Department of biology

(General Zoology)

Lab 4

Stage -1-

Reduction cell division

By

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Reduction cell division (Meiosis)

Meiosis is a process where a single cell divides twice to produce four daughter cells containing half the original amount of genetic information. These cells are called as gametes sperm in males, eggs in females.

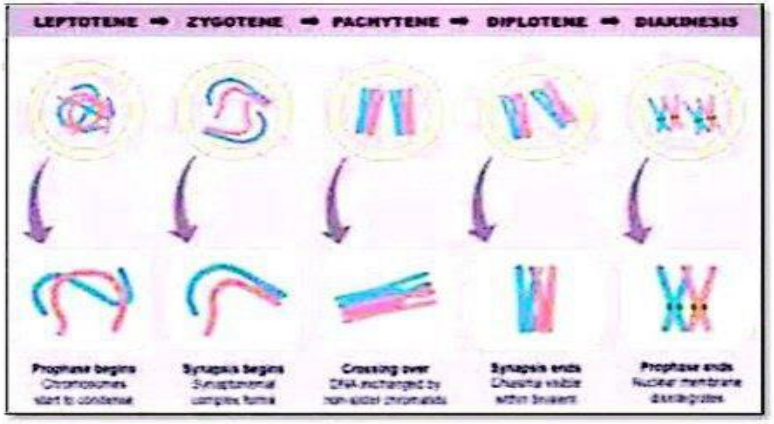
- It occurs in two stages of the nuclear and cellular division as **Meiosis I** and **Meiosis II.**
- DNA replication occurs, however, only once.
- It involves the pairing of homologous chromosomes and recombination between them.
- Four haploid daughter cells are produced at the end.

Meiosis I has a following sub stages:

1. **Prophase I**
2. **Metaphase I**
3. **Anaphase I**
4. **Telophase I**

1. Prophase I:

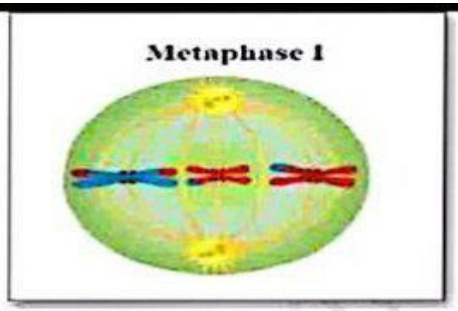
- Prophase I is the longest phase of meiosis
- it is divided into sub stages:
    1. **leptotene**
    2. **zygotene**
    3. **pachytene**
    4. **diplotene,**
    5. **diakinesis.**



- Each sub-stage represents different levels of chromosome condensation, pairing, and crossing over, contributing to the generation of genetic diversity among gametes.

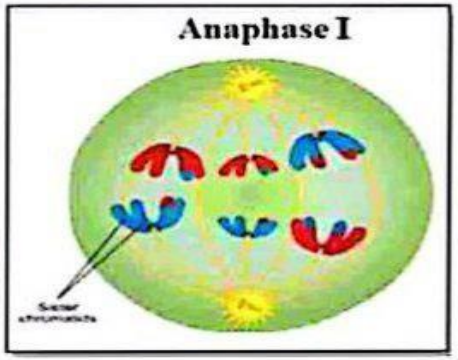
2. Metaphase I

- The synapsed chromosomes line into the metaphase plate of the cell.



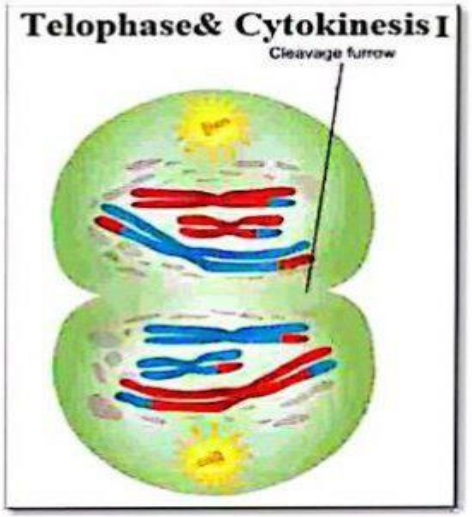
3. Anaphase I

- The homologous chromosomes are completely separate from each other and move towards opposite poles of the cell.
- The centromeres that hold the 2 chromatids of the one chromosome do not divide as they do in mitosis. Therefore, the 2 chromatids do not separate and move together to the poles of the cell.



4. Telophase I

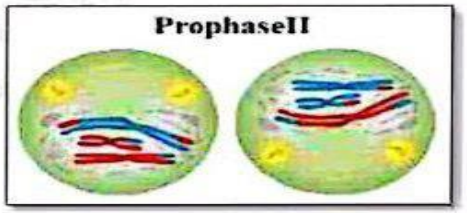
- The nucleolus and nuclear membrane are formed.
- The cytokinesis occurs resulting 2 daughter cells, but each one contains one chromosome from each homologous pair (2n,2c) this mean the nuclei contain double amount of DNA, but one chromosome of the bivalent.



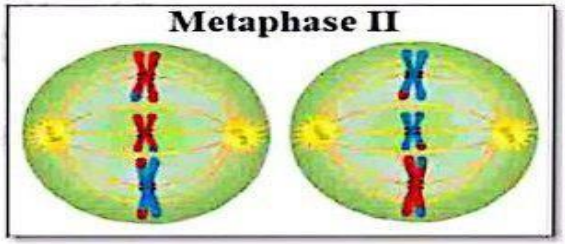
Meiosis II

- The same four phases seen in meiosis II
  1. prophase II
  2. metaphase II
  3. anaphase II
  4. and telophase II
- The period, or time between meiosis I and meiosis II is called Interkinesis No replication of DNA occurs during interkinesis; because the DNA is already duplicated.

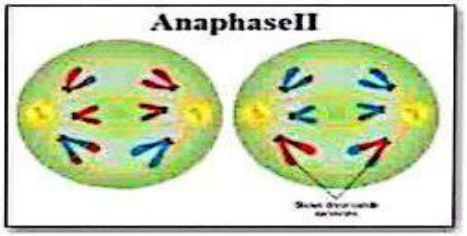
1. **Prophase II :**
   - The chromosomes condense again.
   - The nuclear membrane degenerate.
   - Form the spindle fibers.



2. **Metaphase II:** The diploid number of chromosomes, each consisting of 2 chromatids joined at the centromeres are arranged in the metaphase plate.

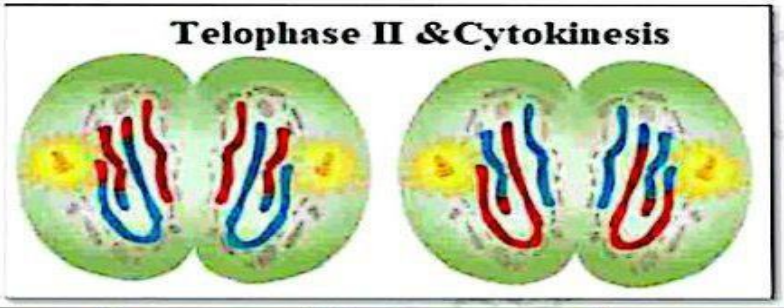


3. **Anaphase II**: The centromere which bind the sister chromatids separate, the sister chromatids move to the opposite pole as chromosomes.



4. Telophase II

- Haploid set of the chromosomes at two poles uncoil and form the chromatin.
- The nucleolus reappears.
- Nuclear envelope reforms.
- Also after the Telophase II the cytokinesis occur, resulting 4 daughter cells each one has 1 chromatid, and haploid number of chromosomes.



	Mitosis	Meiosis
Where it occurs	Occurs in all organisms, except viruses	Only occurs in animals, plants, and fungi
Cells it produces	Creates body/somatic cells	Creates germ/sex cells
Number of cell divisions	One cell division (4 stages total)	Two cell divisions (8 stages total)
Prophase length	Prophase is short	Prophase I is longer
Recombination/crossing over	No recombination/crossing over in prophase	Recombination/crossing over of chromosomes during prophase I
Metaphase	During metaphase, individual chromosomes line up on cell's equator	During metaphase I, pairs of chromosomes line up on cell's equator
Anaphase	During anaphase, sister chromatids move to opposite ends of the cell	During anaphase I, sister chromatids move together to the same cell pole. During anaphase II, sister chromatids are separated to opposite ends of the cell
Number of cells created	End result: two daughter cells	End result: four daughter cells
Ploidy	Creates diploid daughter cells	Creates haploid daughter cells
Genetics	Daughter cells are genetically identical	Daughter cells are genetically different


Thank
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