Meiosis cell division

by

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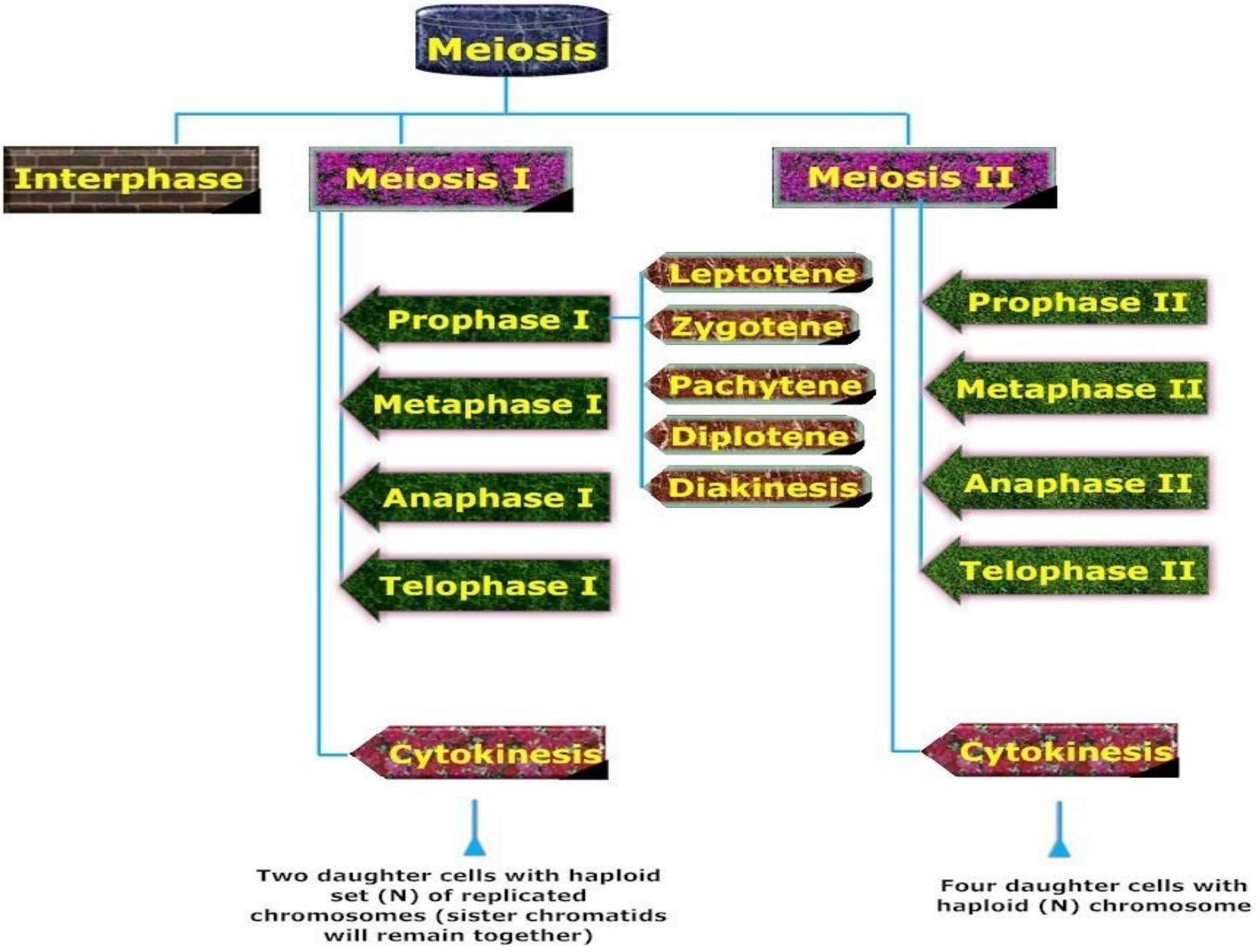
Introduction

- The meiotic cell division first time described by van **Beneden** in 1883
- Meiotic cell division occurs in germ cells of all living organism.
- During meiosis, the genetic material of a diploid germ cell undergoes two nuclear divisions and resulting in to four haploid daughter cells.
- Each daughter cells has one half of the number of chromosomes
- There are two successive nuclear divisions in meiosis as compared to the one division found in mitosis. Introduction

- The two stages of meiosis are

  Meiosis I

  Meiosis II


Meiosis
Interphase
Meiosis I
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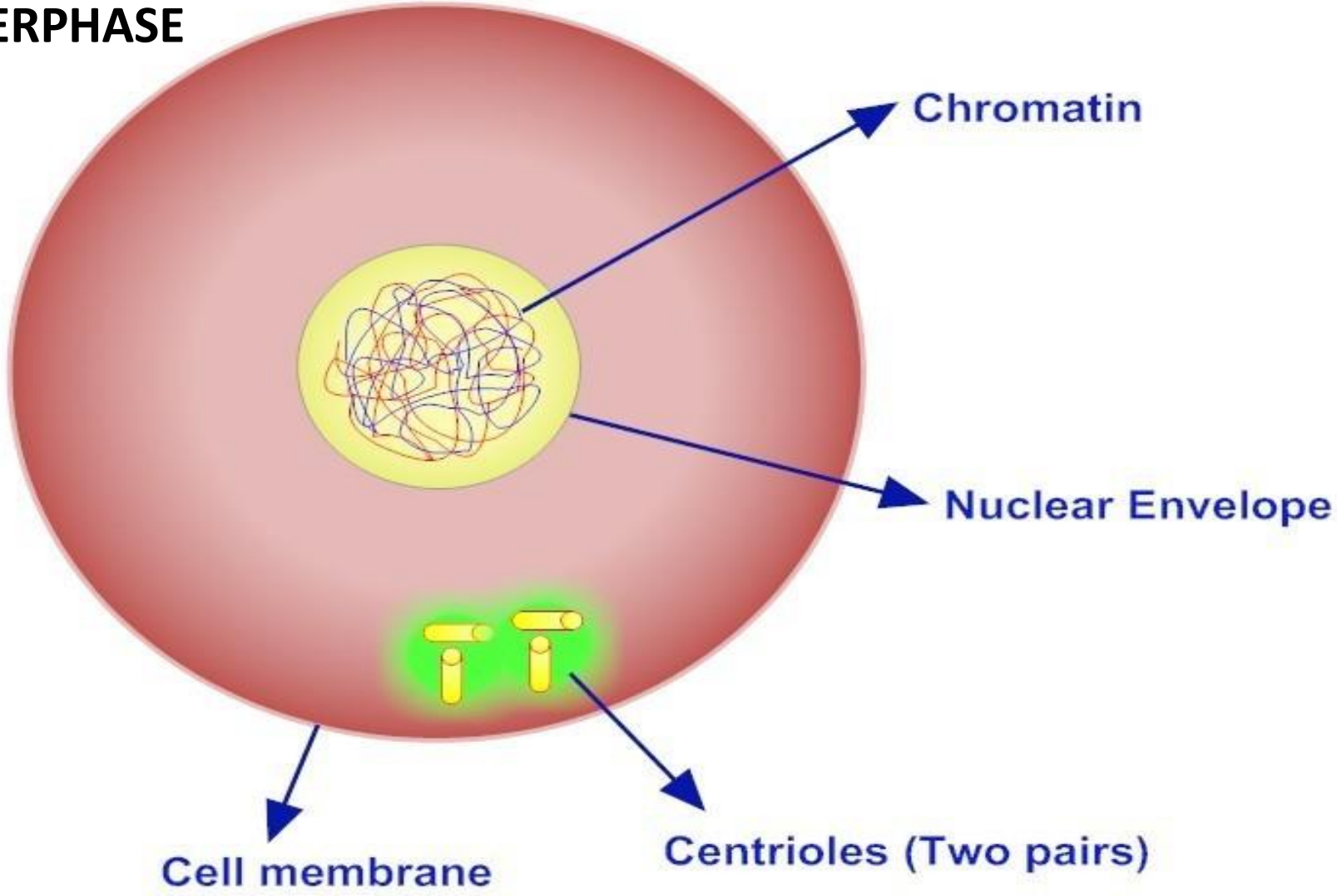
Prophase I
Leptotene
Zygotene
Pachytene
Diplotene
Diakinesis
Metaphase I
Anaphase I
Telophase I
Prophase II
Metaphase II
Anaphase II
Telophase II
Cytokinesis
Cytokinesis
Two daughter cells with haploid set (N) of replicated chromosomes (sister chromatids will remain together)
Four daughter cells with haploid (N) chromosome

INTERPHASE



INTERPHASE

MEIOSIS I

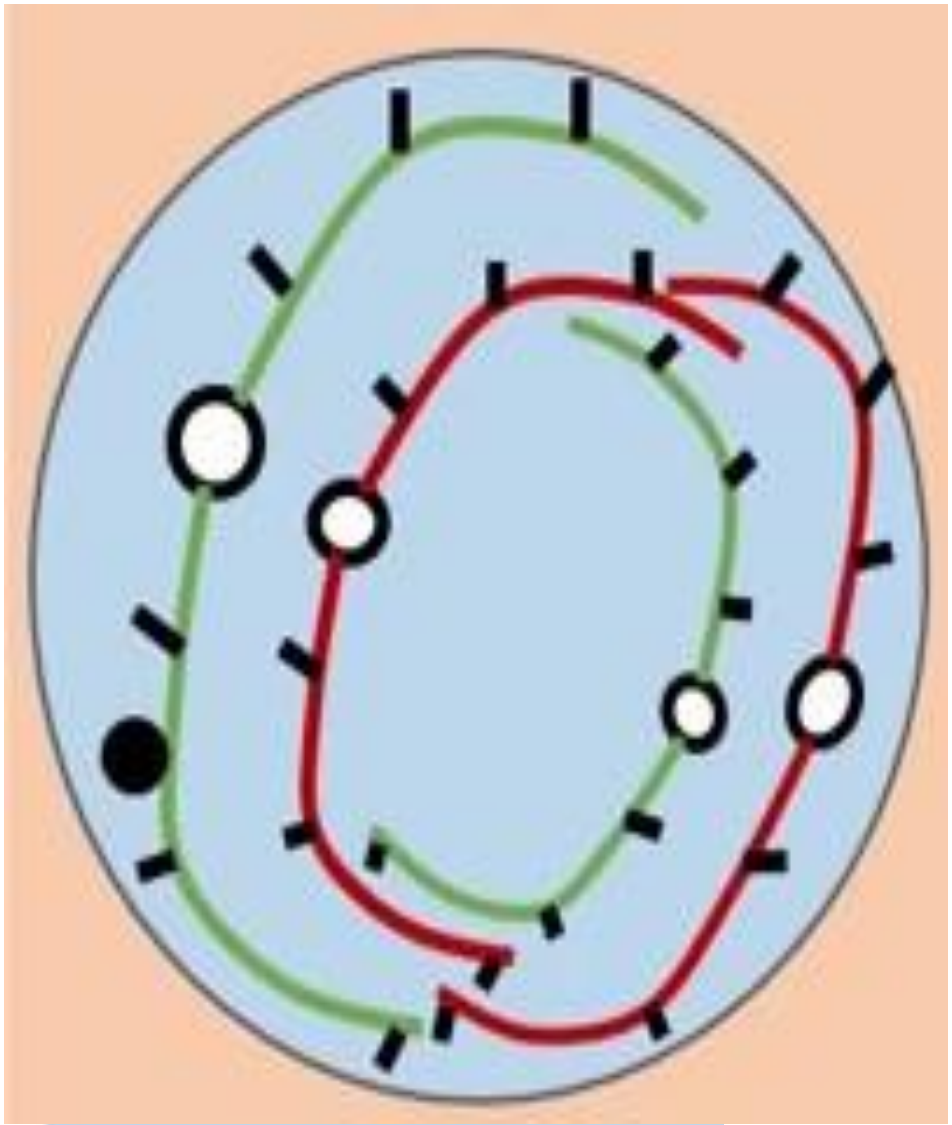
- Meiosis I separate homologous chromosomes and produce two cells with haploid chromosome number (N) for that reason it is known as **Reductional Division**.
  - Meiosis I consist of four stages,
    - Prophase I
    - Metaphase I
    - Anaphase I and
    - Telophase I

PROPHASE I

The Prophase I divided into 5 stages

- Leptotene
- Zygotene
- Pachytene
- Diplotene and
- Diakinesis

Prophase 1

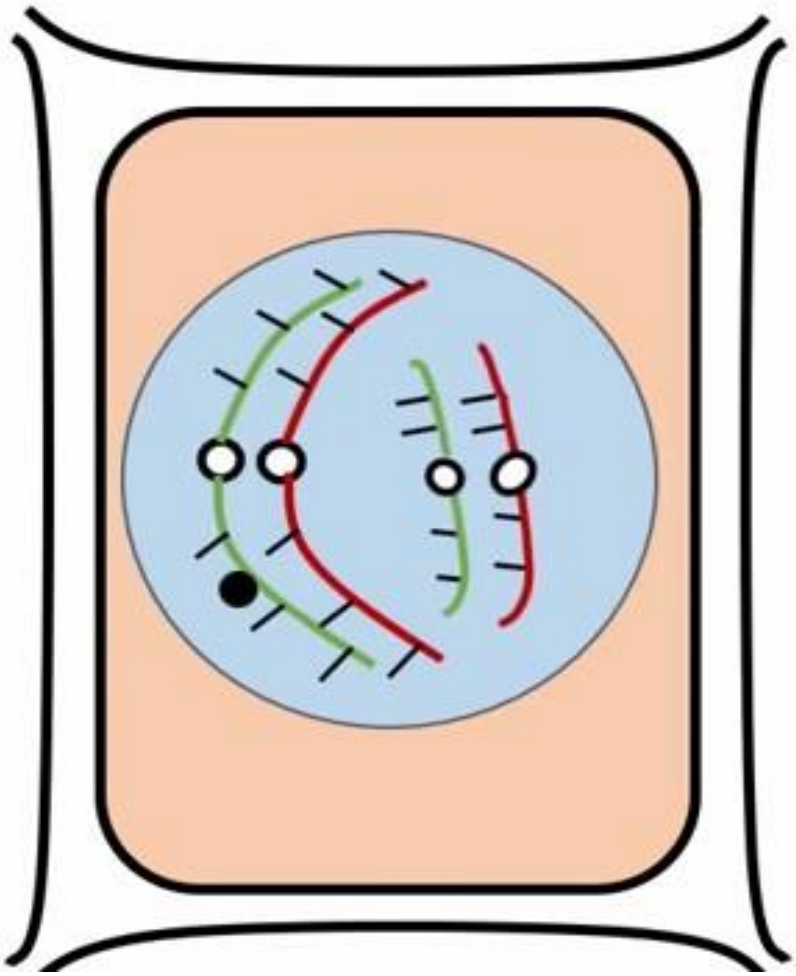


Leptotene:

- The first stage of Prophase I is called **Leptotene**

All the chromosomes begin to condense, so, they become visible as fine thread. There is marked in the nuclear volume

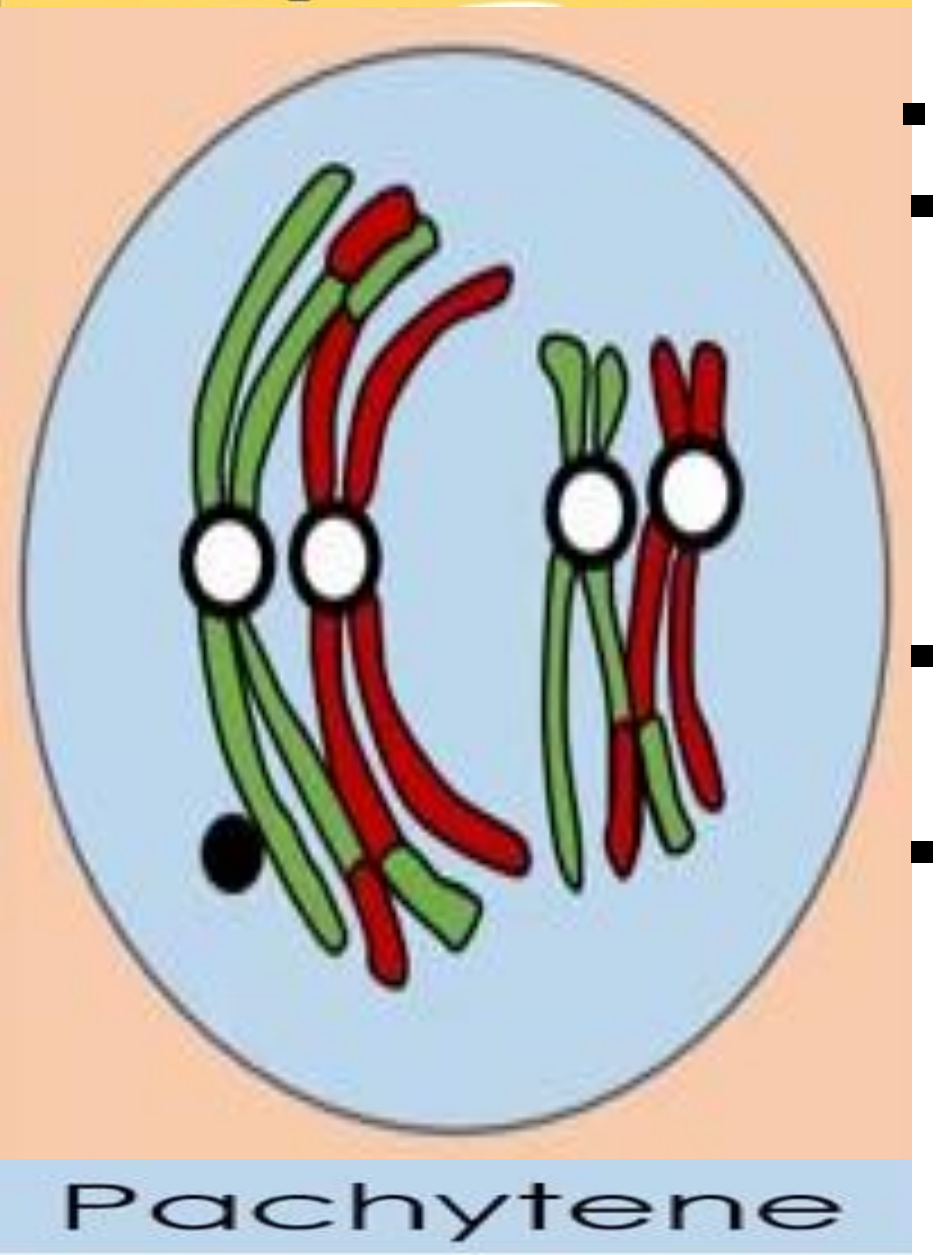
Prophase 1



Zygotene

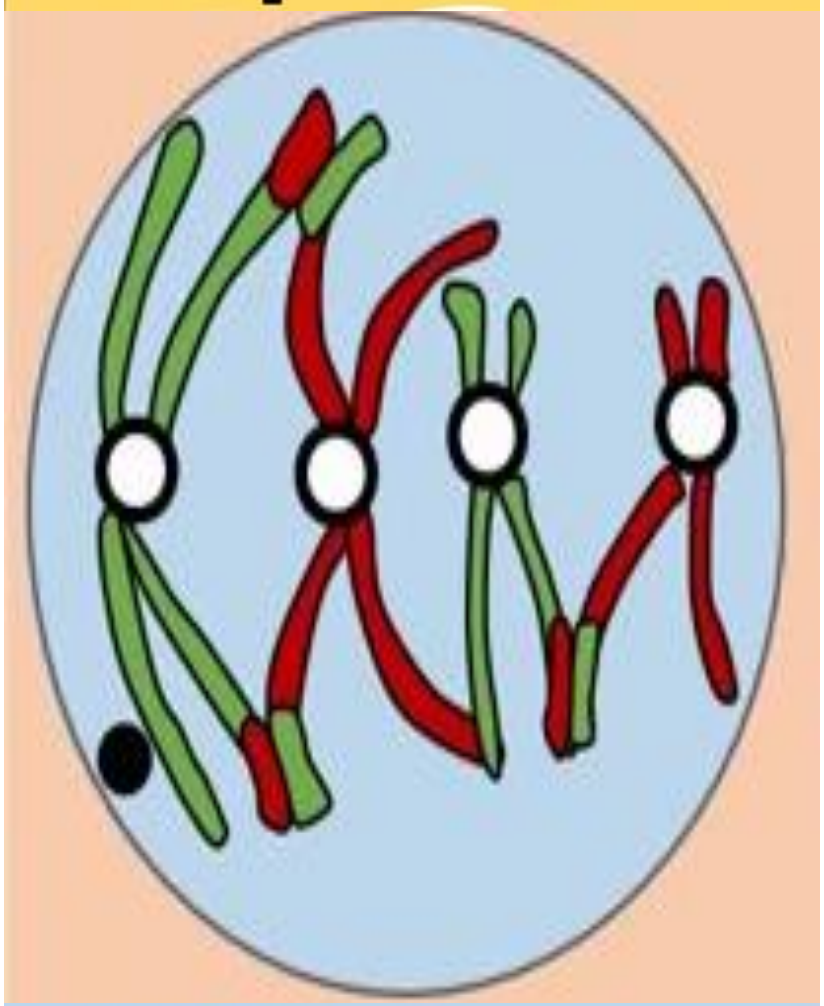
- **pairing** homologus chromosomes
- **synapsis** (The process of pairing between homologus chromosome is known as **synapsis**)
- **bivalent** (The combined homologous chromosomes are said to be bivalent)
- **syneptonemal complex**

Prophase 1



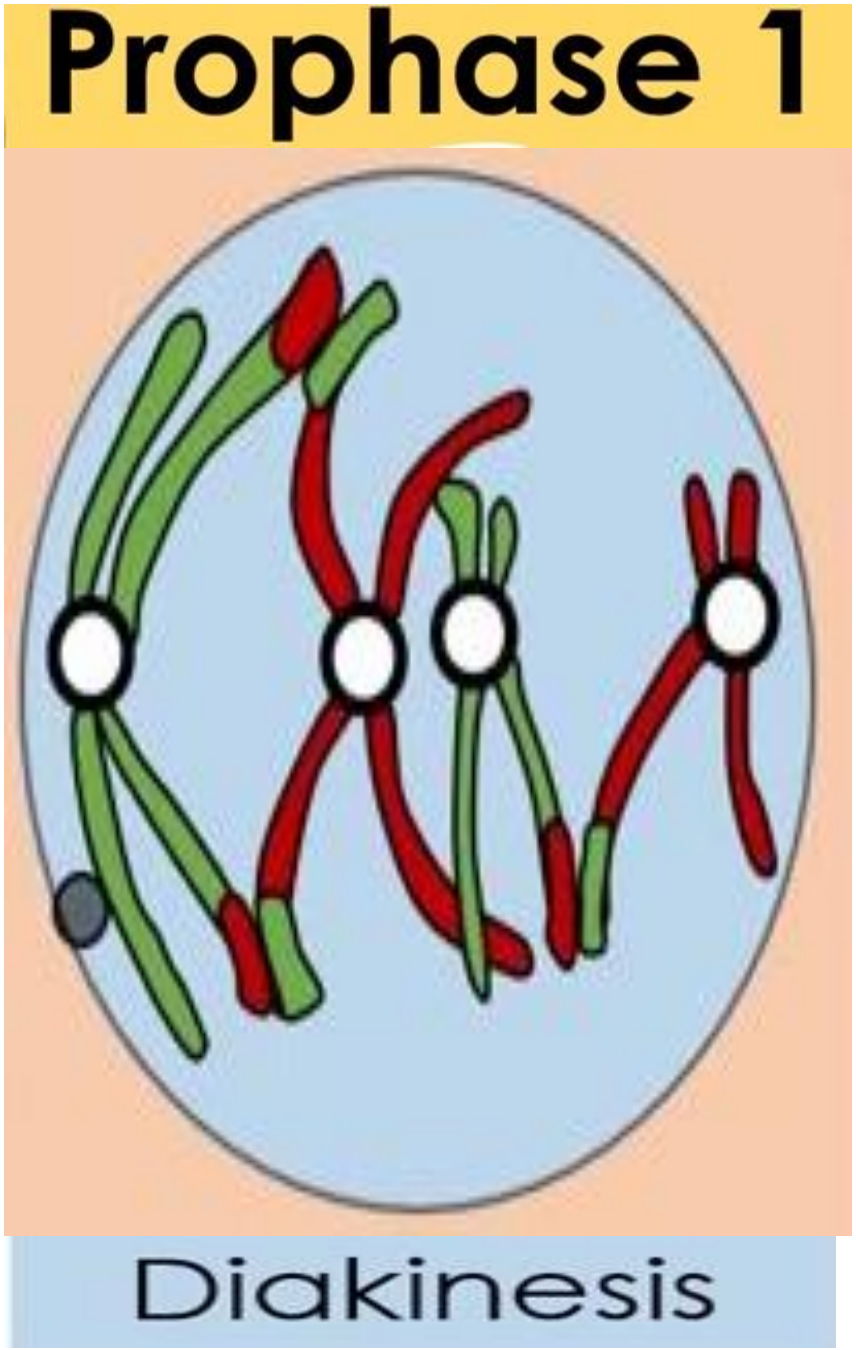
- The process of synapsis is complete.
- The two homologus of each
- bivalent appears to be attached with each other at one or more points, these attachments are known as **chiasmata**
- Crossing over between two non- sister chromatids.
- Cross overs make new gene combinations and which are an important source of genetic variations.

Prophase 1



Diplotene

- The chromatids continue to shorten and thicken and the four sister chromatids in a group is called a **tetrad**.
- The synaptonemal complex begins to break down.
- The paired chromatids begin to pull apart

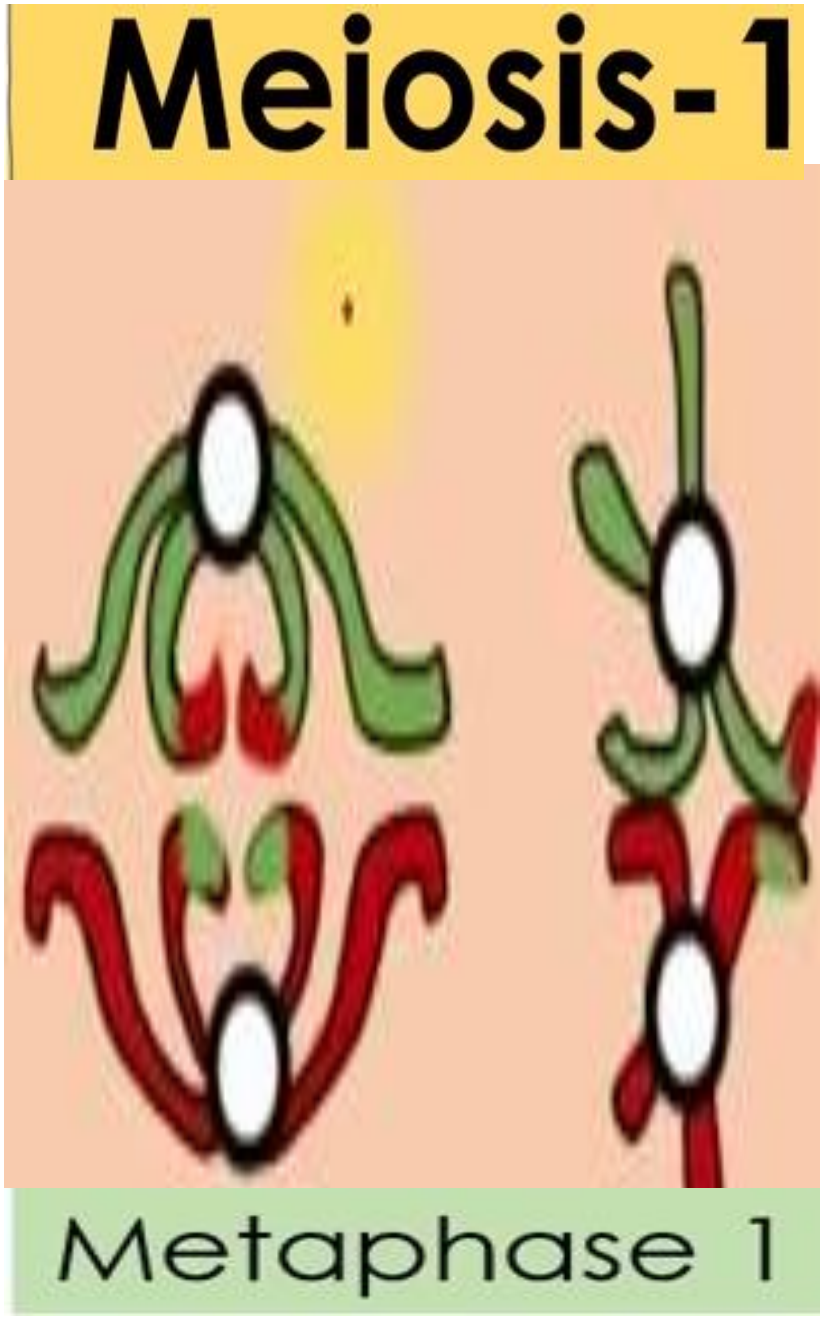


The Chromomes become shorter and thicker

Nucleolus and nuclear envelope disappear towards the end of diakinesis.

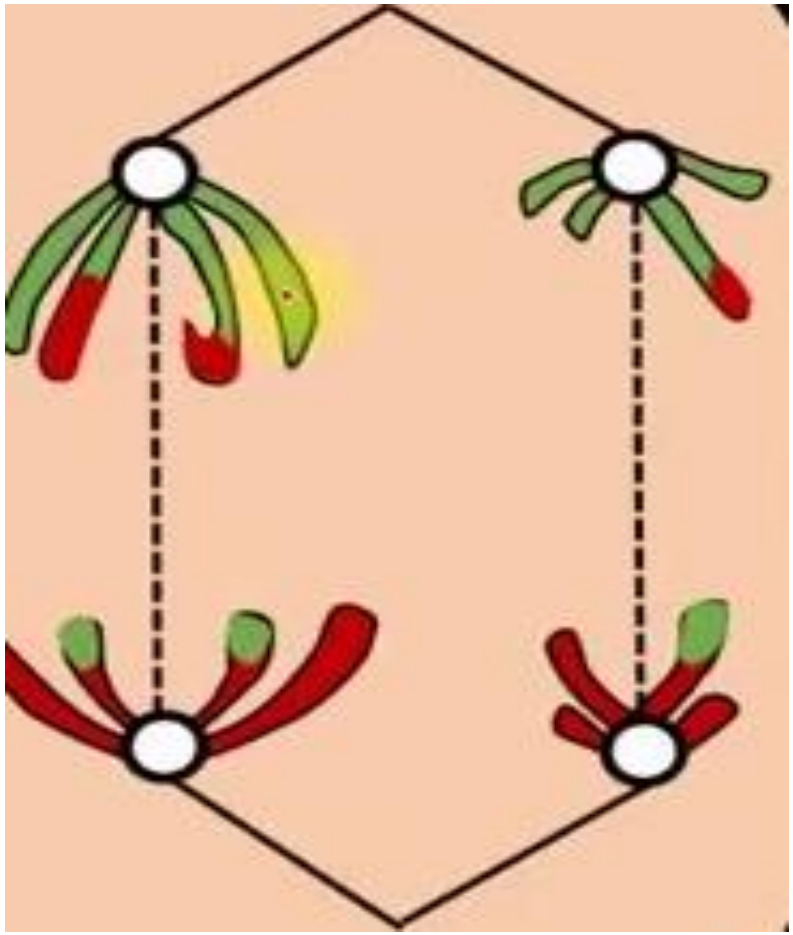
The spindle apparatus becomes organized.

The centrioles migrate away from one another



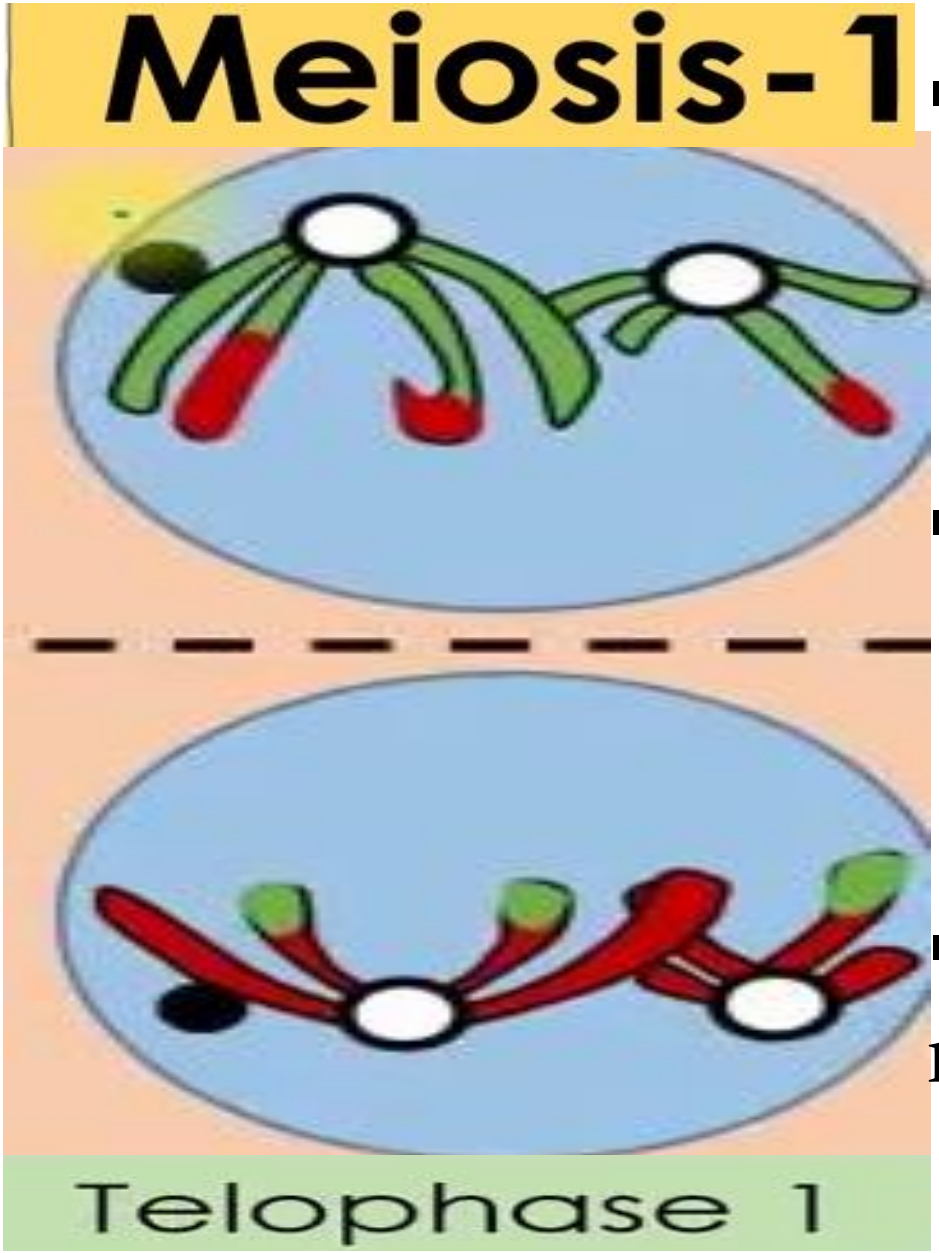
- All the bivalents migrate within a cell migrate to metaphase plate.
- One homologue is pulled above the metaphase plate, the other below.
- The centromeres of homologous chromosomes of each bivalent stretch out on either side

Meiosis-1



Anaphase 1

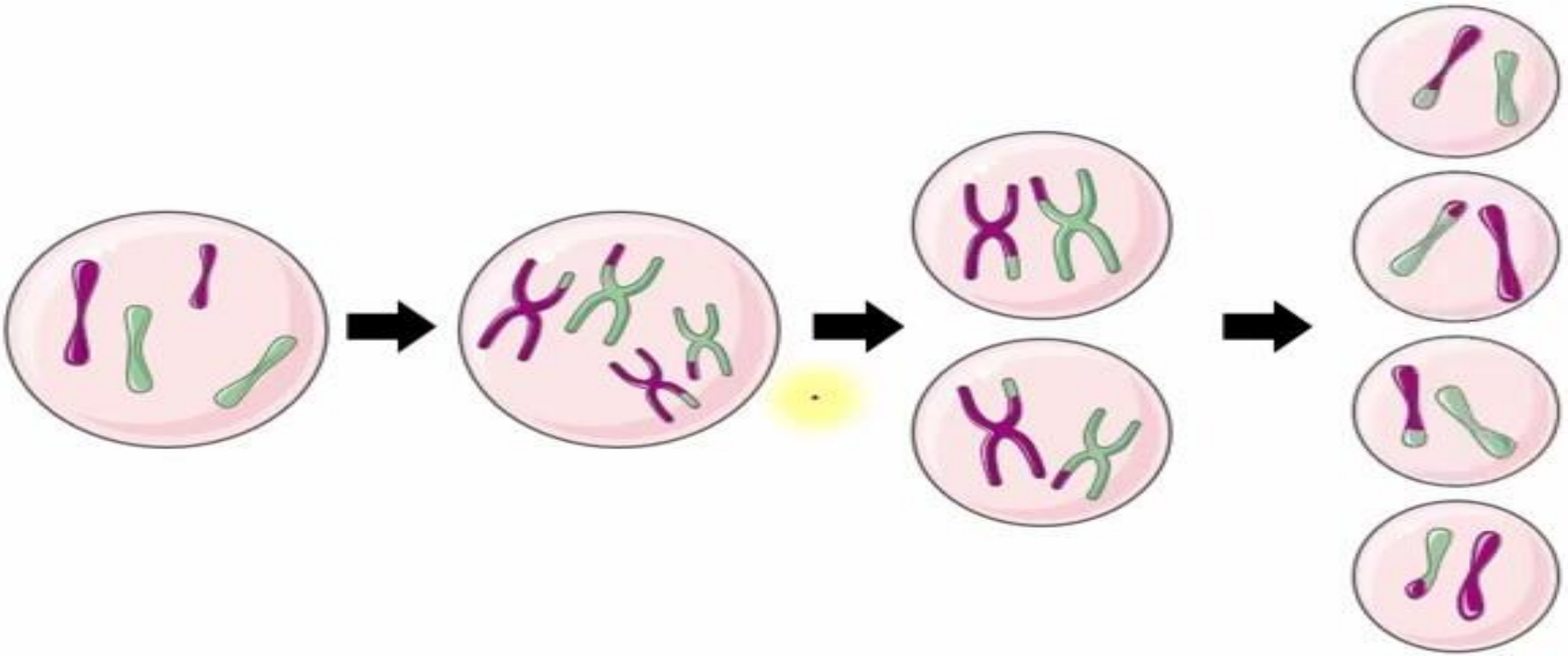
- বাইভ্যালেন্ট আলাদা হয়ে যায় ।
- ক্রোমাটিড আলাদা হয় না।
- ক্রোমোসোমের মেরুমুখী চলন ঘটে।
- ক্রোমোসোম সংখ্যা অর্ধেক হয়।



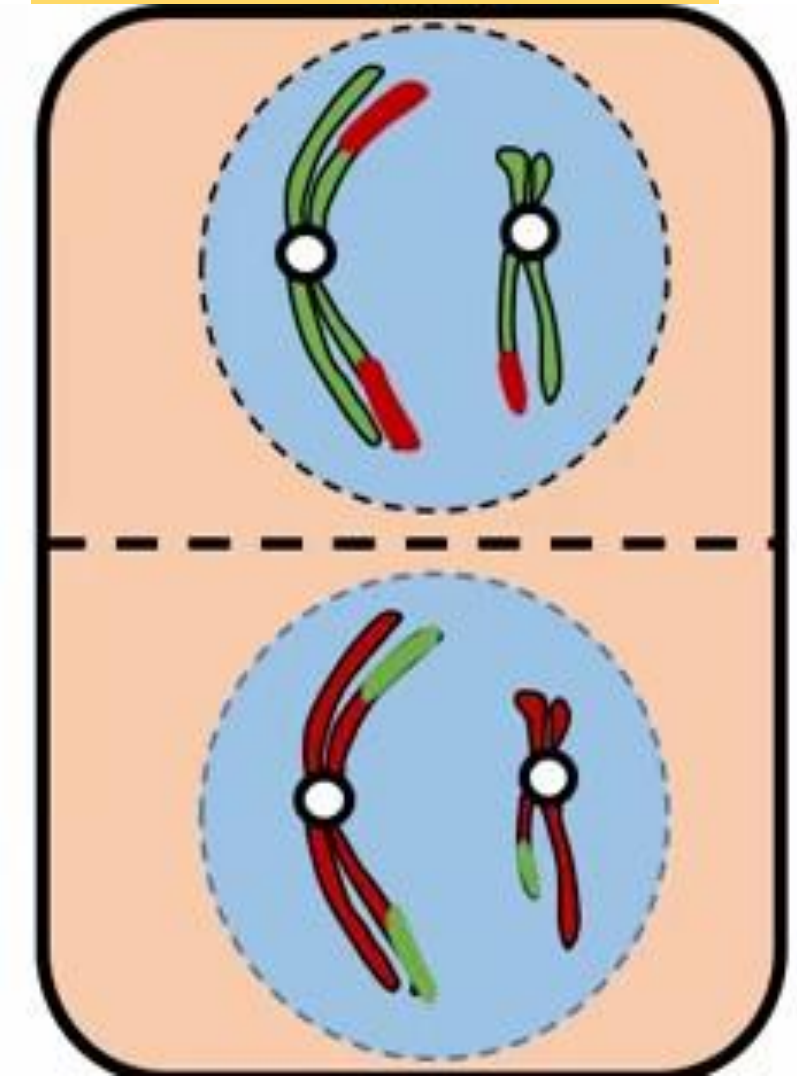
- The homologous chromosome complete their migration to the two poles
- The nuclear envelope organized around two groups of chromosomes.
- The nucleolus also reappears

- Cytokinesis involves formation of a cleavage furrow, resulting in the pocketing of the cell into two cells.
- A t the end of Telophase I and Cytokinesis, two daughter cells are produced, each with one half of the number of chromosomes (haploid set of replicated chromosomes) of the original parent cell.

Meiosis-2

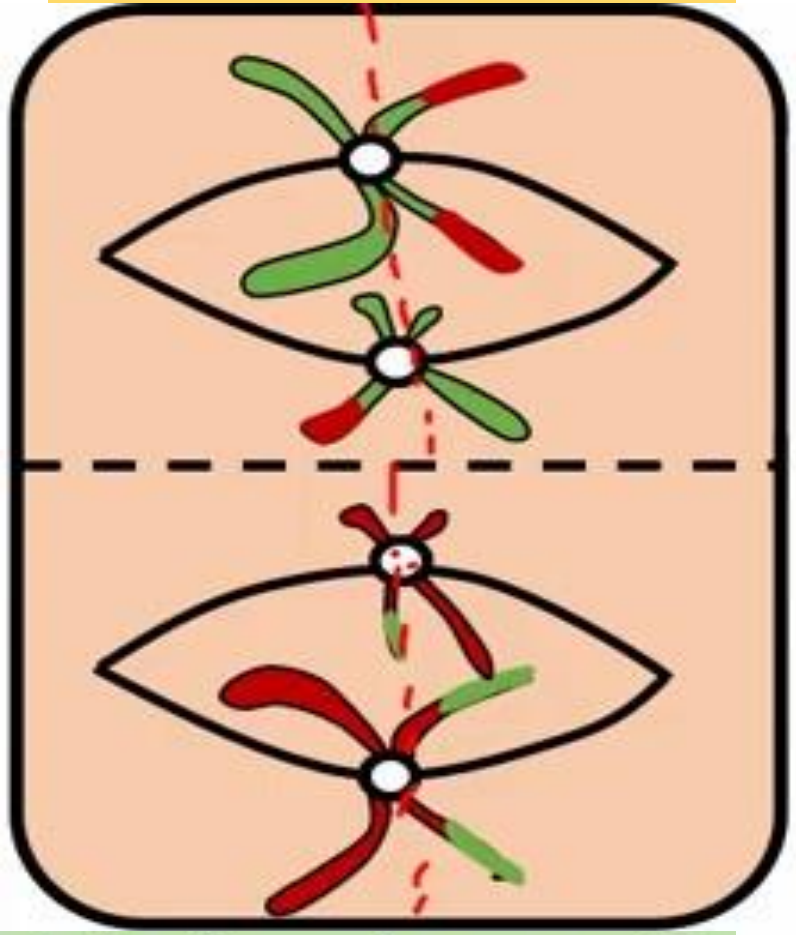


Meiosis-2



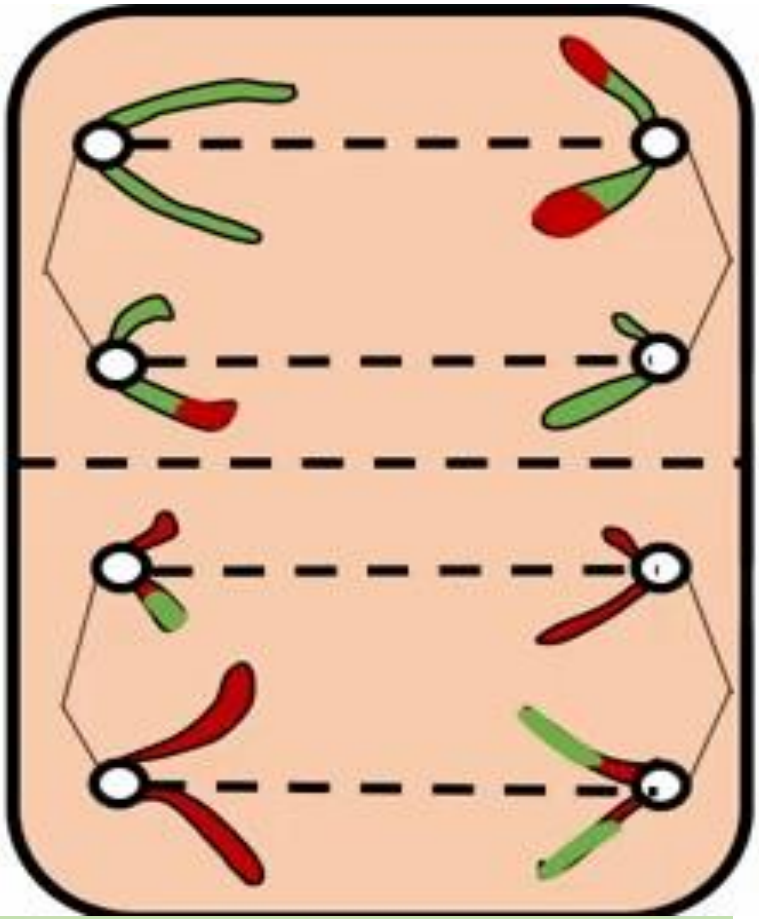
Prophase 2

Meiosis-2



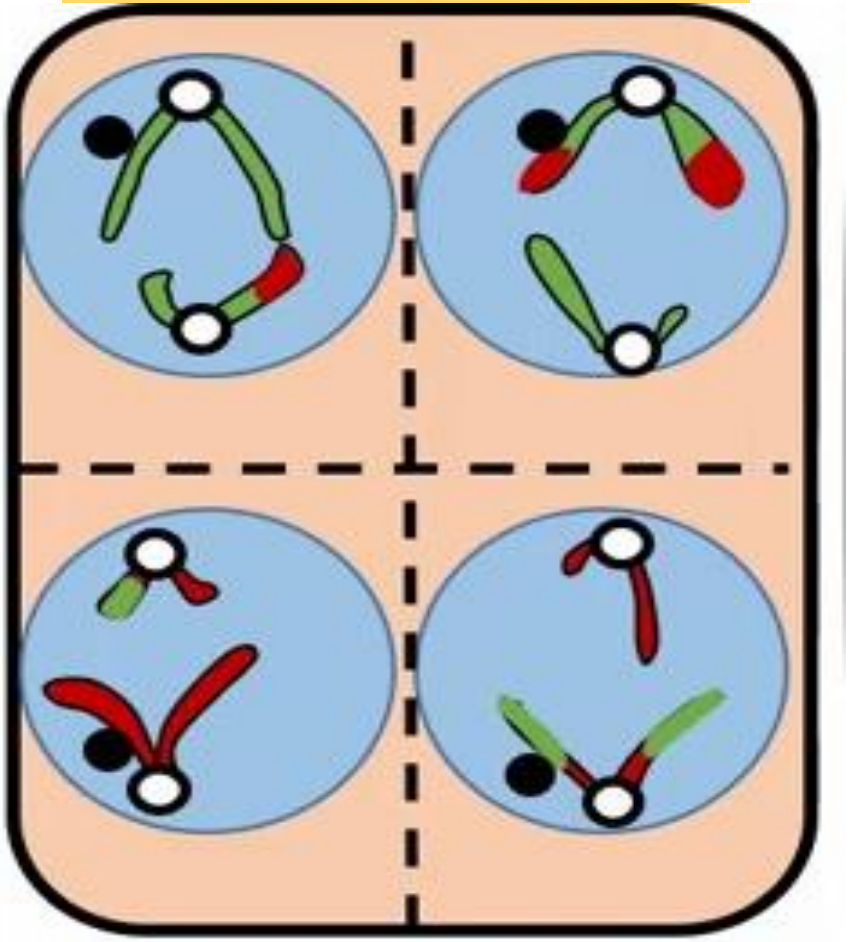
Metaphase 2

Meiosis-2



Anaphase 2

Meiosis-2



Telophase 2