

# The thickening and shortening of chromosomes take



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The pairing is brought about in zipper like fashion.

As soon as two chromosomes come in contact, their attraction forces are neutralized.

**Precocity theory:**

This theory was given by Darlington in 1930 and he gave an explanation for meiotic chromosome pairing in the form of precocity theory. According to this theory, meiosis is a precocious mitosis, chromosomes which have not yet duplicated, have to enter prophase.

This is responsible for chromosome pairing. 2) Synaptonemal complex: Scientist Moses in 1956 first discovered synaptonemal complex. It is a feature of meiotic prophase. Synaptonemal complex is a tripartite structure, usually found between the two paired homologous chromosomes of each bivalent in all animal and plant nuclei undergoing meiosis.

This is considered to be a physical structure, which is associated with synapsis of homologous chromosomes. It is one of the main events occurring during zygotene stage. It is composed of proteins. It consists of these three distinct elements. 1. A relatively dense central element. 2. Two comparatively dense lateral elements.

3. Two relatively less dense transverse elements. 3) Terminalization: At diplotene stage, thickening and shortening of chromosomes take place. Homologous chromosomes start separating from one another. This separation starts at centromere and travels towards the ends.

This kind of separation from centromere towards the ends is known as terminalization. The total number of chiasmata terminalized at any given stage or time is known as coefficient of terminalization. There are three theories to explain the mechanism of chiasma terminalization.

1) Electrostatic hypothesis 2) Coiling hypothesis 3) Elastic chromosome repulsion theory

**Significance of crossing over:**

1. Crossing over provides origin of new characters due to change of genetic material. 2. It provides the evidence showing that the genes are linearly arranged on the chromosome. 3. The frequency of crossing over is helpful in the mapping of the chromosomes.

4. Linkage groups and linear arrangement of genes throw much light on mechanism of nature of genes. 5. It is useful for improvement of plants and animals by producing several combinations from which selection can be made. 6.

It produces recombinants hence playing important role in evolution.