



# Meiosis in Stages Through Permanent Slides

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Course: Cell biology (MA 219)

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# Outline



- Mitosis
- Phases of Mitosis
- Why use onion roots for viewing mitosis
- Materials and Equipment
- Procedure



## ■ Objectives

- By examining the onion root tip cells under a microscope, the experiment aims to identify and distinguish the different stages of mitosis, including the characteristics of each stage.



## ■ Meiosis:

- Is a process where a single cell divides twice to produce four cells.
- The purpose of meiosis is to produce gametes, the sperm and eggs, with half of the genetic complement of the parent cells.
- Cell division occurs twice during meiosis, one starting cell can produce four gametes (eggs or sperm).
- Each round of division, cells go through four stages: prophase, metaphase, anaphase, and telophase.



- **Meiosis:**

- ✓ Stages of Meiosis I:

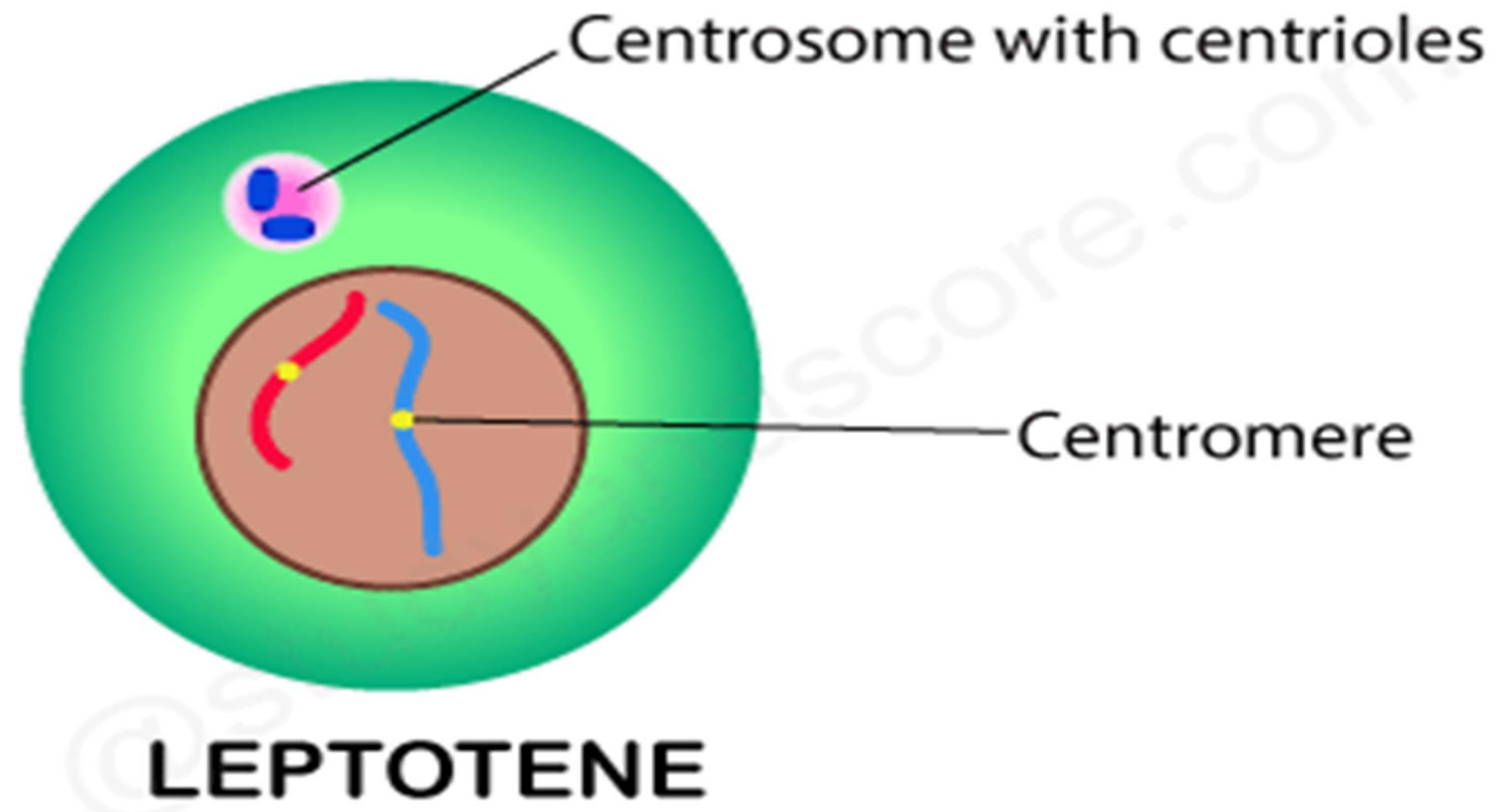
- Prophase I

- ✓ In this stage, the chromosomes condense and move towards the center of the cell.

- It consists of five different sub-phases:

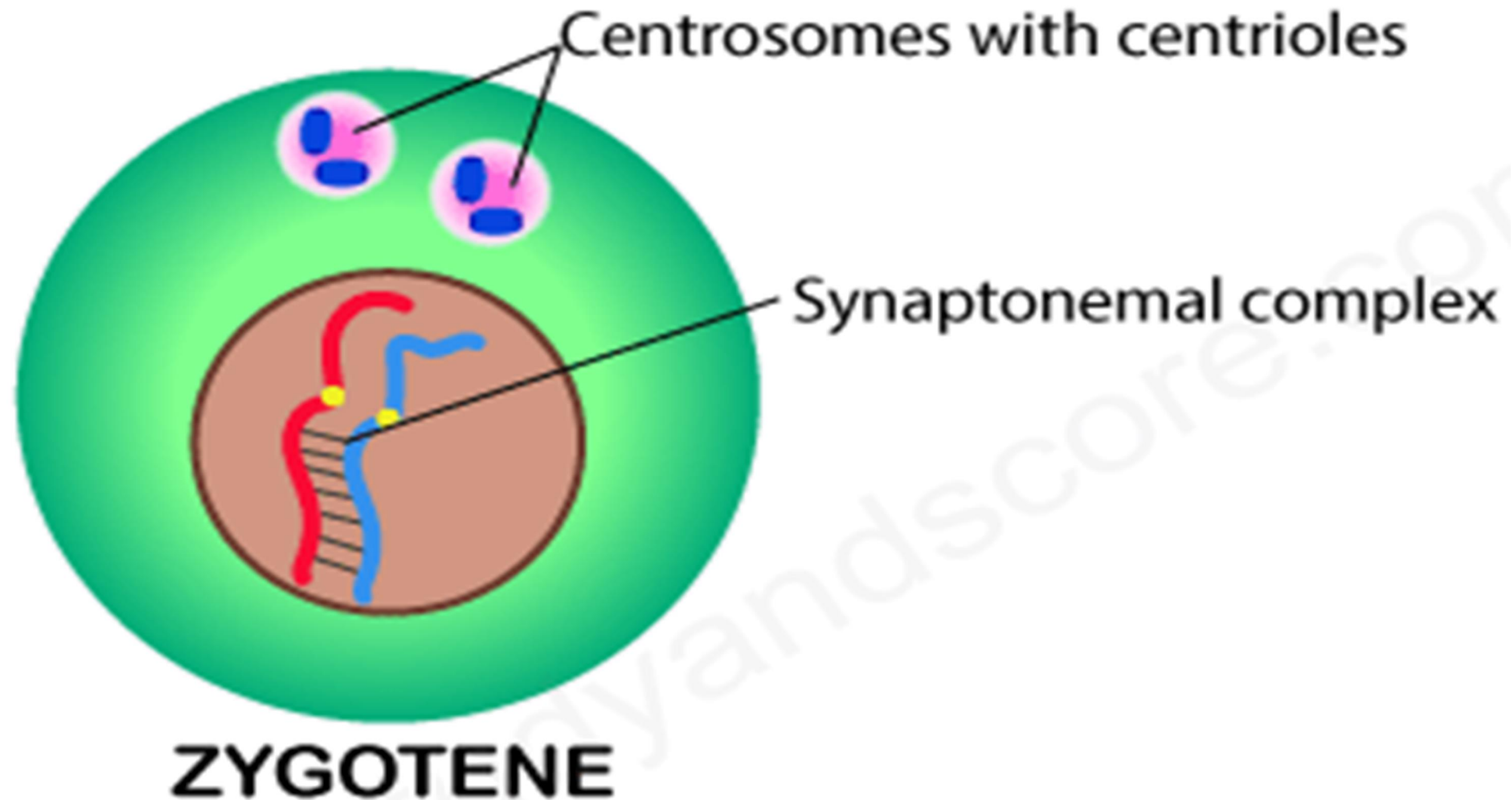
## ■ Leptotene:

✓ Is characterized by the condensation of chromosomes. Chromosomes become visible under a microscope as thin, thread-like structures.



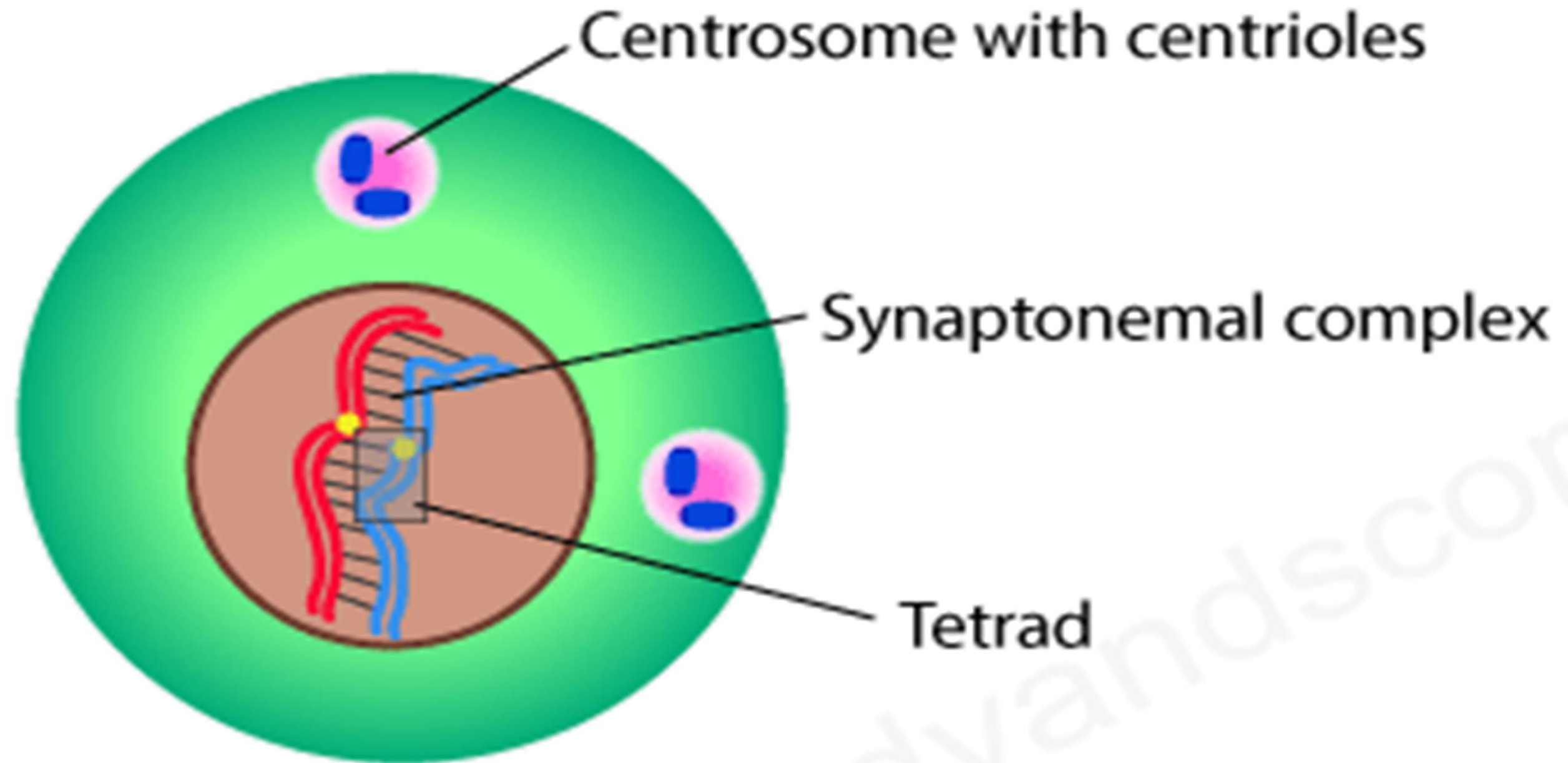
- **Zygotene:**

- Synapsis between homologous chromosomes start.



## ■ Pachytene:

- The sister chromatids separate but the homologous chromosomes remain attached.

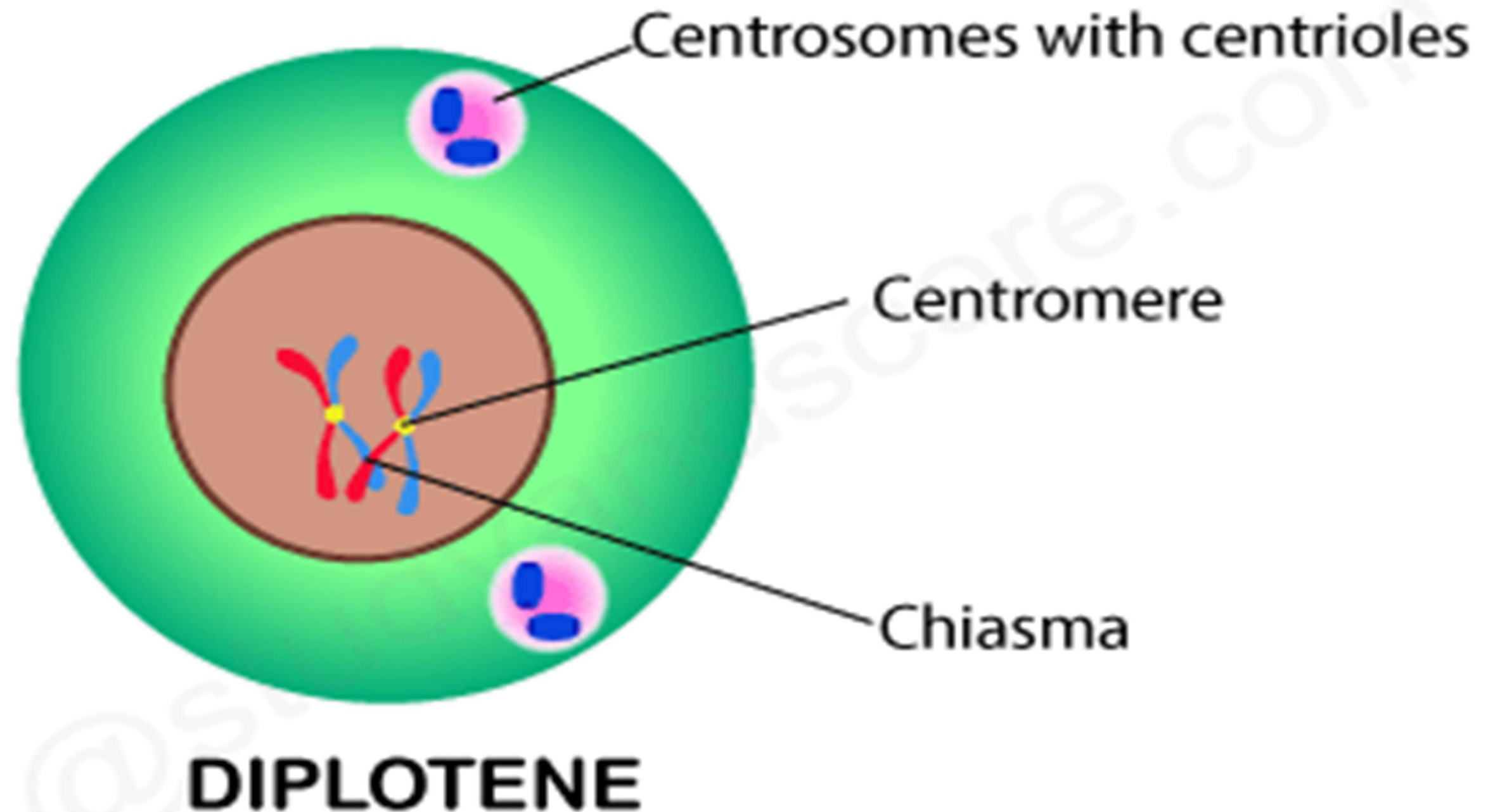


**PACHYTENE**



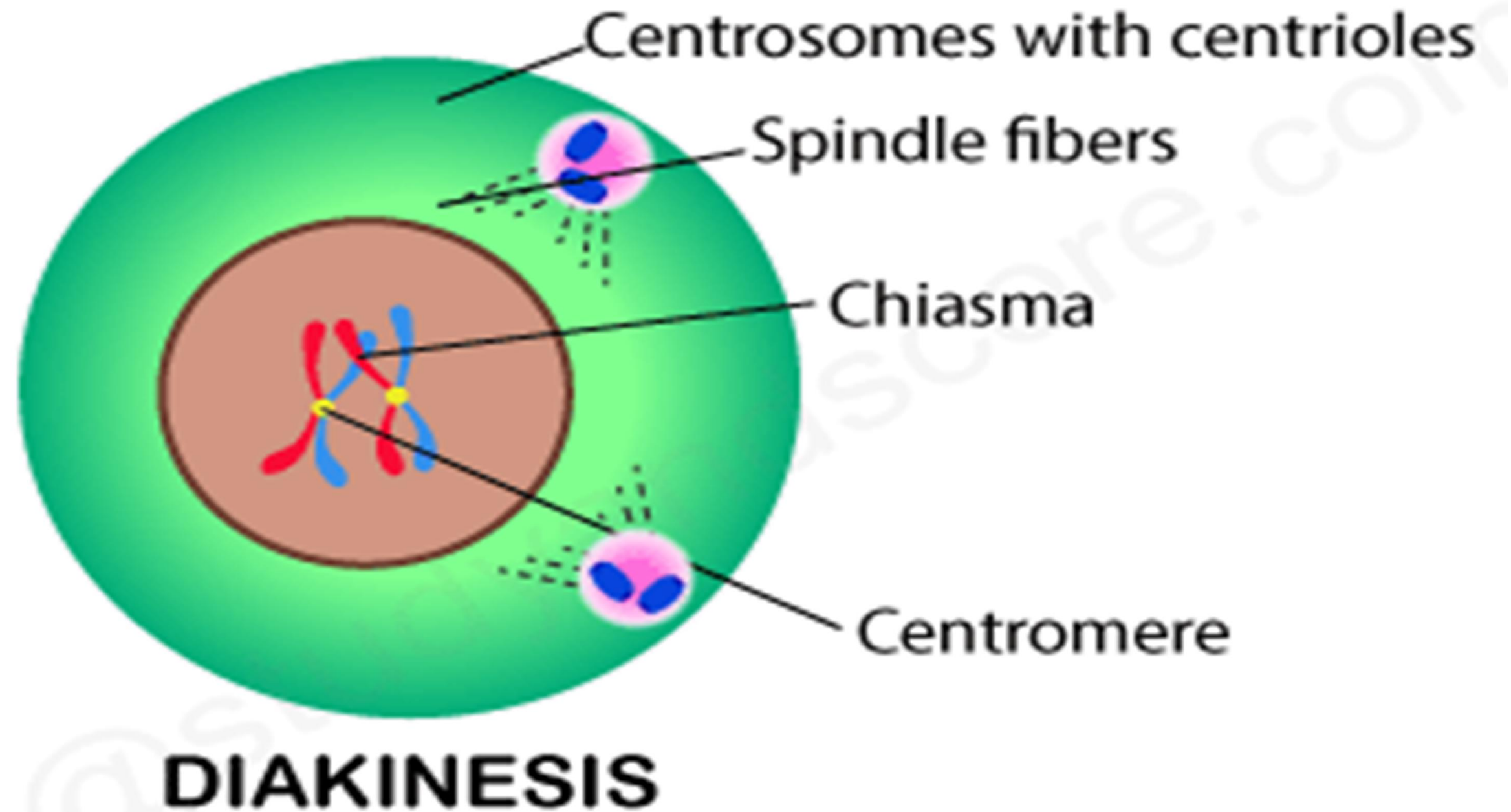
## ■ Diplotene:

- Chromosomes start to separate from each other. The paired homologous chromosomes remain connected at chiasmata .



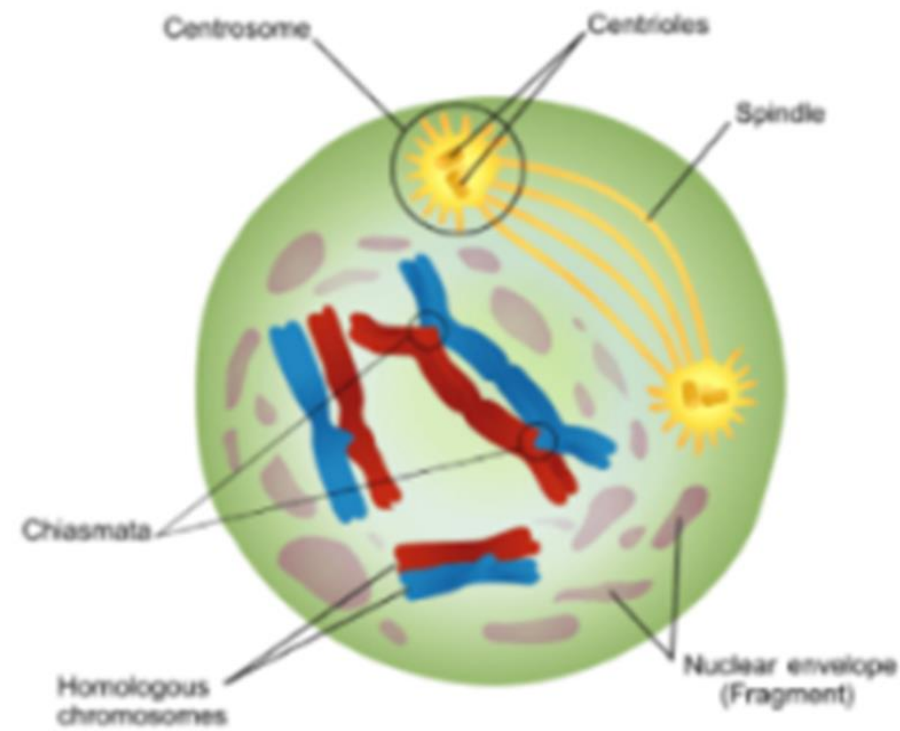
## ▪ Diakinesis:

- The condensation of chromosomes stops at this stage and the chiasmata is clearly visible under an electron microscope.



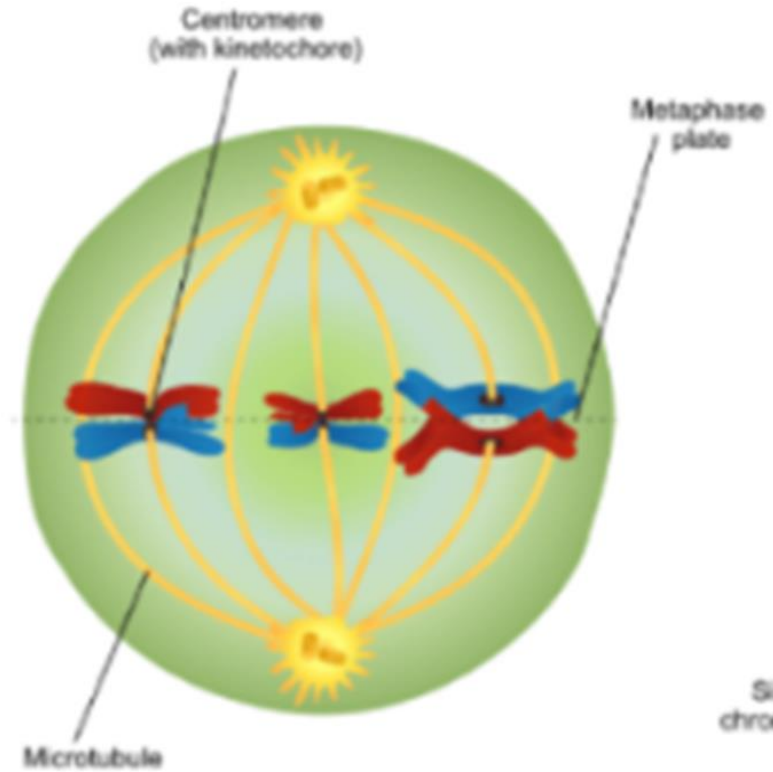
# MEIOSIS I

## Prophase I



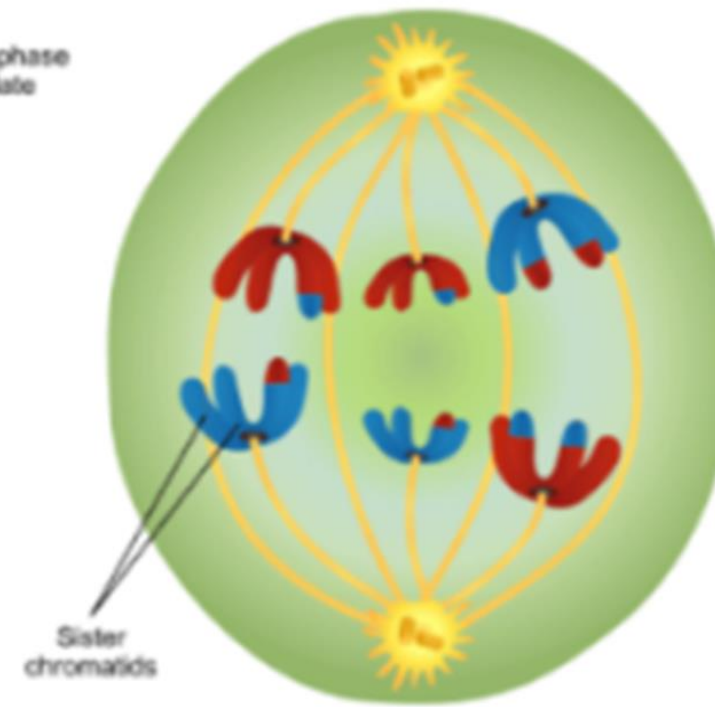
The chromosomes condense, and the nuclear envelope breaks down. Crossing-over occurs.

## Metaphase I



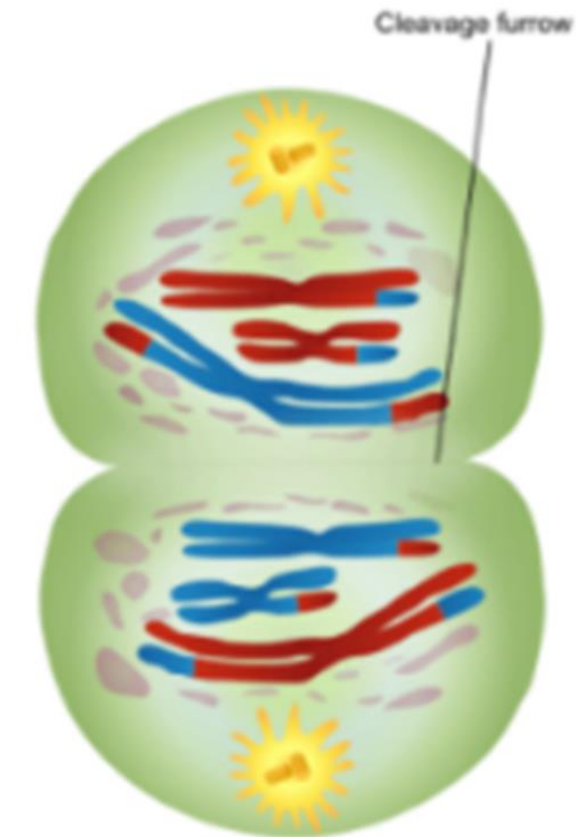
Pairs of homologous chromosomes move to the equator of the cell.

## Anaphase I



Homologous chromosomes move to the opposite poles of the cell.

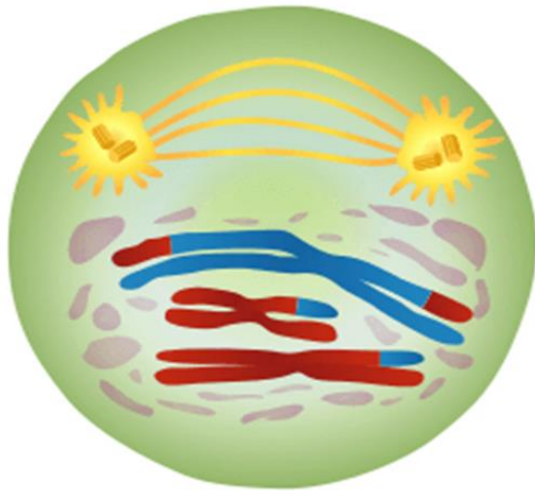
## Telophase I & cytokinesis



Chromosomes gather at the poles of the cells. The cytoplasm divides.

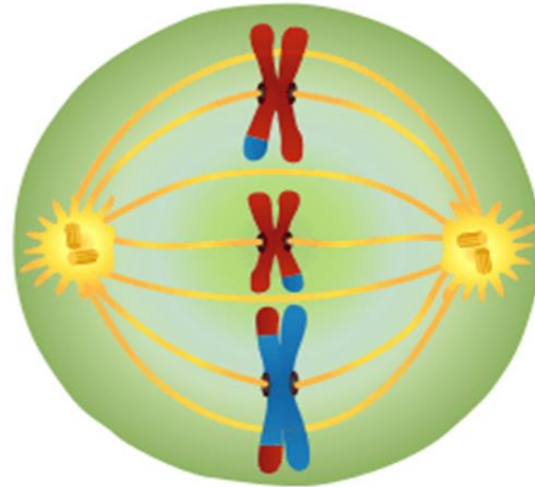
# ■ Stages of Meiosis II:

**Prophase II**



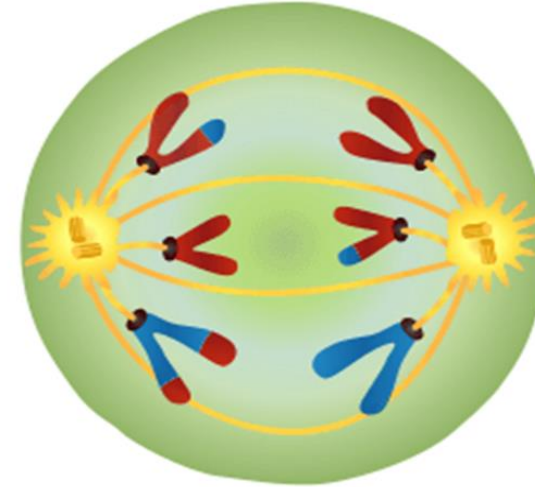
A new spindle forms around the chromosomes.

**Metaphase II**



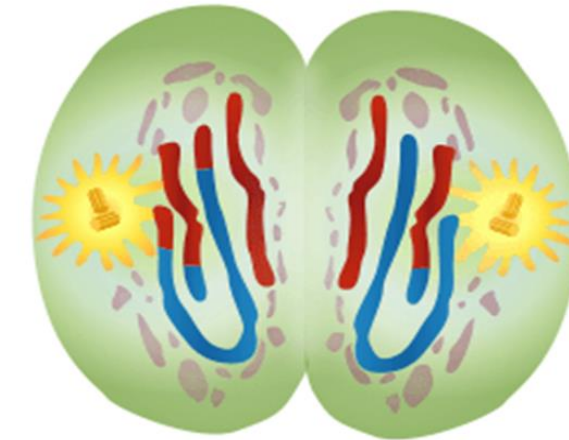
Metaphase II chromosomes line up at the equator.

**Anaphase II**

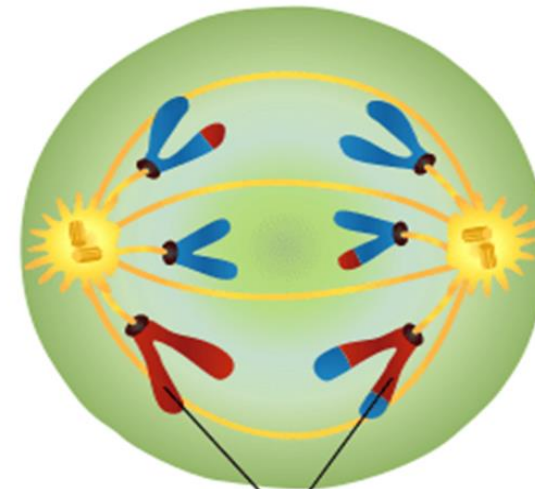
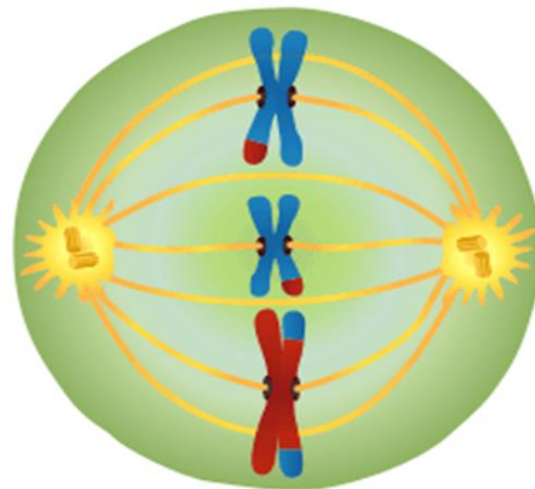
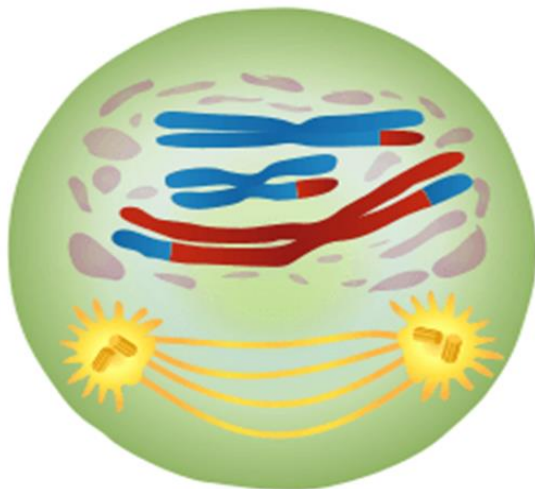


Centromeres divide. Chromatids move to the opposite poles of the cells.

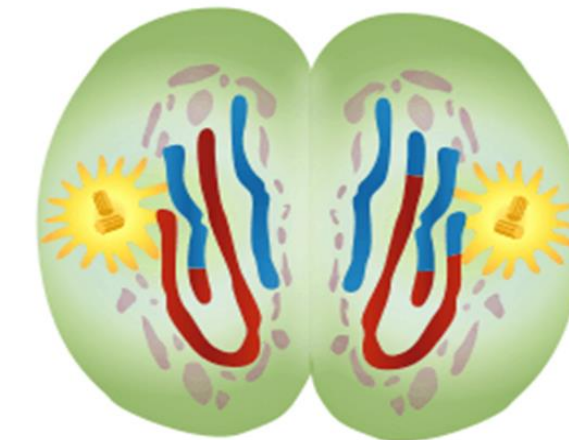
**Telophase II & cytokinesis**



A nuclear envelope forms around each set of chromosomes. The cytoplasm divides.



Sister chromatids separate



## ▪ **Aim:**



- ✓ The stages of meiosis can be observed under a microscope using permanent slides that capture cells at different points in the process.
- Materials Required:
- Permanent slides of meiosis
- Compound Microscope
- Procedure:
- ✓ Place the slide on the stage of the microscope. Look for dividing cells with different magnification.

# References



- Celis, J. E. (Ed.). (2006). Cell biology: a laboratory handbook (Vol. 1). Elsevier.
- Guthrie, C., & Fink, G. R. (Eds.). (2002). Guide to yeast genetics and molecular and cell biology, Part C (Vol. 351). Gulf Professional Publishing.
- Das, D. (2017). ESSENTIAL PRACTICAL HANDBOOK OF CELL BIOLOGY & GENETICS, BIOMETRY & MICROBIOLOGY: A LABORATORY MANUAL. Academic Publishers.



**Thanks**