**Mitosis Lab Marcus Stevens February 9, 2016**

1. Introduction

Mitosis is a type of cell division that results in two daughter cells each having the same number and kind of chromosomes as the parent nucleus. It is the equal division of the nucleus. In this lab, the region of cell division, called the meristem, located near the root tips of onions, was examined for the number of its cells in each stage/phase of the cell cycle. There were two root tips studied, one was applied with a mitogenic factor and the other was not. This would indicate whether the variable had an effect on the amount of time that the root tip cell spent in a particular phase of the cell cycle. The five phases that were examined were interphase, prophase, metaphase, anaphase, and telophase.

1) **Interphase** is the phase of the cell cycle in which the majority of the cells spend most of their life. During this phase, the cell copies its DNA in preparation for mitosis.

2) In **prophase**, the first phase mitosis, DNA and proteins contained in the nucleus, known as chromatin, condenses.

3) During **metaphas**e, the spindle attaches to the centromere of each chromosome and the chromosomes align themselves in the middle of the cell.

4) In **anaphase**, the chromatids are separated and pulled to the opposite poles.

5) Finally, in **telophase**, the sister chromatids completely reach opposite poles. The small nuclear vesicles in the cell begin to re-form around the group of chromosomes at each end.

**Purpose:** The purpose behind this experiment is to classify and count each cell on the meristem region of an onion root tip applied with and without a mitogenic factor based on what phase it is in to predict how much time a dividing cell spends in each phase.

**Hypothesis:** When the meristem region of an onion root is applied with a mitogenic factor, the time that a cell spends in each phase of mitosis will not be significantly different when compared to a root tip devoid of the mitogenic factor.

1. Materials and Methods (Procedure)

**Materials:** This lab requires prepared slides of onion root tips, mitogenic factor, a pencil, paper, a light microscope, and a chromosome simulation kit (showing the images of the different phases).

**Procedure:**

1. Place the prepared microscope slides containing the strips of onion root tips under the microscope at 10x magnification.
2. Start to look at the strip on the far left of the slide and locate the meristem region (region of cell division).
3. Once the meristem region is located, increase the magnification to 40x.
4. Count 50 cells per partner (100 cells in total) and record the findings on a data table that corresponds with the phases of the cell cycle.
5. Repeat steps 1, 3, & 4, but look at the strip of onion root on the far right, that is the root that the mitogenic factor was applied to.
6. Record the findings in the same data table and compare them in a pie chart.
7. Results

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| --- | --- | --- | --- | --- | --- |
| **Phases:** | No Mitogenic Factor # of cells | Mitogenic Factot # of cells | Total # of Cells | % of Total Cells | Total Time in each Stage |
| Interphase | 34 cells | 23 cells | 57 cells | 28.5% | 410.4 minutes |
| Prophase | 22 cells | 32 cells | 54 cells | 27% | 388.8 minutes |
| Metaphase | 3 cells | 6 cells | 9 cells | 4.5% | 64.8 minutes |
| Anaphase | 18 cells | 14 cells | 32 cells | 16% | 230.4 minutes |
| Telophase | 23 cells | 25 cells | 48 cells | 24% | 345.6 minutes |
| **Total:** | **100 cells** | **100 cells** | **200 cells** | **100%** | **1440 minutes** |

**Time in each Stage**  = % of Total Cells \* 1,440 minutes (24 hours)

1. Conclusion

It was hypothesized that when the meristem region of an onion root is applied with a mitogenic factor, the time that a cell spends in each phase of mitosis will not be significantly different when compared to a root tip devoid of the mitogenic factor. This statement, according to the data, appears to be true. There was not a significant impact on the number of cells or on the time spent in that particular stage of mitosis. The interphase appeared to be the most prominent cell, which makes sense since cells spend the majority of their life in that stage. Moreover, interphase appears to have correct numbers data-wise. Prophase, however, was more abundant that originally anticipated when the cells were applied to the mitogenic factor. This most likely means that there was a trigger in the mitogenic factor that may have set off a receptor of some sort in the onion’s cells. This trigger subsequently stalled the progression of the cell cycle, which would account for the length of time that the cells spent in the prophase stage. However, this observation may be by chance and there is no further statistical evidence to analyze. Therefore, the hypothesis can be regarded as correct.

There were several limitations in this experiment. For example, there was absolutely no statistical equation or program to signify if the variable was significant, it was merely based upon the human eye. Furthermore, in the procedure, human error was a factor when counting and classifying the cells, so the data is not precise. The final identified limitation in this experiment was the lack of information in terms of the mitogenic factor. With these limitations affecting the experiment, the overall interpretation may be inhibited.