

Onion Root Tip Lab Report

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Biology

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Problem, Hypothesis and Prediction

In this lab experiment, Hannah was to analyze an onion root tip under a microscope to observe the mitotic stages that occur in the cells of onion root tips. The problem was, at what rate does mitosis occur in different parts of the onion root? The hypothesis that was being considered is this: The stage of interphase will more likely be the stage spotted in most of the cells because it is the longest stage, therefore easier to observe. Hannah predicts that she will see more cells going through interphase than any other phase of the cell cycle.

Materials:

- Onion Root Tip
- One small cup containing HCl
- One small cup containing Carnoy
- Forceps
- Prepared Slide
- Scallop
- Toluidine Blue
- Paper towel
- Water
- Cover Slip
- Microscope
- Dropper

Procedure:

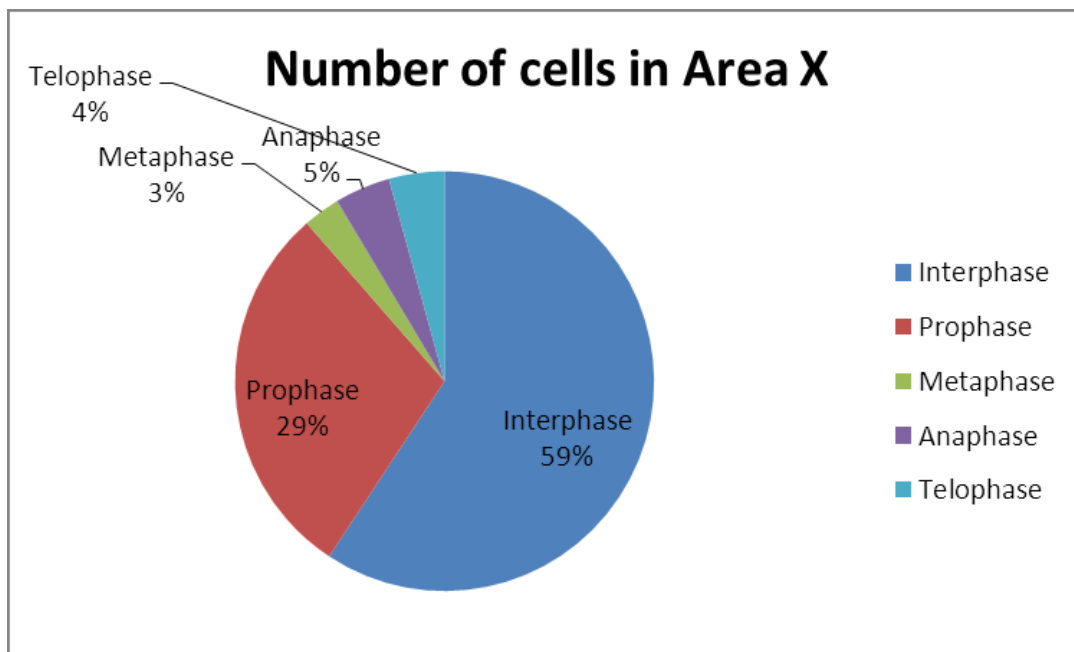
First, a pre-ready slide was provided. On this slide was an onion root tip. Area X was located on low power. Once that was achieved, Hannah switched to high power. She created a data table. After counting and observing the cells. Then, she recorded how many cells were found in each phase of mitosis and interphase for area X.

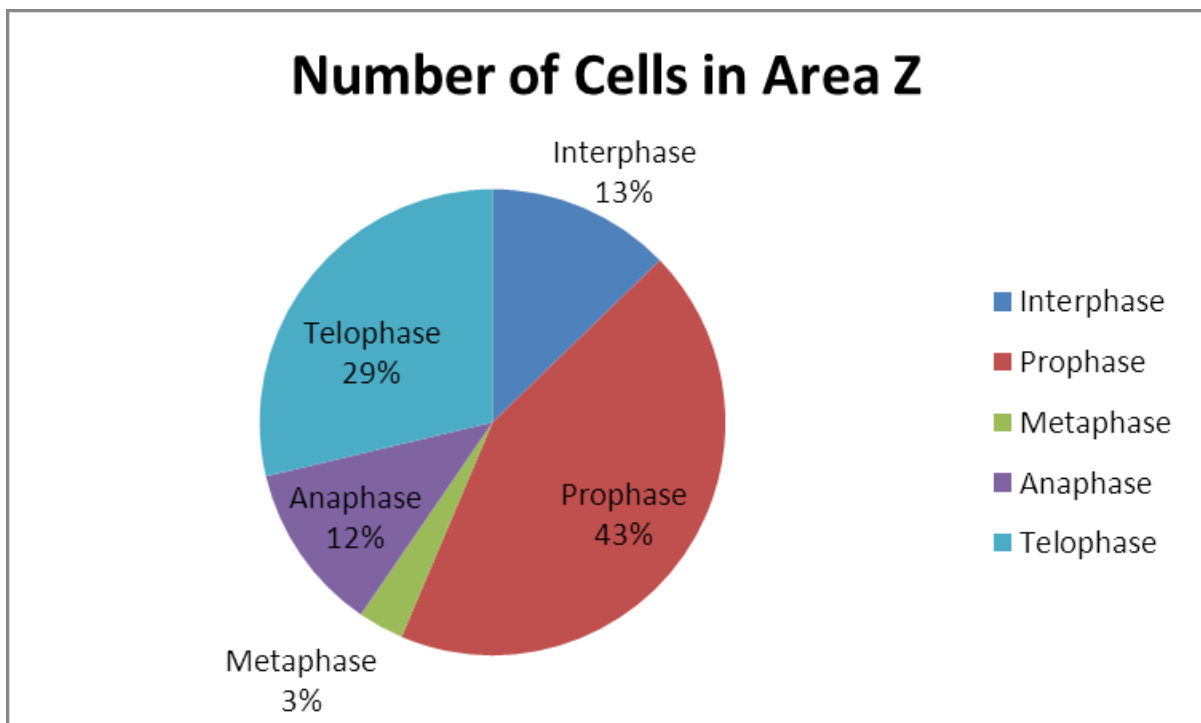
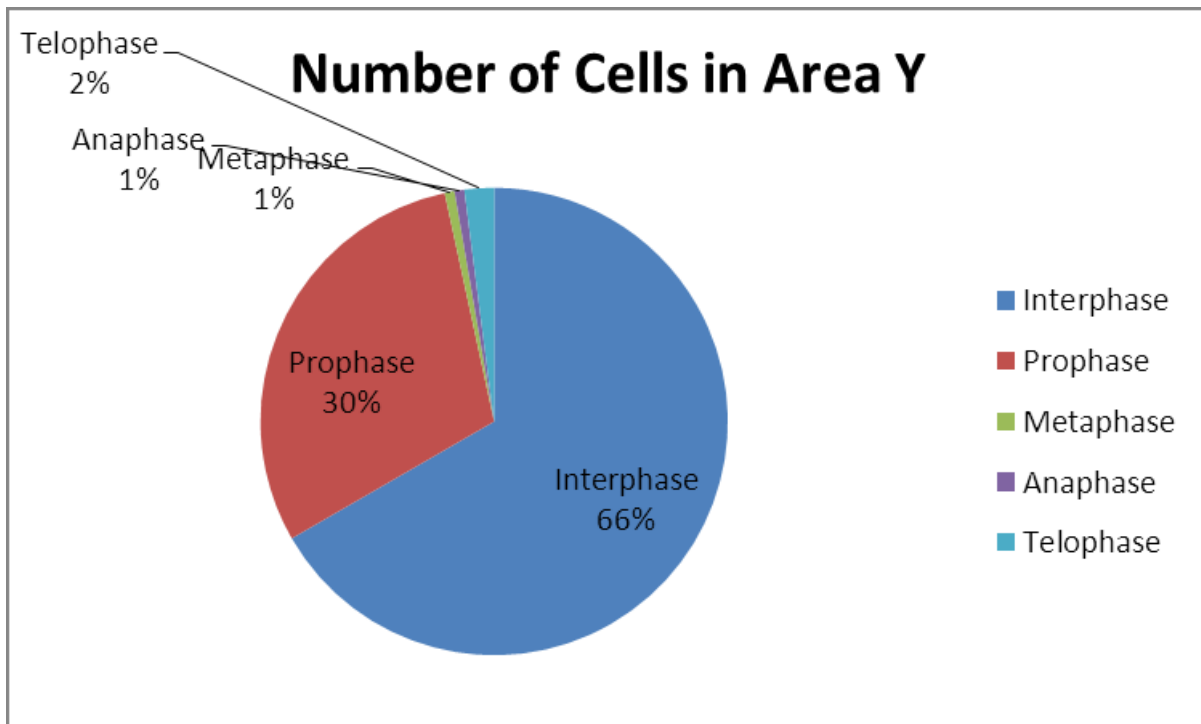
Area Y was then located on low power, using the same slide. Then, Hannah switched to high power. Hannah began to count the cells that were undergoing mitosis and interphase. She tallied the amounts of each as she counted. The cells that were in mitosis and interphase were recorded in a data chart.

Hannah had two small cups and filled and labeled one with HCl and one with Carnoy. She used Forceps to transfer an onion root tip into the HCl. After four minutes, it was transferred to the Carnoy. After four minutes, it was then placed on a slide. Using a scallop, every part of the onion root was cut off and trashed but the very tip. The root tip was covered for two minutes with Toluidine blue and blotted with a paper towel. Then, a drop of water covered it and a cover slip was pressed on. The slide was then placed on the microscope. Area Z was then located on low power. The number of cells undergoing mitosis and interphase were recorded in a data chart. The mess was then cleaned up.

Data:

Phase:	Number of cells in Area X	Number of Cells in Area Y	Number of Cells in Area Z
Interphase	83	98	12
Prophase	41	44	41
Metaphase	4	1	3
Anaphase	6	1	11
Telophase	6	3	27





Calculations:

Percentages-

$$83/140=59\%$$

$$41/140=29\%$$

$$4/140=3\%$$

Analysis and Conclusion:

This lab was an experiment designed to analyze how many cells could be observed in each part of mitosis for different areas of an onion root. First, with a prepared slide, area X and Y were located and each counted and recorded of what stages were observed. Then, another onion root tip was prepared and area Z was located. With the data of all three areas, the mitotic stages were able to be easily analyzed.

The problem in this experiment was at what rate does mitosis occur in different parts of the onion root? The hypothesis that was considered was that the stage of interphase will more likely be the stage spotted in most of the cells because it is the longest stage, therefore easier to observe. After completing the experiment, the hypothesis proved to be true in two areas of the cell and not true in one area of the cell. In area X, 59% of the cells were spotted in Interphase. There

was 29% in Prophase, 3% in Metaphase, 5% in Anaphase and 4% in Telophase. In area Y, 66% was spotted in interphase. There was 30% in Prophase, 1% in Metaphase, 1% in Anaphase and 2% in Telophase. In area Z, the higher percentage of 43% was found in prophase rather than interphase. There was 13% in Interphase, 3% in Metaphase, 12% in Anaphase, and 29% in Telophase

. In this experiment, a component that went wrong was the percentages of the different phases in area Z. A majority of the cells were not found in Interphase, unlike the other areas. This impacted the project by changing the outcome and data. It did not fit with the hypothesis like the other areas of the onion root tip. This problem could have occurred because of a miscount or because that specific area of the root tip had more cells engaging in prophase than interphase. This error that occurred is most likely due to a fault of human.

Question and Answer:

1. Which area of the onion root tip (X or Y or Z) had the greatest percentage of cells undergoing mitosis? The lowest? Use specific totals from your data table to support your answer. Part Z has the greatest percentage of cells undergoing mitosis with, 87%. Area X has 41% of cells undergoing mitosis and Area Y has the lowest percentage with 34% of cells undergoing mitosis.

2. If mitosis is associated with rapid growth, where do you believe is the location with the most rapid root growth, area X, Y, or Z? The most rapid root growth occurred in part Y because area Y had the lowest, 34%, of mitosis being observed. This means it was happening so quick to be seen. And this means that area Y has the most rapid root growth.
3. Where might you look for cells in your body that are undergoing mitosis? You would look in skin and hair cells because those kinds of places in your body are always growing and healing.
4. Assume that you were not able to observe cells in every phase of mitosis. Explain why this might be considering the length of each phase?
Interphase is the longest phase, so that made it easier to observe.
Prophase is the next to be longest, so it was also observed easier.
Telophase is also less rapid, making it easier to spot as well. But
Metaphase and Anaphase are very rapid making them hard to observe. In all three areas Metaphase and Anaphase had some of the lowest percentages of cells; Area X had 3% for Metaphase and 5% for Anaphase, area Y had 1% for both Metaphase and Anaphase, and area Z had 3% for Metaphase and 12% for Anaphase.
5. What factors might cause misleading results? How could you avoid these problems? Factors that could cause misleading results and errors are that

this experiment was conducted by nonprofessionals and so cells may have been miscounted or some cells may have been misinterpreted by what phase they were actually in. Also, it could have been poorly focused lens causing a blur. All of these factors could be fixed by being cautious of what could have happened and been worked out ahead of time. Such as, double checking your counts and claims on the phases and proficiently focusing the lenses.

6. What are the possible discrepancies that could have or did occur in the data when comparing the numbers of cells in each phase between the X and Y and Z samples? A discrepancy that occurred in the data was that both areas X and Y had the most cells being observed in Interphase, but area Z did not match with those results. It had the most percentages for cells being observed in Prophase instead.
7. What steps could you take to ensure that the next time you complete a lab in class the accuracy of the data will be precise? You could take more precise precautions, such as recounting your cells again or double checking to verify which stage that the cells were actually in. A big problem that could be fixed is taking your time with it rather than hurrying to try and count all the cells. Taking your time with counting would have succumbed for most of the discrepancies.