Genetic Mapping

Gene of a linkage group may be represented on a single straight line in the same order in which they are normally present in the concerned chromosome.

In such a representation, the distance between the two neightbouring genes is proportional to the frequency of recombination (%) between them.

Such a line depicting the linked genes and the recombination frequencies between them is known as linkage map, genetic map or chromosome map.

Thus for preparing Chromosome map, two informations are necessary:

1. The frequency of recombination between the linked genes.
2. The order or sequence of the linked genes in the chromosome.

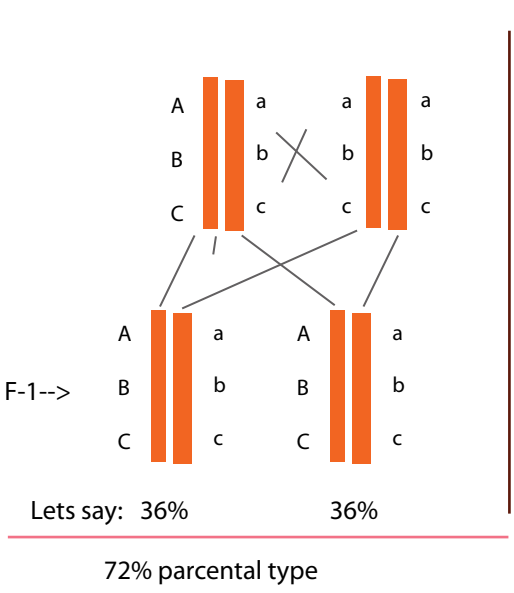
Recombination frequencies between linked genes are determined by appropriate test these percent frequencies are used as map units for linkage maps.

A map unit is that distance in the chromosome which permits one percent recombination between two linked genes. A map unit is also called as Morgan (1 centimorgan = 0.1 mapunit)

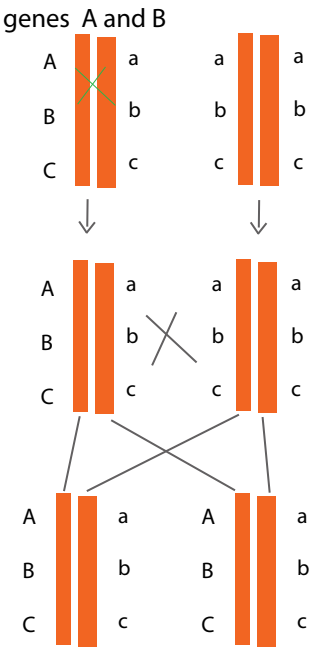
The Sequence of linked gene and their distance is studied by studying the **Three point test cross**.

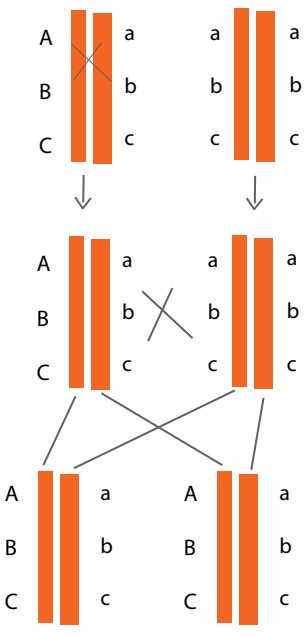
Lets assume that the three genes A, B and C are linked. Their F1 hetrozygous individual will have the genotype combination of ABC/abc and its homozygous recessive parent will have the genotype combination of abc/abc as represented in the cross below:

Note: Its is important to note that the majority of the cases are non recombinant and the least number of offspring are recombinant.



here lets consider the cross between the genes A and B





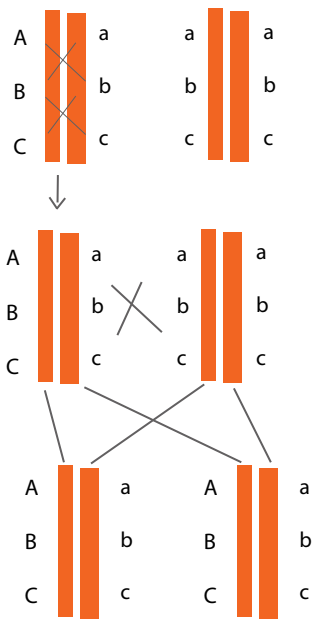
8% single cross between genes B and C

Lets say:--> 9% 9%

18% single cross between the enes A and B

Also, lets consider the cross between genes B and C

Finally, lets consider the double cross between each genes A, B and C.



To find the distance between A-B we must count all crossovers (both single and doubles that occurred in region I = 18% + 2% = 20% or 20 map units between the loci A and B. Similarly we find that the distance between loci Band C is 1

The distance A-C is therefore 30 mapunits

Hence B is the middle of A and C, as depicted in the figure below: