

# Effect of Temperature on Planarian Regeneration



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## Abstract

We set up an experiment that involved cutting planarians of the same species in half transversally. Next, we placed 5 planarians each in containers of planarian water that we placed in different environments - hot, room, and cold temperatures - to test our hypothesis that temperature affects planarian regeneration. We also had a group of 5 uncut planarians in each corresponding temperature environment. We left the planarians in their environments for 14 days, recording the sizes of the planarians on days 0, 4, 7, 8, 14. We recorded sizes by using a regeneration chart with 7 stages, recording the stage for each planarian. Because the planarians in the hot environment died, we sought to compare the rate of regeneration for the cold versus room temperature planarians. Finally we conducted a chi-square test for goodness of fit that led us to

## Hypothesis

- We hypothesize that temperature will change the rate of regeneration for planarians.

## Introduction

- Planarians are flatworms that are known to be able to regenerate over half of their body when cut in 14 days. We wondered if this biological regenerative growth process was affected by the temperature of the water and environment the planarians are part of, knowing that temperature can catalyse and damage many biological processes even on the cellular level. Therefore, we conducted this experiment to answer the question: does temperature affect the rate of regeneration in planarians?

## Variables / Research

Controlled variables	Independent variable	Dependent variable
<ul style="list-style-type: none"> <li>Temperature of planarian environment</li> <li>Planarian cut location</li> <li>Amount of planarians &amp; water</li> </ul>	<ul style="list-style-type: none"> <li>Concentration of mineral water.</li> </ul>	<ul style="list-style-type: none"> <li>Number of pillbugs on each side of choice chamber.</li> </ul>

## Materials

Materials (detailed list)	Quantity (be specific)
Petri Dish	6
Planarians	30
Planarian Water	200 ml
Fridge	1
Incubator	1
Microscope	1

## Methodology

Step 1

Fill 6 petri dishes with planarian water and 5 planarians each.

Step 2

Leave two dishes under box, two in incubator, two in fridge.

Step 3

On certain days, place planarians under microscope and take pictures to track stages.

Step 4

Compare regeneration rate of planarians in different environments on day 14.

## Average Growth Stage by Day (Cold & Cut vs Room Temp & Cut)

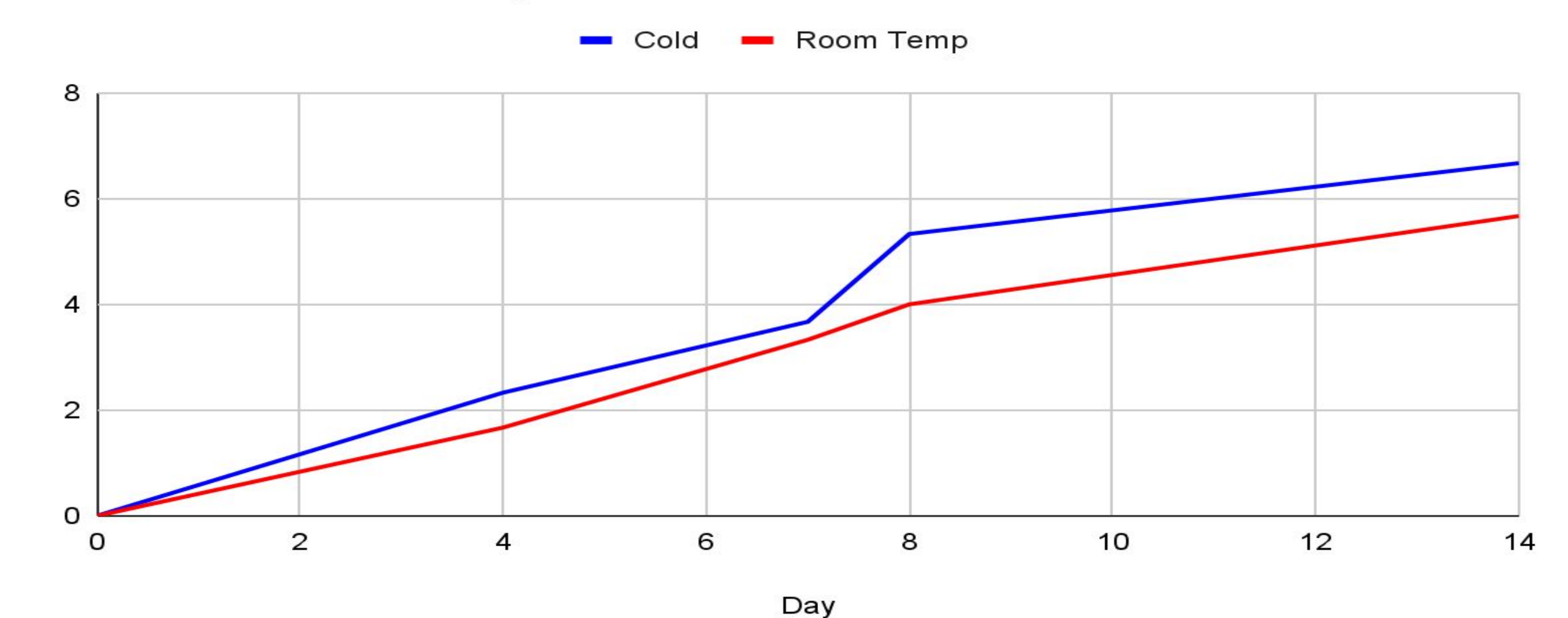
Day	0	4	7	8	14
Cold Cut	0	2.33	3.67	5.33	6.67
Room Cut	0	1.67	3.33	4	5.67

## Results

Our null hypothesis is that temperature does not affect planarian regeneration growth. Our alternative hypothesis is that temperature affects planarian regeneration growth.

Assuming that the null hypothesis is true, the probability of obtaining a sample of 5 planarians in which the observed values differ from the expected values by at least as much as the ones in our sample is 7.74772071%. Therefore, we fail to reject the null hypothesis because the p value of 7.74772071% is less than the 5% level of significance at which we are testing. It would appear that the regeneration time between room temperature planarians and cold temperature planarians are not different.

Cold and Room Temp



## Discussion

- Our results showed that there is no correlation between temperature and planarian regeneration, because there was not enough statistical evidence to reject the null hypothesis.
- We got the results we did because we assumed that the planarians would regenerate differently in various environments. In reality, planarian probably do regenerate differently in different environments, but our experiment was simply unable to back this up.
- Our hypothesis was incorrect because the planarian did not regenerate in one temperature better than the others.
- We would conduct further studies by maybe having more different temperatures to see if this would change the data some.

## Planarian Picture Link

[https://docs.google.com/presentation/d/1SNZlcaK\\_cTQDCv3JCoOYW\\_PoHfxpqDo1U7oCmMb\\_AVsg/edit?usp=sharing](https://docs.google.com/presentation/d/1SNZlcaK_cTQDCv3JCoOYW_PoHfxpqDo1U7oCmMb_AVsg/edit?usp=sharing)

## Chi Square Data

$$\chi^2 = [(0-0)^2/0] + [(2.33-1.67)^2/1.67] + [(3.67-3.33)^2/3.33] + [(5.33-4)^2/4] + [(6.67-5.67)^2/5.67] = 0.9141448811$$