

Onion Root Tip Lab: Online Version

Introduction:

We will be exploring the phases of the cell cycle in an onion root over the next few days. The first part of this investigation is an online simulation of the lab to get you used to recognizing the phases of the cycle in onion root cells. The second part will be an actual survey of an onion root tip completed in the lab.

In this online simulation, you will classify each cell based on what phase it is in (interphase, prophase, metaphase, anaphase, or telophase). At the end, you will count the cells found in each phase and use those numbers to predict how much time a dividing cell spends in each phase. Some things to keep in mind:

- Interphase encompasses the G₁, S, and G₂ phases of the cell cycle, whereas PMAT are the four phases of mitosis. Together, interphase + PMAT make up the cell cycle.
- If you see a bunch of cells in one particular phase, it makes sense that that phase must take the longest. It's kind of like looking photographs of a human taken every day of his or her life...are most of the pictures going to be of a baby, a child, an adolescent, or an adult? Why is this so?

Directions:

1. Type in the following url:
http://www.biology.arizona.edu/Cell_BIO/activities/cell_cycle/cell_cycle.html
(If you Google 'onion root tip mitosis, University of Arizona' it should be the first to come up.)
2. Read the introduction and then click "next" at the bottom of the screen.
3. Review the phases of the cell cycle and click "next" again.
4. Read the assignment and click "next" again. You will be collecting data on this sheet as well as online.

Procedure:

1. *Classify each cell* based upon the phase it is in by clicking on the phase stage that the cell is in. Count the cells in each phase and record the numbers in Data Table A. If you incorrectly classify a cell, don't worry, simply read the description of your error then retry!
2. *Calculate the percent of cells in each phase* using the following formula:
Percent of cells in a particular phase = $\frac{\text{number of cells in that phase}}{\text{total number of cells counted}} \times 100$
3. *Determine the time required for each phase:*
Assume that the number of cells in a phase indicates the time spent in that phase during the cell cycle (see analogy above). If the total time for the cell cycle is known, we can calculate the time spent in each phase using the data we collect. **Onion cells require about 12 hours (720 minutes) to complete cell division.** The amount of time spent in each phase can be calculated with the following formula:

$$\text{Time spent in a phase} = \frac{\text{number of cells in that phase}}{\text{total number of cells counted}} \times 720 \text{ minutes}$$

4. Using the formula above along with your data, calculate the time required for each phase.
5. Record the times in Data Table A.

