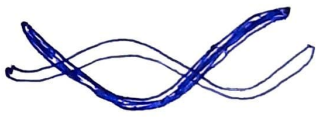
Crossing over

- Crossing over is the interchange of chromosomal parts between non-sister chromatids of a homologous pair of chromosomes resulting in recombination of genes.
- Crossing over was discovered by Morgan.
- Crossing over is the
- It occurs during meiosis or gametogenesis.
- Number of crossing over depends upon the length of the chromosome. Length is long - high % of crossing over.
- when genes are located distantly, the chance of CO is higher. when located genes are closely the chance of CO is lesser.

Single CO

Double CO



Single CO in a homologous chromosome, it is called single crossing over.

Two cross overs in a homologous chromosom it is called double crossing over.

Many crossing overs in a homologous chromosome, it is called multiple crossing ove

Crossing over in Drosophila.

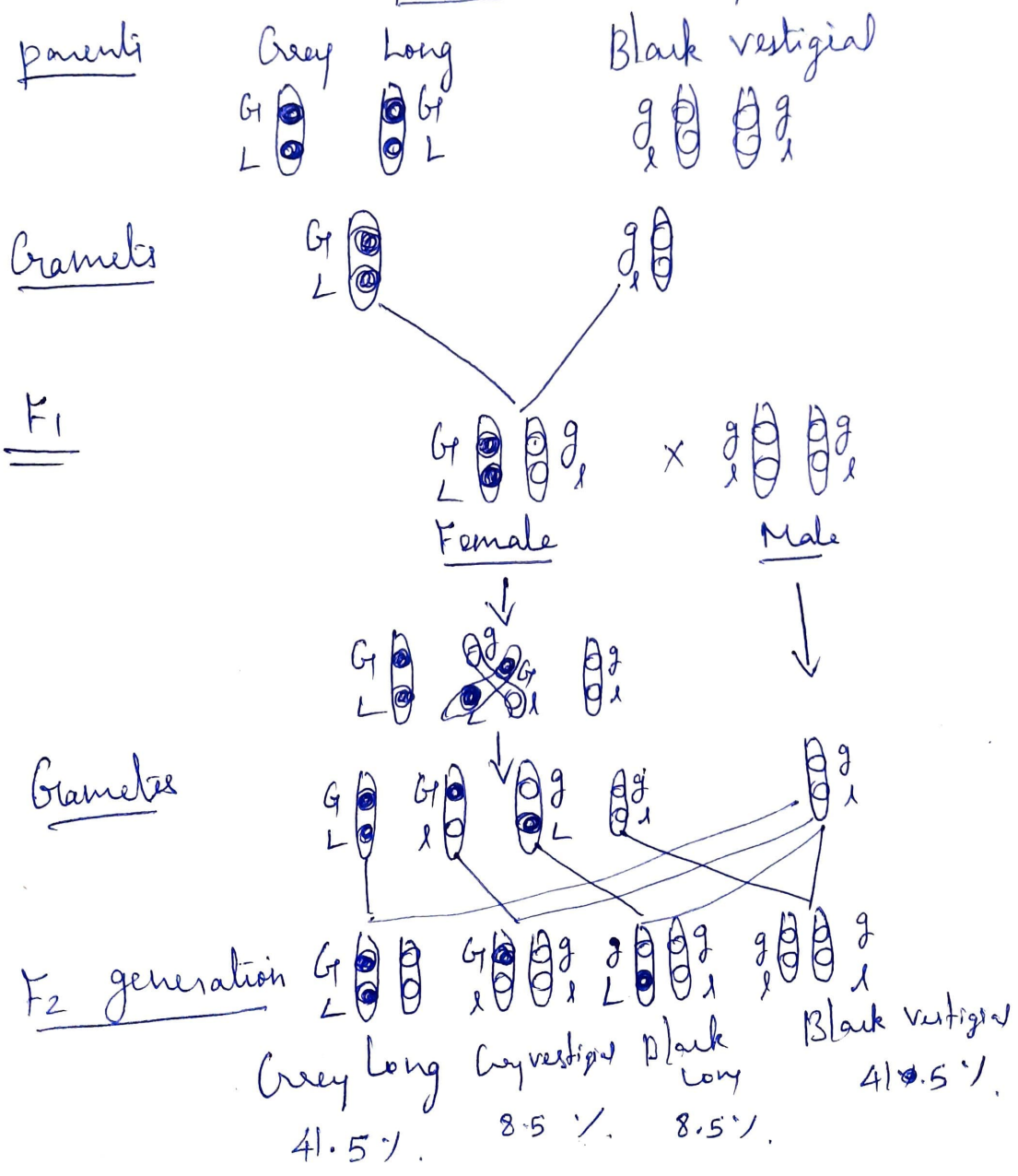
- Grey long Drosophila is crossed with a black vestigial, the F_1 hybrid is grey long
- when female flies of F_1 generation are back crossed with double recessive male, four types of offsprings are produced.

- Among females F1 the four types of offspring, two types - black vestigial (41.5%) and grey long (41.5%) - are similar to parents - They are known as parental Combinations

- The other two types grey vestigial (8.5%) and black long (8.5%) are different from their parents genotypically and phenotypically, they are known as non-parental Combinations.

- Due to C.O non-parental Combinations occurs.

Crossing over in Drosophila



Mechanism of C.O

① . Synapsis - pairing of homologous chromosome is called synapsis.

② . Bivalents - paired homologous chromosomes are called bivalents

③ . chromatids - homologous chromosomes split longitudinally. Each chromosome splits into two chromatids.

④ . tetrad - homologous chromosome have four chromatids. This is called tetrad stage.

⑤ . Sister chromatids - two chromatids of a chromosome are attached by a single Centromere. These are called sister chromatids

- Non-sister chromatids of homologous chromosomes twist over each other.
- At certain points, the non-sister chromatids are connected with each other. The points of contact between non-sister chromatids are called chiasmata.

chiasma - Cross

- At the chiasmata the chromatids break. (endonuclease)
- The broken chromatid of one chromatid is fused with the other chromatid and vice versa. (ligase)
- After crossing over, the non-sister chromatids move towards the end from each other. (terminalization).