Chromosome Map

The chromosome map may be defined as a Line, on which the genes are Represented by points, seprated by distances proportional to the Amount of crossing over.

The percentage of crossing over is dieredtly proportional to the distance of the alleles showing crossing over in the chromosome.

The chromosome maps are the graphic Representation of the genes in a chromosome.

The percentage of crossing over is calculated by test crosses. In Mapping the genes, a unit of distance is used and it is called as map unit or Morgan unit.

The first chromosome map was made in 1911 by Sturtevant and soon after additional Maps were made by Bridges and others.

Procedure of the chromosome Mapping :-

In fact, genes are plotted on the chromosome on the basis of crossing over Results between different pairs of linked genes. The Actual distance between two genes is said to be equivalent to the percentage of crossing over between these genes.

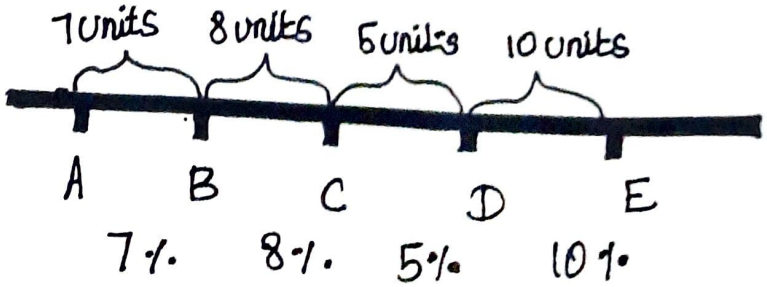
When the % of crossing over between Two genes is 5. Then the distance is 5 units. For Example, five genes A, B, C, D and E are to be plotted on a chromosome. If cross over Results indicate that Genes A and E have the highest percentage of crossing over, it means that these should be placed at the maximum distance.

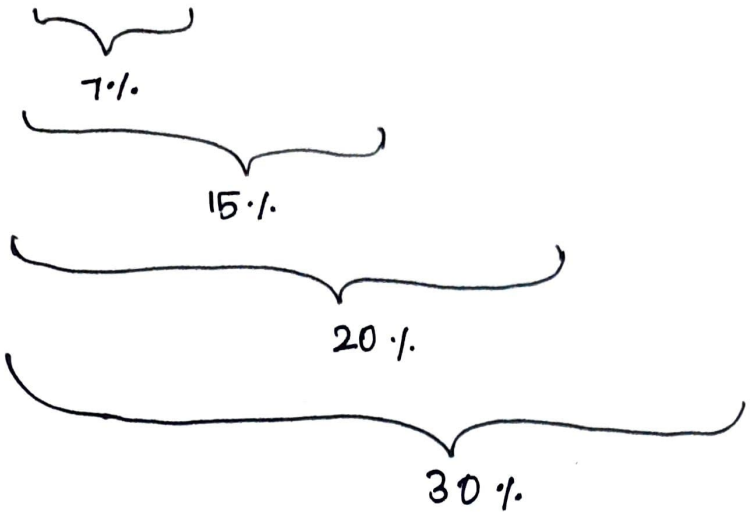
In this Example, the gene A can be Taken as a starting point in the chromosome and can be Represented by 0.

Now if the gene A and B Exhibit 7% Crossing over, the gene B can be placed on the chromosome at a distance of 7 units.

If the gene C shows 8% crossing over with gene B and about 15% crossing over with gene A, it can be plotted on the chromosome at a distance of 15 units from gene A.

Similarly if Gene A and E Exhibit 20% and 30% crossing over with gene D and 5% and 10% with gene these, are located on the chromosome 5 and 10 units away from the Gene C Respectively.





Digrammatic Representation of the Method of Locating genes on a chromosome on the Basis of % of crossing over.

Construction of chromosome Map in Drosophila :-

In Drosophila, the chromosome Map is Constructed with the help of test cross.

In Drosophila, grey colour is dominant over black colour and the long wing is dominant over vestigal wing.

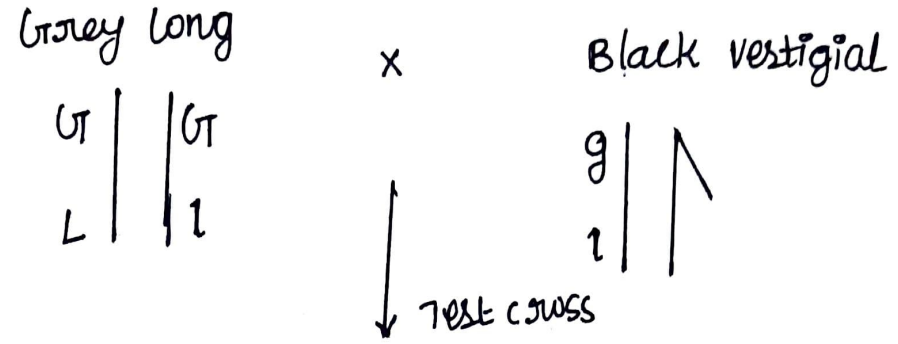
The F_1 Female hybrid is Test crossed. Four Types of individuals are Formated[1].

out of Four Types, Two types are parental Type (GT:L & B:V) and other Two are non-parental Type (GT:V & B:L) due to crossing over.

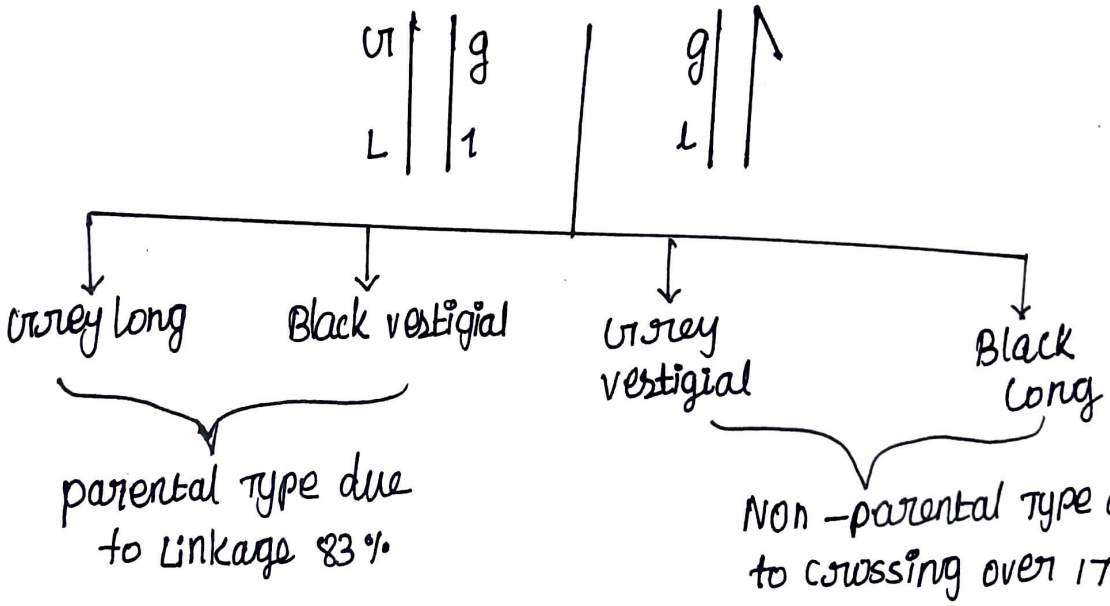
Non-parental type is 17%. so the percentag of crossing over is equivalent to 17%.

The distance between the two genes (Cr-L) is equivalent to the percentage of crossing over or percentage of non-parental combination.

So the distance between the gene Cr & L is equivalent to 17 morgan units.



F1 Female Grey long x Black vestigial



percentage of non-parental combination = 17 %
So the percentage of crossing over = 17
So the distance between the gene Cr & L = 17 map unit