2 Analysis

After collecting the data the authors of this paper aggregated their data with other members of their lab group

2.1 Research Questions

The authors considered a number of potential research questions including:

2.2 Stastics

Note: The threshold of significance used in this lab is $p < 0.05$

> Statistical summary statements: At least two statistics summary statements that showcase the results from your (i) ANOVA or two-way ANOVA and (ii) chi-squared contingency analysis. See Bio Binder H-10 and H-12 for instructions and examples on how to write a summary statement, in addition to the relevant sections for ANOVA and chi-squared analyses for relevant numbers to report.

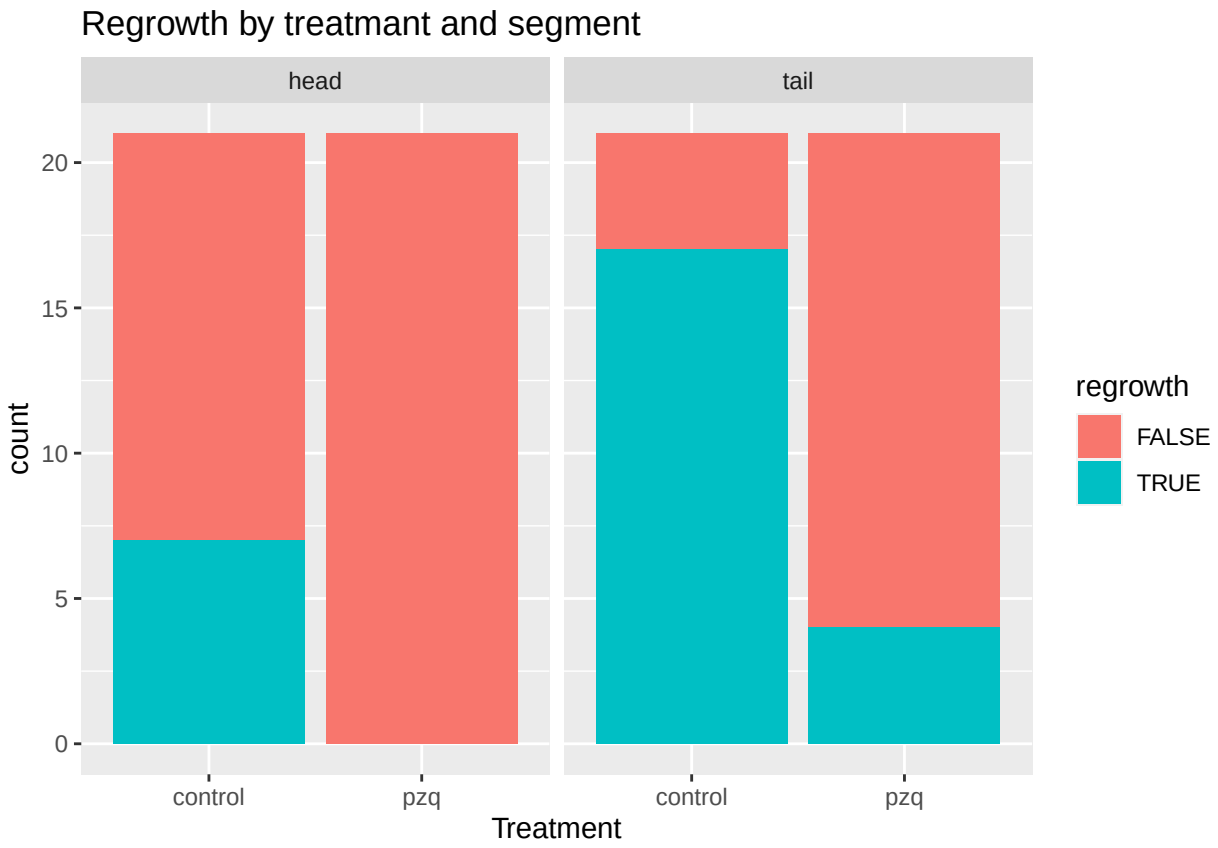
2.2.1 PZQ impact on regrowth

```
##
##            N  Y
##   control 14  7
##   pzq     21  0
```

```
##
##  Pearson's Chi-squared test with Yates' continuity correction
##
## data:  tolower(heads_data$Treatment) and heads_data$`New Pharynx appearance on HEAD (Y/N)`
## X-squared = 6.1714, df = 1, p-value = 0.01298
```

```
##
##            N  Y
##   control  4 17
##   pzq     19  2
```

```
##
##  Pearson's Chi-squared test with Yates' continuity correction
##
## data:  tolower(tails_data$Treatment) and tails_data$`New Eye spot appearance on TAIL (Y/N)`
## X-squared = 18.838, df = 1, p-value = 1.423e-05
```



2.2.2 Days before regrowth

3 Figures

Below are the images taken during the course of the lab in addition to several guiding figures to aid the reader in understanding the anatomy of this lab.

3.0.1 Planaria

Planaria are recognizable because....

Figure 1: Planaria under a dissection microscope

The have two distinct body components:

1. The eyes
2. The phayrnx

3.0.2 Splitting

To prepare the planaria for the lab... This process

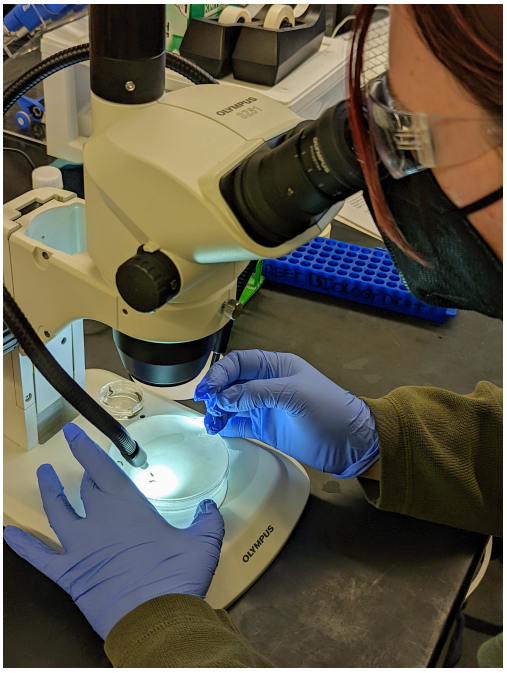


Figure 2: Morgan looking through the dissction microscope

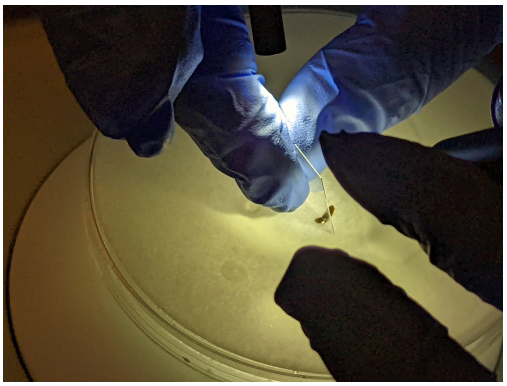


Figure 3: Splitting a planaria with a slide cover

Figure 4: A split planaria with a head (top) and tail (bottom) segment

3.1 Observations

Over time.... PICTURES OF REGENERATING

Below are sever elements from the lab...

3.1.1 Reforming Tail

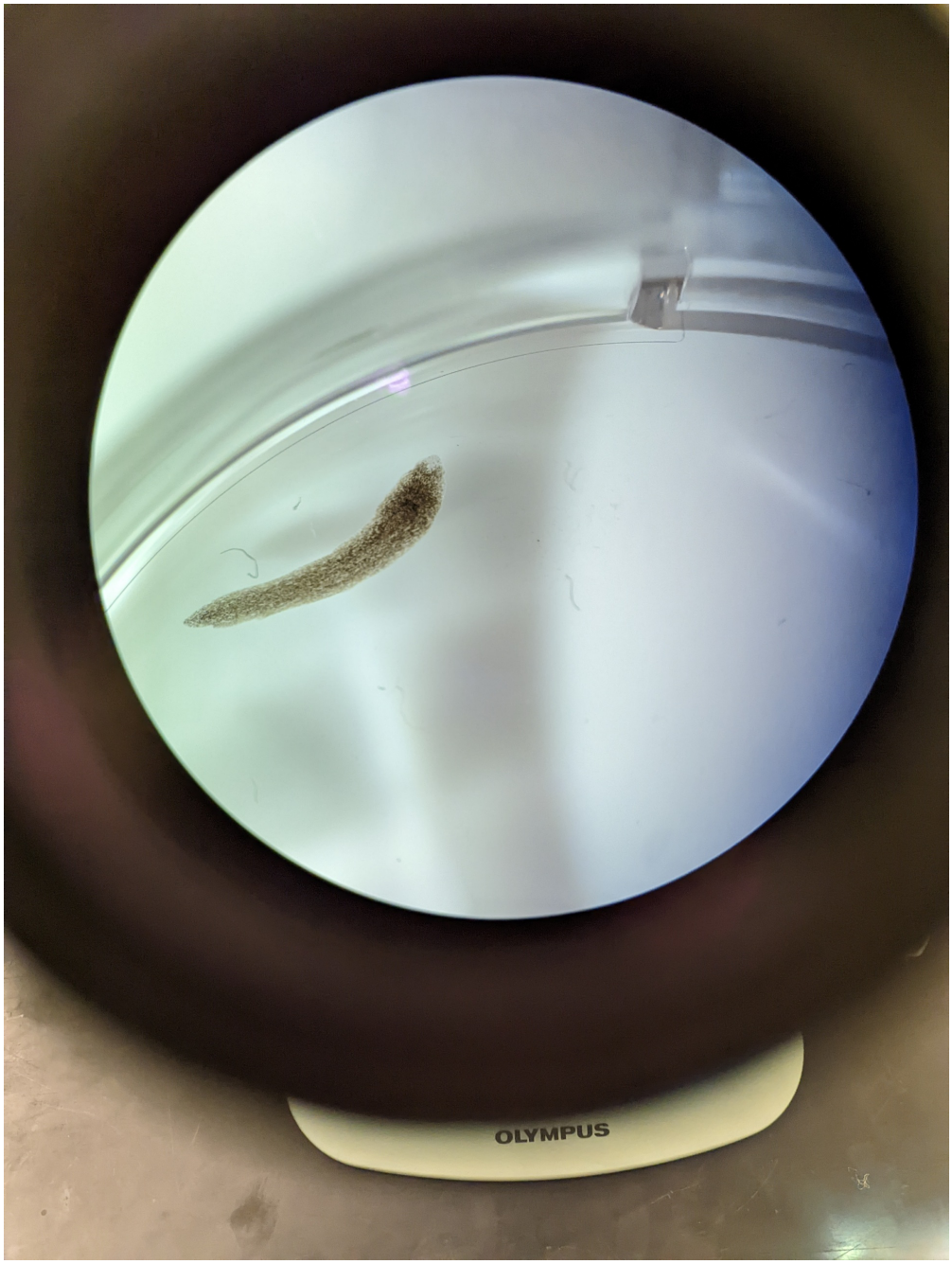


Figure 5: A regenerating tail segment on day 4

As can be seen above, the tail segments...

3.1.2 Reforming Head

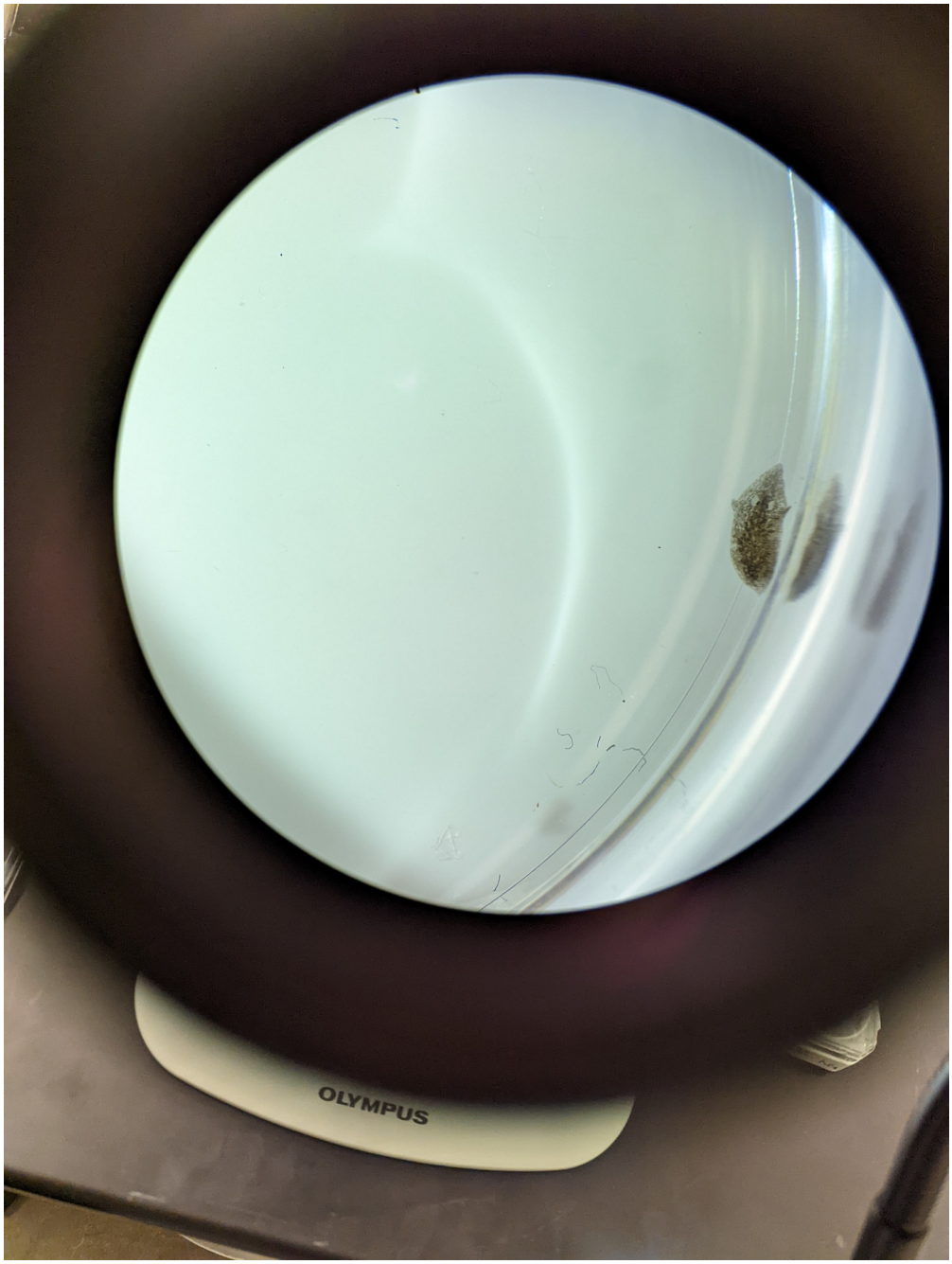


Figure 6: A regenerating head segment on day 4

3.1.3 Disintegration

Of our six Planaria segments that received a PZQ treatment all but one disintegrated.

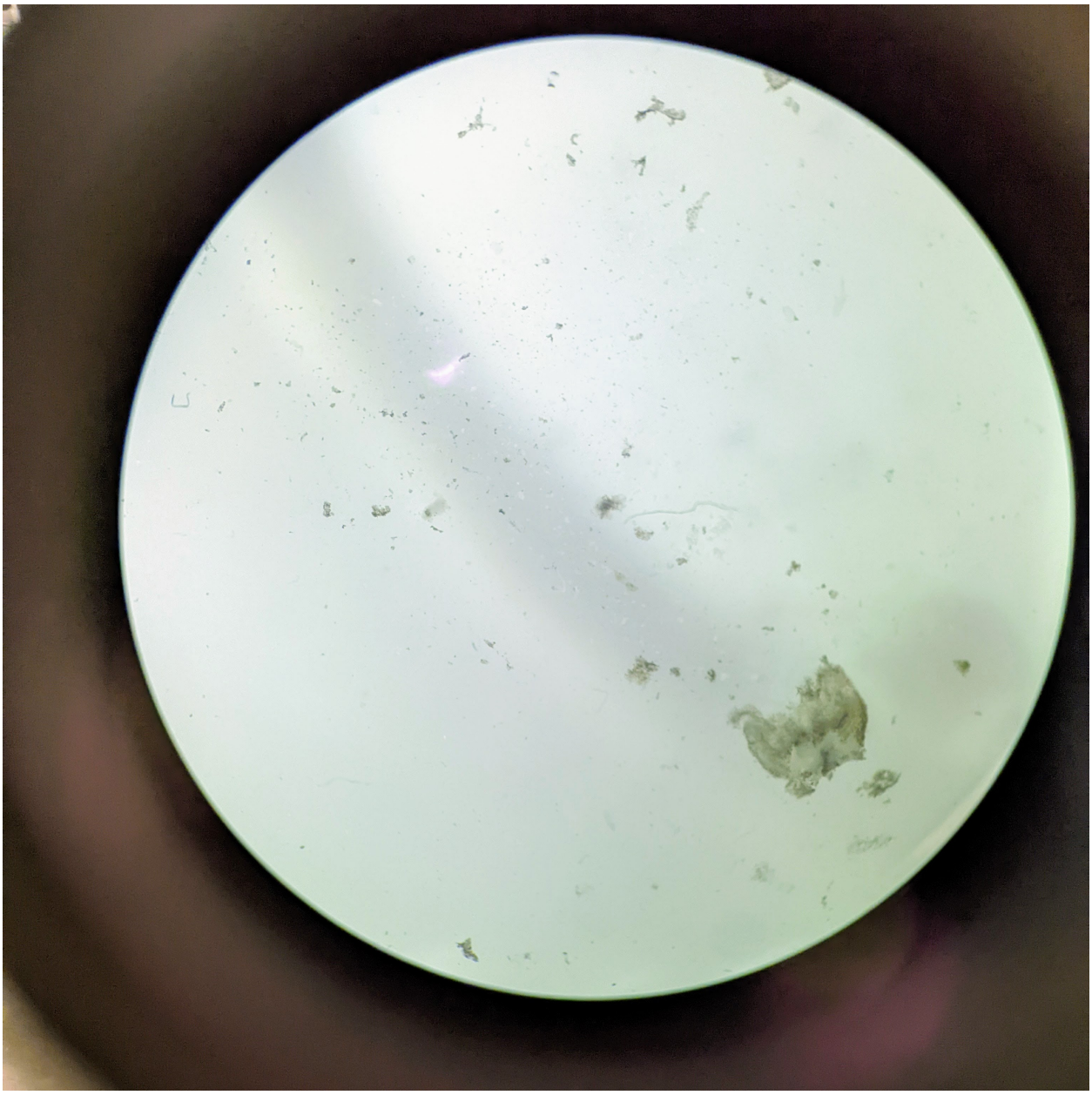


Figure 7: A disintegrated Planria from the PZQ

Table 1: Watch Schedule

Days since start	Date	Day of week	Time	Checker
0	2/3/2022	Thursday	14:52:00	All
1	2/4/2022	Friday	12:50:00	Taylor
2	2/5/2022	Saturday	14:30:00	Morgan
3	2/6/2022	Sunday	13:34:00	Connie
4	2/7/2022	Monday	12:30:00	Taylor
5	2/8/2022	Tuesday	12:30:00	Morgan
6	2/9/2022	Wednesday	17:30:00	Connie
7	2/10/2022	Thursday	13:44:00	All

4 Miscellaneous

This chapter includes subsections that did not fit in the above

4.1 Qualatative Summary

From our groups data only one of

4.2 Author Contributions

> Contribution statement: See contribution statement guidelines and write who did what- Bio Binder T-10; Section U for a good example, Section V for a bad example.

All authors contributed equally to this project

The checking schedule was divided accordingly:

4.3 Grading

4.3.1 Table

Component	**Excellent**	**Good**	**Satisfactory**	**Incomplete/Needs Work**
Report organization				
Report organization				

4.3.2 Other Comments

Bibliography

Hartry, Arlene L, Patricia Keith-Lee, and William D Morton. 1964. "Planaria: Memory Transfer Through Cannibalism Reexamined." *Science* 146 (3641): 274–75.

Pinto-Almeida, António, Tiago Mendes, Rosimeire Nunes De Oliveira, Sheila de Andrade Penteado Corrêa, Silmara Marques Allegretti, Silvana Belo, Ana Tomas, Fernanda de Freitas Anibal, Emanuel Carrilho, and Ana Afonso. 2016. "Morphological Characteristics of Schistosoma Mansoni PZQ-Resistant and-Susceptible Strains Are Different in Presence of Praziquantel." *Frontiers in Microbiology* 7: 594.

Raffa, Robert B, and Joseph M Valdez. 2001. "Cocaine Withdrawal in Planaria." *European Journal of Pharmacology* 430 (1): 143–45.

Wikipedia contributors. 2021. "Praziquantel — Wikipedia, the Free Encyclopedia." https://en.wikipedia.org/w/index.php?title=Praziquantel&oldid=1059876603.