Meiosis

The mechanism which reduces the diploid number of chromosomes to haploid in each sexual generation is called meiosis. Meiosis is also called as reduction cell division as it reduces the number of chromosomes.

Meiosis may be defined as — "Meiosis is a specialized type of cell division occurring only in the diploid reproductive cells and result in the formation of haploi gametes. It takes place before and after fertiliza-tion or during spore formation in plant cell.

It was discovered by Weismann (1887) in plant cell which form after afertilization and Strassburger (1888) studied detail structure which are as follows — Meiosis deals with the formation of four haploid gametes from a diploid mother cell. It comprises two successive division, the Ist is reductional or heterotypic and IInd is like Mitotic or homotypic. The Ist division is accompanied with the reductio in the chromosome number without okany division of centromere, while the second division involves the seperation of the chro-tids, soin it is daughter cells and the numb of chromosomes is half to that of parent ce

Ist set of division → It is very important stage of cell division in which number of chromosome is reduce to half, so the

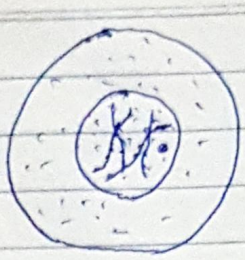
division is also called as reduction cell divisi
The division has been divided into 4 successive stages, they are -

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

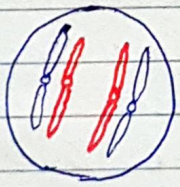
1. Prophase I → The prophase I is a very long process and takes longer duration for completion of different stages. On the basis of different changes taking place the prophase has divided into 5 sub-stage, known as -

(a) Bi Leptotene.
(b) Zygotene.
(c) Pachytene
(d) Diplotene
(e) Dikinesis

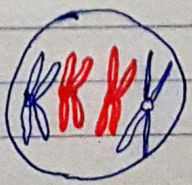
(a) Leptotene → In this stage chromosomes are attached with the nuclear membrane and look like a bouquet (Moens 1969), nucleus looks like a ball, chromosome are clearly seen and they gradually shorten and thicken which bears granular structure genes, chromosome also becomes cylindrical, uncoiled and distind is structure. The nucleolus increases in size. All the chromosome have a single centromere which is spherical and non-stainable.



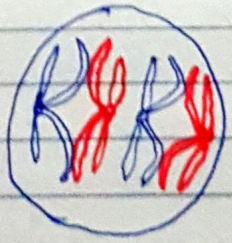
(b) Zygotene → Chromosome becomes thicker and smaller known as chromatids. The homologous chromosome pair together (male and female chromosome); the pairing of chromosome is known as Synapsis. The pairing may be at the centromere region or at any ends of chromosomes takes place, the paired chromosome are also known as bivalent.



(c) Pachytene → In this stage pairing of homologus chromosome completed, bivalent chromatids become more thicker and shorter due to gradual condensation of chromosome. Two homologous chromosome coils or twist each other and each bivalent chromatid divides longitudinally and forms tetrad chromatids, containing four chromatids in each bivalent which are attached with centromere.

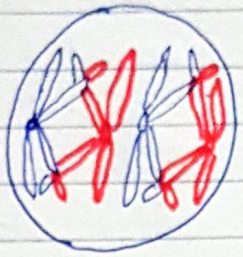


④ **Diplotene** → In this stage weaker chromatids break at certain points. The broken pieces are then interchanged between the homologous chromatids and are attached to their receptive points. This exchange and recombination of chromatids is known as crossing over. The homologous chromosome although seperate from each other through some are attached at certain points, these points are known as chaismata formation. The number of chaismata formation depends upon the length of the chromatids but not more than four chaismata formation in a chromosome takes place. After the chaismata formation it begins to move along the length of chromosome from centromere to the nuclear membrane. This displacement of chaismata is termed as terminalization.



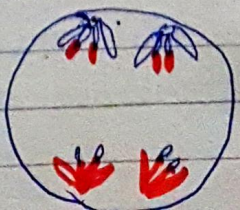
⑤ **Diakinesis** → In this stage the chromosomes constricted more due to formation of major coils. The seperation of homologous chromosome completed and arranged in the centre. The matrix covered the chromatids. The nuclear membrane and nucleolus begins to disappear gradually. Due to terminalization the bivalent chromatids appears as rounded bodies and

arranged near the nuclear membrane.



2. Metaphase I → In this stage nuclear membra and nucleolus completely disappear. The spindle fibres develop from matrix and tetrad chroma -tids arranged on equator and spindle fibre attached with centromere of chromatid and attached with the opposite pole.

3. Anaphase I → In this stage bivalent chroma -tids arranged on opposite pole due to the cons -triction of spindle fibres. In this time the two chromatids of a chromosome also seperate from each other. This is why it is treated to be a reductional division. Spindle fibre degenerate but some part of the fibres are attached with chromatids in opposite pole and at each pole chromatids are arrange in a bunch.



4. Telophase I → The nuclear membrane and nucleolus also are formed on the opposite pole around the haploid chromatids. Chromatids gradually elongate and coil. Matrix absorb water and forms nucleoplasm. In this way two haploid nuclei are form where the chromosome number is half to the parent nuclei, but it is very short duration because then the and there second set of division start.