

Meiosis

Homologous= a pair of chromosomes, one maternal and one paternal, with the same gene loci and therefore determine the same features.

Chromatid= one of the two copies of a chromosome that are joined together by a single centromere prior to cell division.

Meiosis occurs in the reproductive organs of plants and animals, forming haploid gametes. To maintain a constant number of chromosomes from one generation to the next, the number of chromosomes must be halved. Cells produced are genetically different. Meiosis brings genetic variation in living organisms.

The zygote (fertilised egg) divides by mitosis forming an embryo. Meiosis involves two divisions with each diploid cell producing four haploid gametes. The first division may be called a reduction division as the chromosome number is halved, crossing over may occur in this. The second division is identical to mitosis. It results in genetic variation in offspring, due to:

- Independent assortment of homologous chromosomes
- Crossing over between the chromatids of homologous chromosomes

During meiosis I, homologous chromosomes pair up and chromatids wrap around each other. Equivalent portions of these chromatids may be exchanged by crossing over. By the end of this stage, the homologous pair separate with one chromosome of each pair going into one of the two daughter cells. This forms two haploid daughter nuclei.

During meiosis II, chromatids move apart and the two new haploid nuclei divide in a process identical to mitosis. This forms four haploid nuclei.

During metaphase, when the cell is not dividing, the content of the cell is doubled and new cell organelles are formed.

Meiosis I

Prophase 1

- Chromosomes become shorter and thicker and split into two chromatids
- In cells with centrioles (animals and lower plants), centrioles move to the poles of the cells and microtubules begin to radiate from them, forming asters, forming the spindle.
- This is different from mitosis because homologous chromosomes associate in pairs and each pair is a bivalent.
- Each bivalent consists of four strands, made up of two chromosomes each split into two chromatids.
- These chromatids wrap around each other and partially repel but remain joined at certain points called chiasmata.
- Here, chromatids may break and recombine with a different but equivalent chromatid; crossing over
- At the end of prophase, the nuclear membrane disintegrates and the nucleolus disappears.