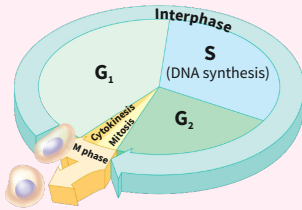


## Cell Cycle

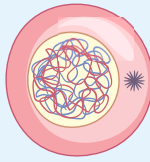
Cell cycle is the sequence of events by which a cell duplicates its genome synthesizes the other constituents of the cell and eventually divides into two daughter cells.



## PHASES OF CELL CYCLE

### Interphase

- 1) G<sub>1</sub> phase cell is metabolically active and grows continuously
- 2) In S- phase DNA synthesis occurs and its content increases from 2c to 4c.
- 3) In G<sub>2</sub> Phase Proteins are synthesized in the preparation for mitosis while cell growth continues.



### M - Phase

It starts with nuclear division corresponding to chromosomes and ends with division of cytoplasm.

### Quiescent stage (G<sub>0</sub>)

In this stage cell does not divide and exit G<sub>1</sub> phase to enter an inactive stage called G<sub>0</sub>. Cell is metabolically active but does not proliferate.

### Significance of Mitosis

- i) Growth of multicellular organisms,
- ii) Maintenance of surface/ Volume ratio,
- iii) Maintenance of chromosome number,
- iv) Regeneration

### Cytokinesis

Division of cytoplasm

#### i) Animal cell:-

Cleavage furrow formed in plasma membrane.

#### ii) Plant cell:-

Cell plate formed which represents the middle lamella between two adjacent cell walls.

## 10. CELL CYCLE AND CELL DIVISION

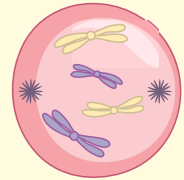
### MITOSIS

“Equational division” the number of chromosomes in the parental cell and in cells of the progenies are the same.

### Prophase

#### First stage of mitosis

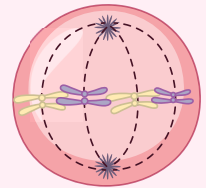
- + Chromatin condenses to form chromosomes.
- + Microtubules are assembled into mitotic spindle.
- + Centriole moves to opposite poles.



### Metaphase

#### Second stage of mitosis

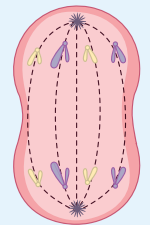
- + Spindle fibers attached to Kinetochores of chromosomes
- + Chromosomes arranged at the equator of the spindle to form metaphase plate.



### Anaphase

#### Third stage of mitosis

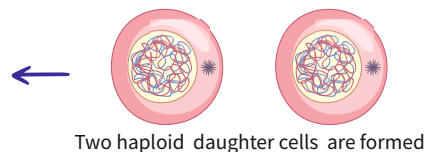
- + Centromeres split and chromatids separate.
- + Chromatids move to opposite poles.



### Telophase

#### Fourth stage of mitosis

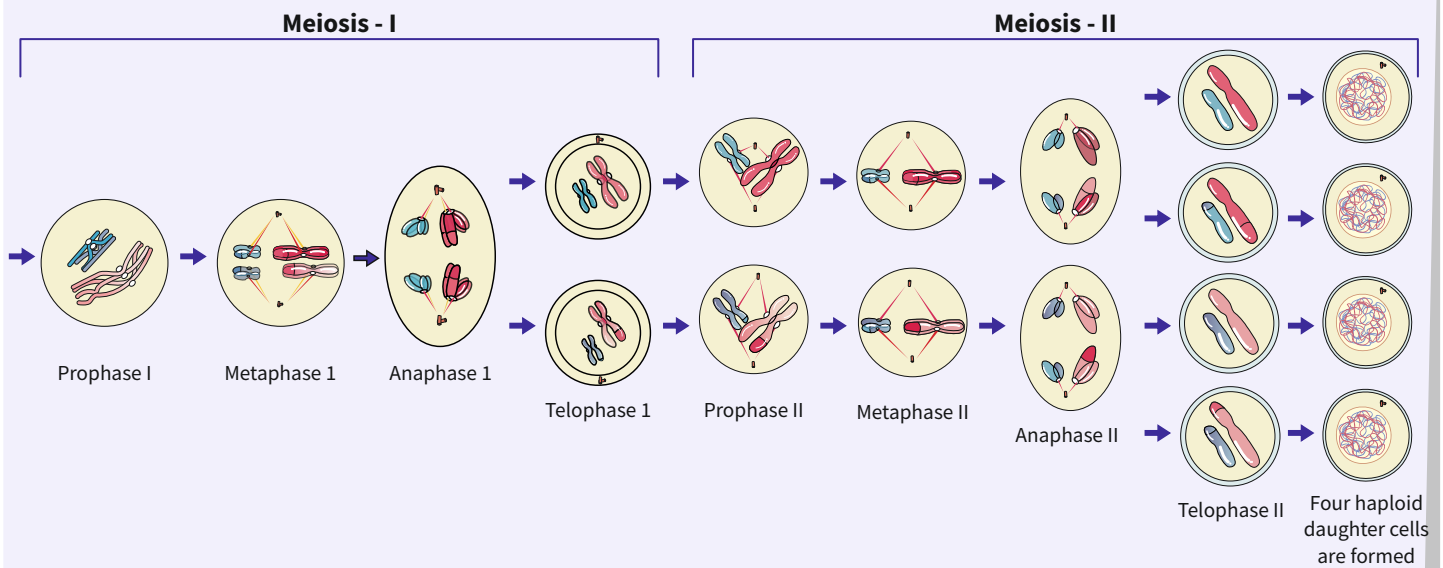
- + Chromosomes cluster at opposite poles.
- + Nuclear envelope assembles around the chromosome clusters.
- + Nucleolus, Golgi complex and ER reform.



Two haploid daughter cells are formed

## MEIOSIS

Specialised kind of cell division that reduces the chromosome number by half results in the production of haploid daughter cells. This kind of division is called meiosis. Meiosis ensures the production of haploid phase in the life cycle of sexually reproducing organisms whereas fertilisation restores the diploid phase. We come across meiosis during gametogenesis in plants and animals. This leads to the formation of haploid gametes.



## MEIOSIS - I

### Prophase-I

#### Leptotene

Chromosomes compact throughout this stage.

#### Zygotene

Homologous chromosomes start pairing together and this process of association is called (synapsis) - **Synaptonemal complex** is formed.

#### Pachytene

Crossing over occurs between non sister chromatids of homologous chromosomes leading to recombination and this process is catalysed by enzyme complex - **recombinase**.

#### Diplotene

Synaptonemal Complex dissolves and the recombined chromosomes separate from each other except at the sites of crossing over. These X- Shaped Structure are called Chiasmata.

#### Diakinesis

The final stage of meiotic prophase I is diakinesis. This is marked by terminalisation of chiasmata.

### Metaphase-I

Bivalent chromosomes align on the equatorial plate. Microtubules from opposite poles of the spindle attach to the pair of homologous chromosomes.

### Anaphase - I

Homologous chromosomes separate while chromatids remain associated at the centromeres.

### Telophase - I

Nuclear membrane and nucleolus reappear.

The stage between the two meiotic divisions is called interkinesis and is generally short lived. There is no replication of DNA during interkinesis. Interkinesis is followed by prophase II, a much simpler prophase than prophase I.

## Significance of Meiosis

- (i) Gametes are formed (haploid),
- (ii) Increases the genetic variability
- (iii) Maintain the chromosome number.
- (iv) Variations are very important for the process of evolution.

## MEIOSIS II

It is the same as mitosis