

CBSE Class-11 Biology CHAPTER-10

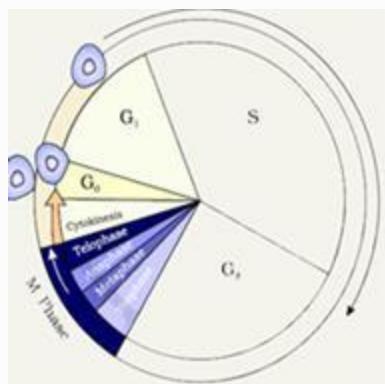
CELL CYCLE AND CELL DIVISION

- The sequence of events by which a cell duplicates its genome, synthesizes the other constituents of cells and eventually divides into two daughter cells is called cell cycle.
- DNA synthesis occurs in one specific stage of cell division but distribution of chromosome in cells occurs in complex series of events during cell division.

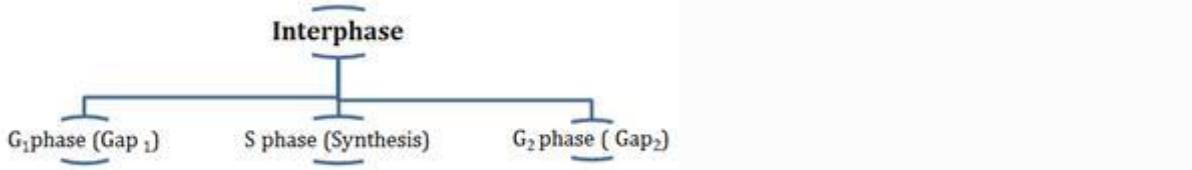
Phases of Cell cycle

Human cell divides once in approximately 24 hours, which may vary in different organisms. In yeasts it takes about 90 minutes to complete the cell division process.

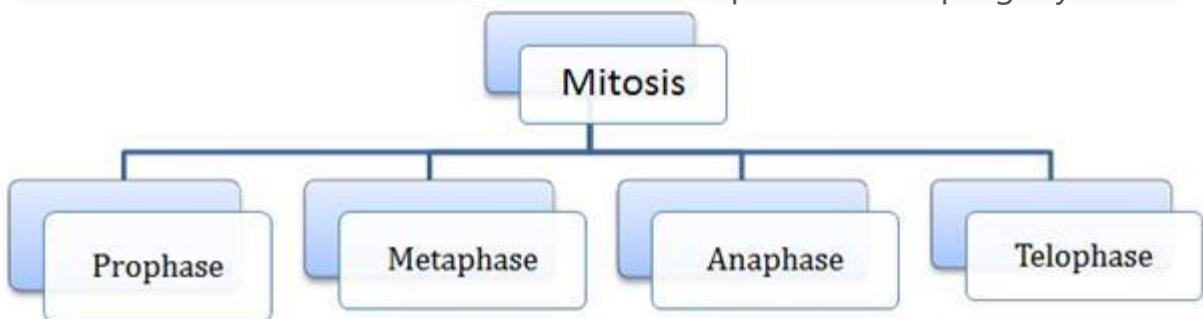
Cell cycle is divided into two basic phases-



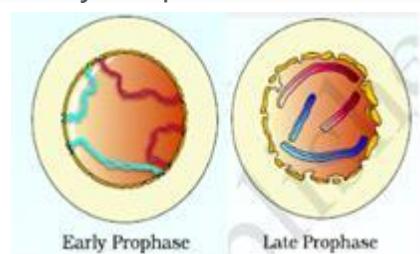
1. **Interphase**— it is the phase between two successive M phases. Interphase lasts for 95% of a cell cycle. This phase is called as resting phase but during this period the cells prepare itself for nuclear division by cell growth.
2. **M Phase**— when the actual cell division or mitosis occurs. It starts with karyokinesis (nuclear division) or duplication of chromosome and end with cytokinesis or division of cell matrix (cytoplasm division). **The interphase is divided into three further phases:**
 - G₁ phase represents the interval between mitosis and initiation of DNA replication. Cell is continuously active and grows in size.



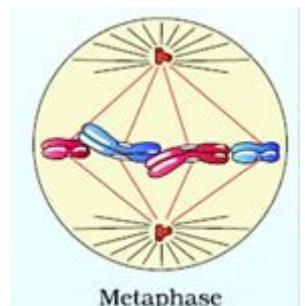
- During synthesis phase, replication or synthesis of DNA takes place and amount of DNA get doubles per cell.
- During G₂ phase protein is synthesized in preparation for mitosis.
- In adult animals, some cells do not divide or may divide occasionally. These cells do not divide further and exits the G₁ phase to enter an inactive stage called **Quiescent Stage (G₀)** of cell cycle.
- In animals mitotic division is present in only somatic diploid cells but in plants it is seen in both haploid and diploid cells.
- Mitosis cell division is also known as **equational division** because the numbers of chromosome remain same in parental and progeny cells.



- **Prophase** is the first phase of mitosis followed by G₂ phase. It involves following events-
 1. Initiation of condensation of chromosomal materials.
 2. Movement of centrioles towards opposite poles of the cell.
 3. At the end of prophase, endoplasmic reticulum, nuclear membrane, Golgi complex disappears.



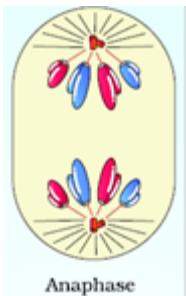
- **Metaphase** starts with complete disappearance of nuclear membrane. The most suitable stage for study of morphology of chromosomes. It involves



- Condensation of chromosomal materials into compact and distinct chromosomes made up of two sister chromatids attached with spindle fibres with centromeres.
- Chromosomes arrange at centre of cell called metaphase plate.

- Anaphase** involves following steps:

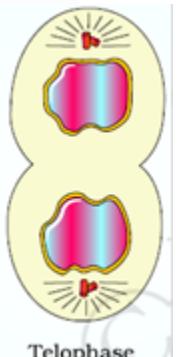
- Splitting of each chromosome at centromere into two sister chromatids.
- Two chromatids start moving towards opposite poles.



Anaphase

- Telophase** is the last stage of mitosis which involves

- Chromosomes reach at opposite poles and lose its identity as discrete unit.
- Nuclear membrane reassembles around the chromosome clusters.
- Nucleolus, Golgi complex and ER reappear.



Telophase

- Cytokinesis** is the division of cytoplasm of a cell after karyokinesis (division of chromosome) into two daughter cells. In animal cells, appearance of furrows in plasma membrane that deepens gradually and joins to divide cytoplasm into two parts.
- In plant cells, wall formation starts at the centre and grows outwards to meet lateral walls. The formation of cell wall begins with formation of **cell plate**.

Significance of Mitosis

- Mitosis produces diploid daughter cells with identical genetic complement.
- It helps in repair of cells, especially in lining of gut and blood cells.
- Meristematic division in apical and lateral cambium results in continuous growth of plants.