

MEIOSIS

- The term "meiosis," coined by Farmer and Moore in 1905, refers to a double division process where a diploid cell gives rise to four haploid cells, each possessing half the number of chromosomes. In meiosis, a single parent cell undergoes two sequential cycles of nuclear division but only one cycle of DNA replication, resulting in the formation of four haploid daughter cells.
- Meiosis exclusively occurs in cells of sexually reproducing organisms, particularly during specific stages of their life cycle. The process involves the formation of haploid gametes, which are essential for sexual reproduction. The offspring produced through sexual reproduction involves the fusion of two haploid gametes, ensuring the restoration of the diploid phase.

Meiosis I	Meiosis II
1. Prophase I	Prophase II
2. Metaphase I	Metaphase II
3. Anaphase I	Anaphase II
4. Telophase I	Telophase II

Meiosis I:

- **Prophase I:**
Leptotene: Chromatin fibers begin to condense.
Zygotene: Homologous chromosomes pair up through synapsis, forming bivalents.
Pachytene: Chromosomes thicken, and crossing over occurs between non-sister chromatids.
Diplotene: Chromosomes begin to separate, and chiasmata, sites of crossing over, become visible.
Diakinesis: Chromosomes further condense, spindle assembles, and chiasmata terminalize.
- **Metaphase I:** Chromosomes align on the equatorial plate with centromeres in two rows, forming a double metaphasic plate.
 Bivalents distribute randomly, facing either pole.
- **Anaphase I:** Homologous chromosomes separate, moving towards opposite poles.
 Univalent with two chromatids move, maintaining chromosome number reduction.
- **Telophase I:** Chromosomes reach poles, nuclear envelope reappears, and chromosomes uncoil.
 Two daughter cells, each with half the chromosome number, are formed.
- **Cytokinesis:** Follows the first nuclear division, resulting in two haploid daughter cells.

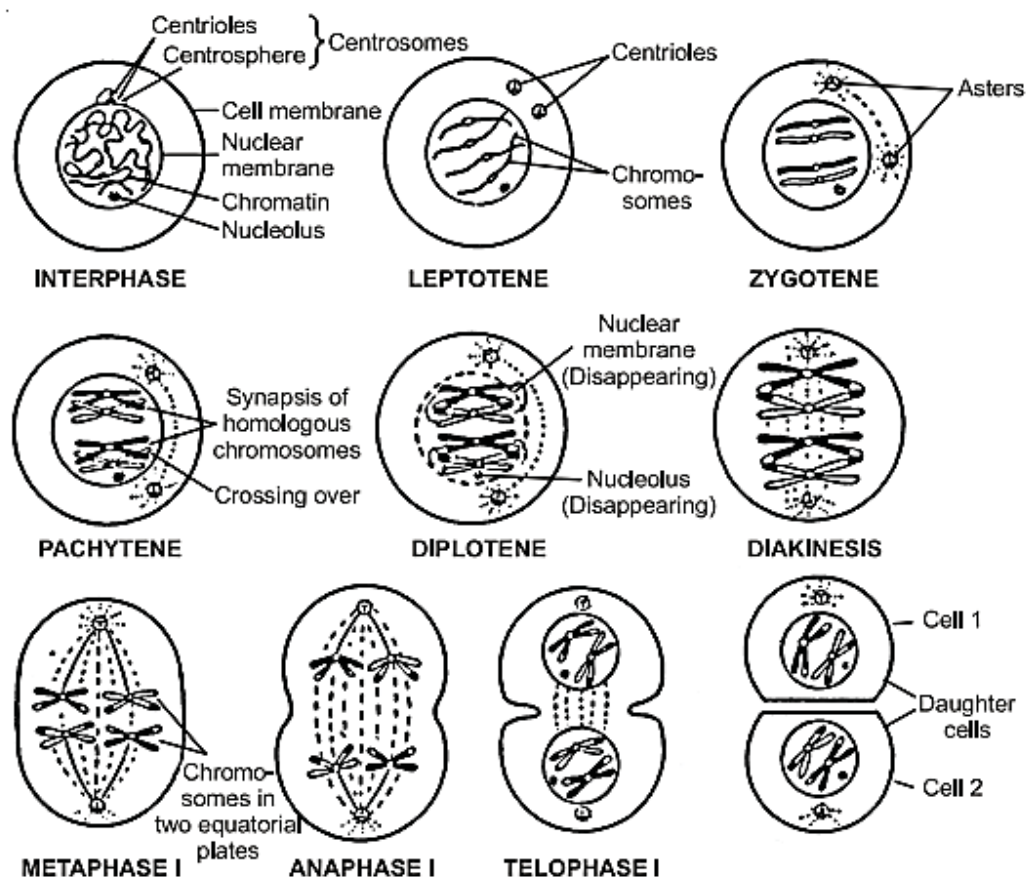


Fig. : Different stages of meiosis I

Interkinesis or Intrameiotic Interphase:

- Metabolic stage between telophase I and prophase II; no DNA replication occurs, but centrioles replicate.

Meiosis II:

- **Prophase II:**
Chromatids of univalent chromosomes condense.
Nuclear envelope and nucleolus disintegrate.
- **Metaphase II:**
Univalents align at the equator.
Microtubules extend and attach to chromatid kinetochores.
- **Anaphase II:**
Centromeres split, allowing separation of chromatids.
Chromatids move to opposite poles.
- **Telophase II:**
Chromatids reach poles, uncoil, and nuclear envelope and nucleolus reappear.
Four haploid nuclei are formed.
- **Cytokinesis:** Follows telophase II, dividing cytoplasm and resulting in four individual haploid cells.

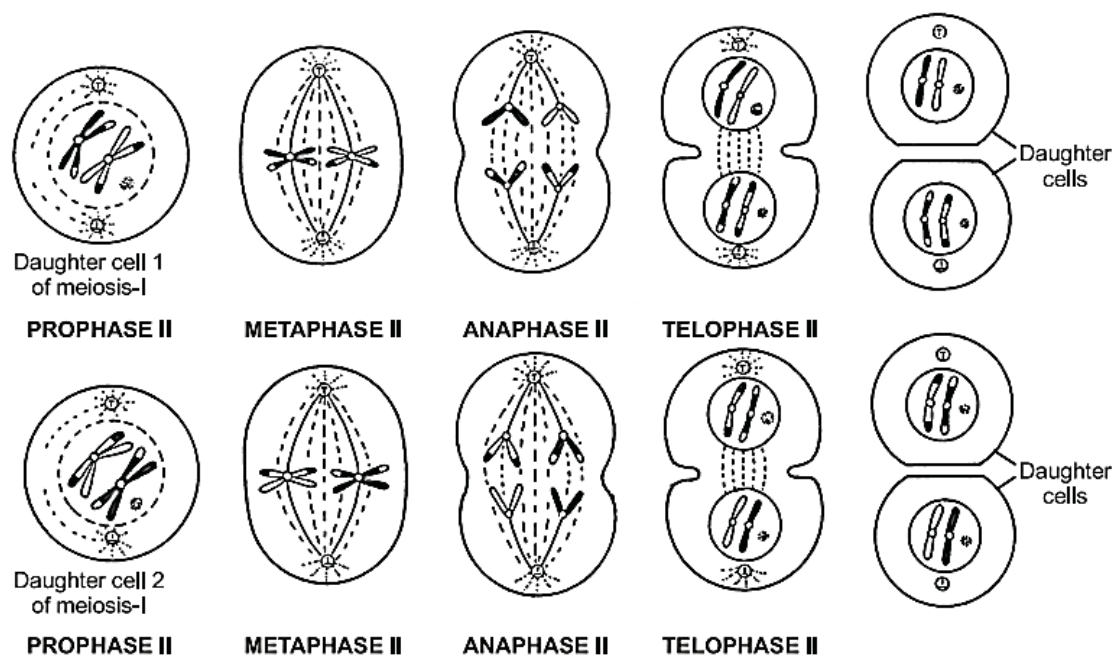


Fig. : Different stages of meiosis II in animal cell