

Mitosis

Introduction

All new cells come from previously existing cells. New cells are formed by the process of cell division which involves both replication of the cell's nucleus (**karyokinesis**) and division of the cytoplasm (cytokinesis).

There are two types of nuclear division: mitosis and meiosis. **Mitosis** typically results in new somatic (body) cells. Formation of an adult organism from a fertilized egg, asexual reproduction, regeneration, and maintenance or repair of body parts are accomplished through mitotic cell division. **Meiosis** results in the formation of either gametes (in animals) or spores (in plants). In this lab we will investigate mitosis in onion root tip and whitefish blastula cells.

Exercise 3A.1: Observing Mitosis in Plant and Animal Cells

Procedure

1. (Examine **POWERPOINT IMAGES OF MITOSIS IN ONION ROOT TIP AND WHITEFISH BLASTULA**)
2. Study individual cells. Identify one cell which clearly represents each phase of mitosis. **Sketch** and **label** the cells.
Use your textbook to help you identify the different stages of mitosis)

Analysis Questions

1. Why is it more accurate to call mitosis "nuclear replication" rather than "cellular division"?
2. Explain why the whitefish blastula and onion root tip are selected for study of mitosis.

Exercise 3A.2: Time for Cell Replication

Procedure

It is hard to imagine that you can estimate how much time a cell spends in each phase of cell replication from a slide of dead cells. Yet this is precisely what you are going to do in this part of the lab. Since you are working with a PowerPoint images of prepared slides, you cannot get any direct information about how long it takes a cell to divide, but you can determine is how many cells are in each phase. From this, you can *infer* the percent of time each cell spends in each phase.

1. Observe every cell in one high power field of view and determine which phase of the cell cycle it is in. This is best done in pairs. The partner observing the slide calls out the phase of each cell while the other partner records. Then switch so the recorder becomes the observer and visa versa. Count 3~4 full fields of view. You need to count at least 200 cells!
2. **USE POWERPOINT IMAGES OF MITOSIS IN ONION ROOT TIP AND WHITEFISH BLASTULA**
3. Record your data in a data chart similar to that in Tables 3.1.and 3.2. **You will need a separate chart for onion root tip cells and whitefish blastula cells.**
4. Calculate the percentage of cells in each phase.
 - Consider it takes, on average, 16 hours (960 minutes)(for onion root-tip cells and 24 hours (or 1,440 minutes) for whitefish blastula cells to complete the cell cycle.
 - You can calculate the amount of time spent in each phase of the cell cycle from the percent of cells in that stage.
 - **Percent of cells in stage X minutes in complete cell cycle = _____ minutes of cell cycle spent in stage.**

Table 3.1: Onion Tip Mitosis

	Number of Cells				Percent of Total Cells Counted	Time in Each Stage
	Field 1	Field 2	Field 3	Total		
Interphase						
Prophase						
Metaphase						
Anaphase						
Telophase						
				Total Cells Counted		

Table 3.2: Whitefish Blastula Mitosis

	Number of Cells				Percent of Total Cells Counted	Time in Each Stage
	Field 1	Field 2	Field 3	Total		
Interphase						
Prophase						
Metaphase						
Anaphase						
Telophase						
				Total Cells Counted		

Questions

1. If your observations had not been restricted to the area of the root tip that is actively dividing, how would your results have been different?
2. Based on the data in Tables 3.1 and 3.2, what can you infer about the relative length of time an onion root-tip cell and a whitefish blastula cell spends in each stage of cell division?

DO NOT FORGET DISCUSSION, CONCLUSION, AND REFLECTION!

DO NOT FORGET YOU MITOSIS DRAWINGS!