

Multiplying by Dividing

There is a repeating cycle of events to life of every cell. This cycle of events is known as the cell cycle. It is useful to learn the parts of the cell cycle and what is accomplished in each part, but it is also useful to know how much time a cell spends in each part of that cycle.

Purpose

To determine how long the stages of the cell cycle take.

Materials and Equipment

- microscope
- prepared slides of onion tip cells undergoing cell division
- coloured pencils
- calculator

Procedure

1. Place one of the prepared slides on the stage of the microscope. Use low power to locate a cell in interphase. Then switch to high power and make a detailed drawing of the cell.
2. Find cells in prophase, metaphase, anaphase, and telophase. Find and view the cells first using low power, then use high power to make detailed drawings. After you finish your drawings, create an appropriate data table with columns labeled: stage of cell cycle, first sample, second sample, and total number. The table should have 6 rows labeled: interphase, prophase, metaphase, anaphase, telophase, and total number of cells counted.
3. Find an area of the slide with many cells undergoing cell division. Switch to the magnification that lets you see about 50 cells at once, which is usually about 100X magnification.
4. Examine the cells row by row and count the cells that are in interphase. Record that number in your data table as your first sample.
5. Examine the cells row by row four more times and count the cells that are in each of the stages of mitosis. Record the results in your data table as your first sample.
6. Move to a new area of the slide. Once again find a proper magnification to view about 50 cells at once and count the cells in each of the 5 stages of the cell cycle. Record the results in your data table in the column labeled second sample.
7. Fill in the column labeled total number by adding the numbers across each row in the data table.

8. Add the totals for the 5 stages to find the total number of cells counted. Use the data collected to find the number of minutes each stage takes.

$$\text{Time for each stage} = \frac{\text{number of cells at each stage}}{\text{total number of cells counted}} \times 720 \text{ min}$$

The cell cycle for onion root tips takes about 720 minutes. For example, divide the total number of cells observed in prophase by the total number of cells counted, multiplied by 720.

Questions

9. A student performing the procedure steps 1 through 8 recorded the following numbers when counting cells in different phases of the cell cycle. Use these numbers to calculate the amount of time each stage takes. What do your calculations indicate about the relative time a cell spends in each stage of its cell cycle?

Phase	First Sample	Second Sample	Total Number
Interphase	42	43	85
Prophase	4	2	6
Metaphase	3	1	4
Anaphase	0	2	2
Telophase	0	2	2

10. Would you expect the similar results for the time each cell cycle stage takes if you used a different type of cell, such as a human muscle cell? Explain your answer.