# Mitosis in Onion Root Tip Cells

**Introduction**

Mitosis is the process by which the cell nucleus is divided into two nuclei. Mitosis takes place in four phases: prophase, metaphase, anaphase, and telophase. The period between one mitosis and the next is called interphase. Chromosome replication occurs during interphase. Organisms such as the common intestinal bacteria *E. coli* can complete mitosis in 30 minutes. Other cells require days. In some cells, such as human muscle cells, mitosis never occurs.

In this investigation, you will observe cells in each phase of the Cell Cycle and determine the time required for plant cells to go through each phase of mitosis. **Carefully** read the Procedure, below.

**Procedure**

1. Take a prepared onion root-tip slide. Place it on the stage and focus near the tip of the root.
2. Starting with Scan, focus the slide. Next, proceed to Low Power and re-focus. Without using the coarse adjustment knob again, go to high (400X) power and fine focus.*\*Do* ***NOT*** *go to Oil Immersion (longest objective)*! Find a cell in **Interphase**. Draw the cell to scale **neatly**, and in **pencil,** using a **ruler** and making parallel lines to the right of the circle**.** (\**Points will be deducted for minimum effort*). Label these structures: **Nuclear membrane, Chromatin, Nucleolus**. Next, find a cell in each of the stages of mitosis. Draw one cell to represent each stage below. **Prophase**- label: **Chromosomes**. **Metaphase**- Label: **Chromosomes; Centrosome** (\*centriole resides here). Using a ‘dashed’ line, **sketch where the equatorial plate** would be, based on how the chromosomes are aligned. **Anaphase**- Label: **Chromosomes; Spindle Fibers**. **Telophase**- Label: **cell plate, nuclear membrane, chromatin**.

 **Interphase**

 **Prophase**

 **Metaphase**

 **Anaphase**

 **Telophase**

1. While on high power and count the total number of cells in the field of view.
2. Without changing the field of view, count the number of cells in each stage of mitosis: prophase, metaphase, anaphase, and telophase. Also record the number of cells in interphase.
3. Record the number of cells present in each phase in table 1.

**Data**

*Table 1: Group Data*

|  |  |
| --- | --- |
| **Phase** | **Number of Cells****in Phase** |
| **Interphase** |  |
| **Prophase** |  |
| **Metaphase** |  |
| **Anaphase** |  |
| **Telophase** |  |
| **Total Cells** |  |

*Table 2: Class Data and Analysis*

|  |  |  |
| --- | --- | --- |
| **Phase** | **Number of Cells in Phase****(Class Data)** | **Percentage of Time Spent in Each Phase****(Cells in Phase / Total Number of Cells)** |
| **Interphase** |  |  |
| **Prophase** |  |  |
| **Metaphase** |  |  |
| **Anaphase** |  |  |
| **Telophase** |  |  |
| **Total Cells** |  |  |

*Graph 1: Bar graph of the number of cells in each phase of mitosis (class data)*



*Graph 2: Pie chart of the hours of the percentage of time spent in each phase of mitosis.*

**Analysis**

1. According to your data, does a typical onion root tip cell spent more time in interphase, or in mitosis?
2. In which phase of mitosis is the most time spent? The least?
3. Interphase is sometimes called the “resting stage”. Explain why this is inaccurate.
4. Why are chromosomes not visible during interphase?
5. Is Interphase part of Mitosis? Why or why not (explain)?
6. Name at least 2 structures involved in cell division that are found in animal cells, but not in plant cells
7. This lab used the root tips as a source of cells. Why would this be used in a mitosis lab? How might the results have been any different if a different part of the plant, such as a fully-grown leaf, had been used?