

Aim

Our aim is to prepare a temporary mount of onion root tip to study mitosis.

Theory

All organisms are made of cells. For an organism to grow, mature and maintain tissue, new cells must be made. All cells are produced by division of pre-existing cells. Continuity of life depends on cell division. There are two main methods of cell division: mitosis and meiosis. In this tutorial we will learn about mitosis.

What is Mitosis?

Mitosis is very important to life because it provides new cells for growth and replaces dead cells. Mitosis is the process in which a eukaryotic cell nucleus splits in two, followed by division of the parent cell into two daughter cells. Each cell division consists of two events: cytokinesis and karyokinesis. Karyokinesis is the process of division of the nucleus and cytokinesis is the process of division of cytoplasm.

Events during Mitosis

1. Prophase:

1. Mitosis begins at prophase with the thickening and coiling of the chromosomes.
2. The nuclear membrane and nucleolus shrinks and disappears.
3. The end of prophase is marked by the beginning of the organization of a group of fibres to form a spindle.

2. Metaphase

1. The chromosome become thick and two chromatids of each chromosome become clear.
2. Each chromosome attaches to spindle fibres at its centromere.
3. The chromosomes are arranged at the midline of the cell.

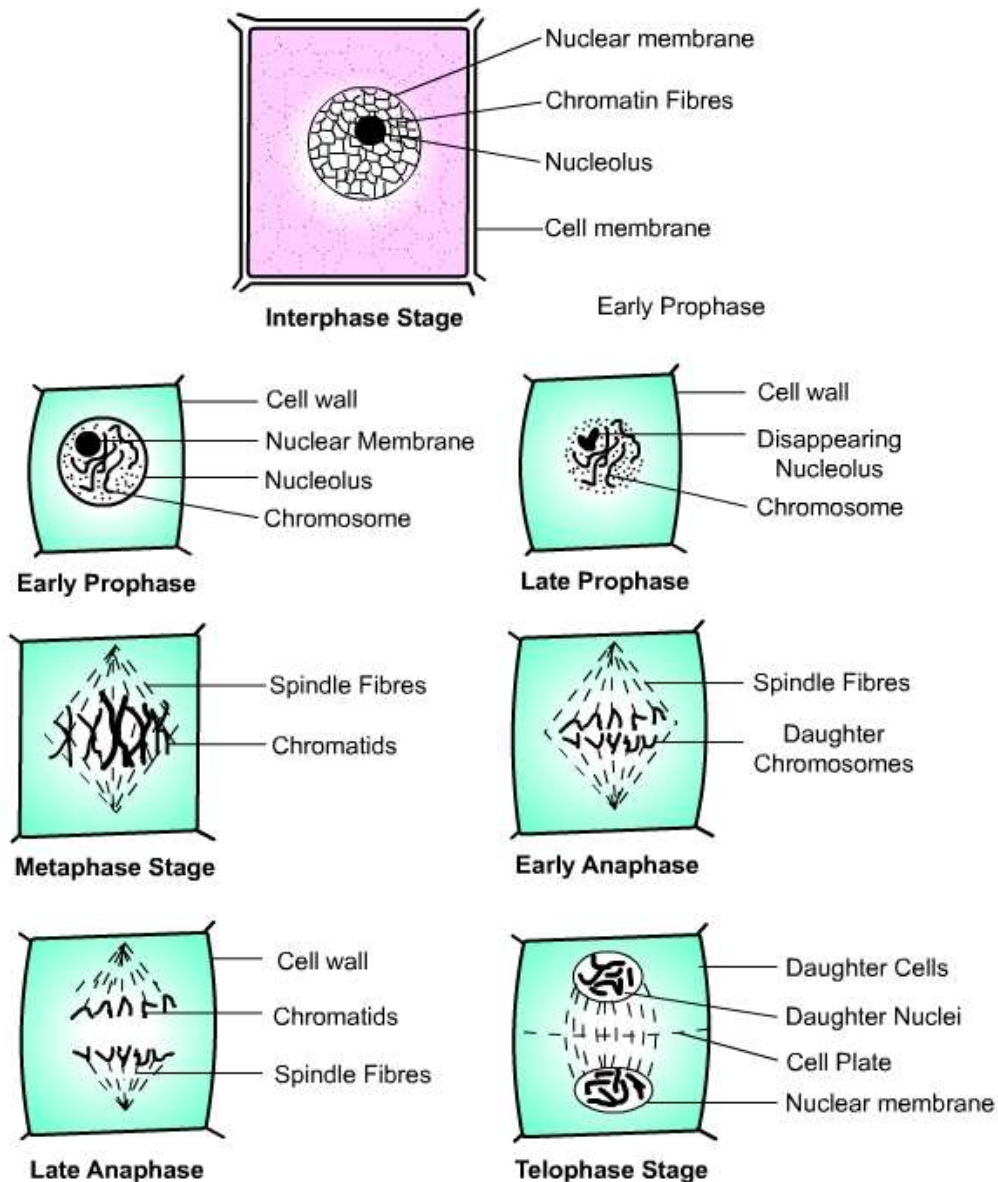
3. Anaphase

1. In anaphase each chromatid pair separates from the centromere and move towards the opposite ends of the cell by the spindle fibres.
2. The cell membrane begins to pinch at the centre.

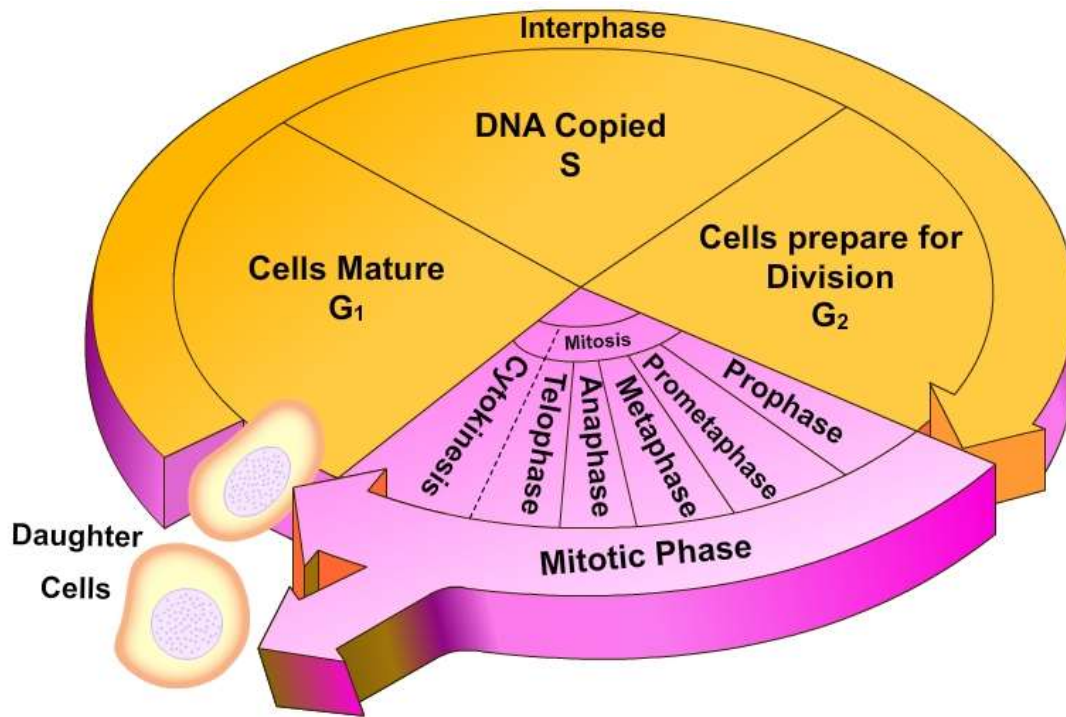
4. Telophase

1. Chromatids arrive at opposite poles of cell.

2. The spindle disappears and the daughter chromosome uncoils to form chromatin fibres.
3. The nuclear membranes and nucleolus re-form and two daughter nuclei appear at opposite poles.
4. Cytokinesis or the partitioning of the cell may also begin during this stage.

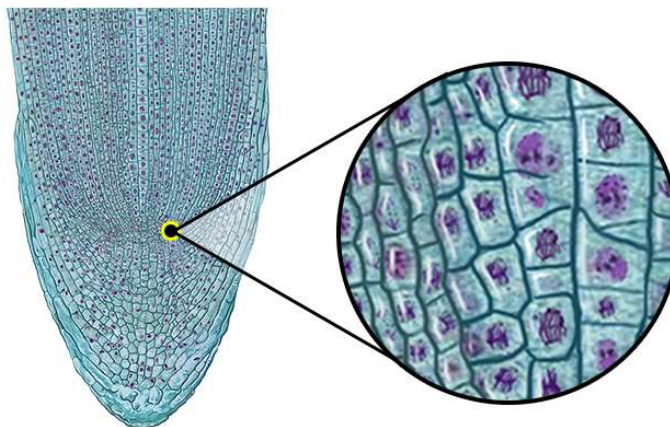


The stage, or phase, after the completion of mitosis is called interphase. It is the non dividing phase of the cell cycle between two successive cell divisions. Mitosis is only one part of the cell cycle. Most of the life of a cell is spent in interphase. Interphase consist of three stages call G1, S and G2.



Mitosis in Onion Root Tip

The meristamatic cells located in the root tips provide the most suitable material for the study of mitosis. The chromosome of monocotyledonous plants is large and more visible, therefore, onion root tips are used to study mitosis. Based on the kind of cells and species of organism, the time taken for mitosis may vary. Mitosis is influenced by factors like temperature and time



Mitosis in Onion Root Tip

Learning Outcomes:

- Students understand the term mitosis.

- Students understand the different events during mitosis.
- Students do the experiment better in the real lab having gone through the animation and simulation.