

Unit 2: Linkage, Crossing over and Chromosomal mapping:

Linkage

Genetic markers located on the same chromosome tend to remain together during sexual reproduction. That is they do not exhibit independent assortment. Such genetic markers are said to be linked and the phenomenon or transmission pattern of linked genes is called linkage.

Genetic markers are said to be linked whenever over 50% of the gametes produced contain parental combinations of the markers are less than 50% of the gametes contain recombinant combination of the gene markers.

Usually, however, when linkage is observed, its results because the genes involved are located close together on the same chromosome.

When genes are so closely associated that they are always transmitted together upon coming from the same parent, linkage between them is considered complete.

The almost complete absence of independent assortment between these two ~~cross~~ gene pairs is evidence of very strong linkage between them.

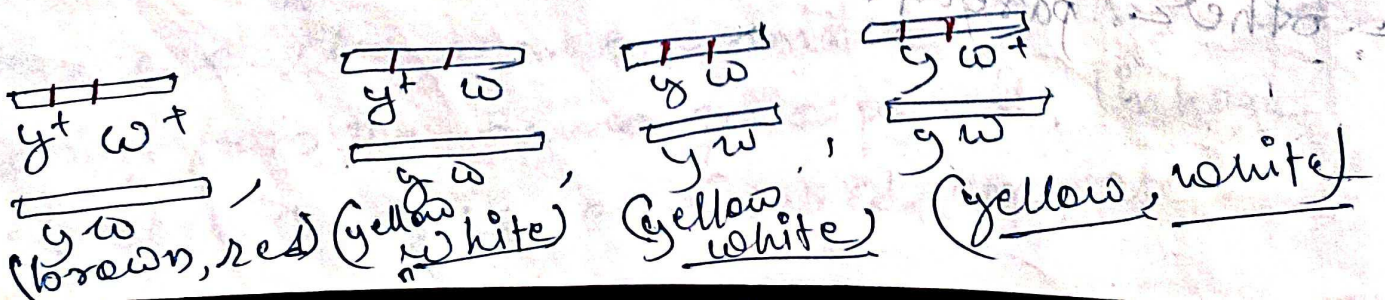
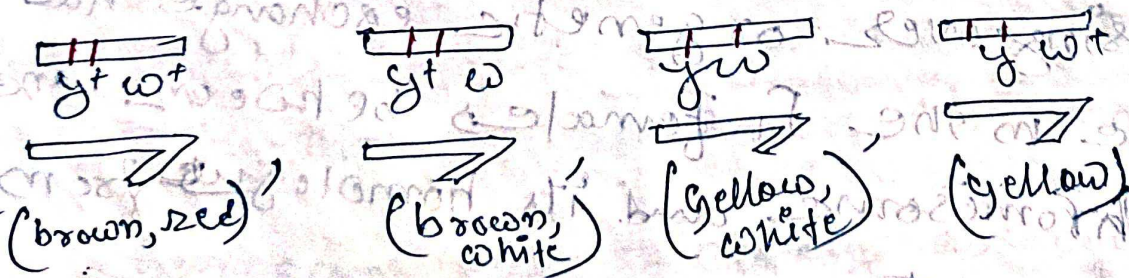
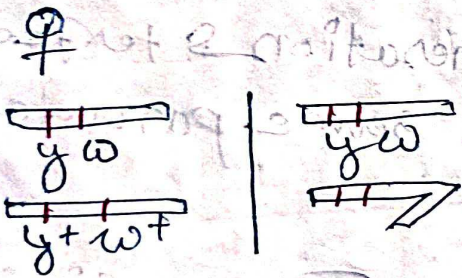
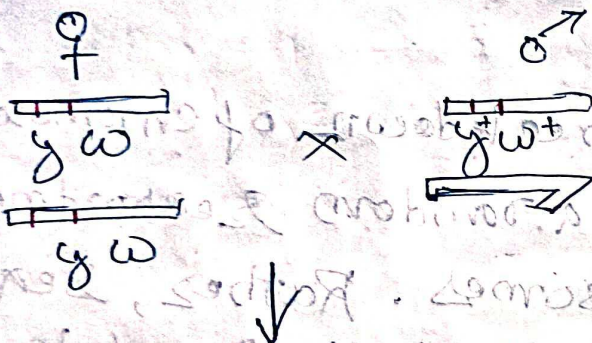
The two main ~~or~~ conclusions can be derived from Morgan's experiments —

① There was no apparent break-down of chromosome during meiosis followed by a random re-assembly of genes into new chromosomes. Rather, ~~see~~ chromosome linked gene remained linked to X chromosomes through all generations tested, although not necessarily to the same parental X chromosomes.

② The occurrence of recombinant types signifies that a crossing over or genetic exchange had taken place in the F₁ females between one parental chromosome and its homologue from the other parent.

Example: ①

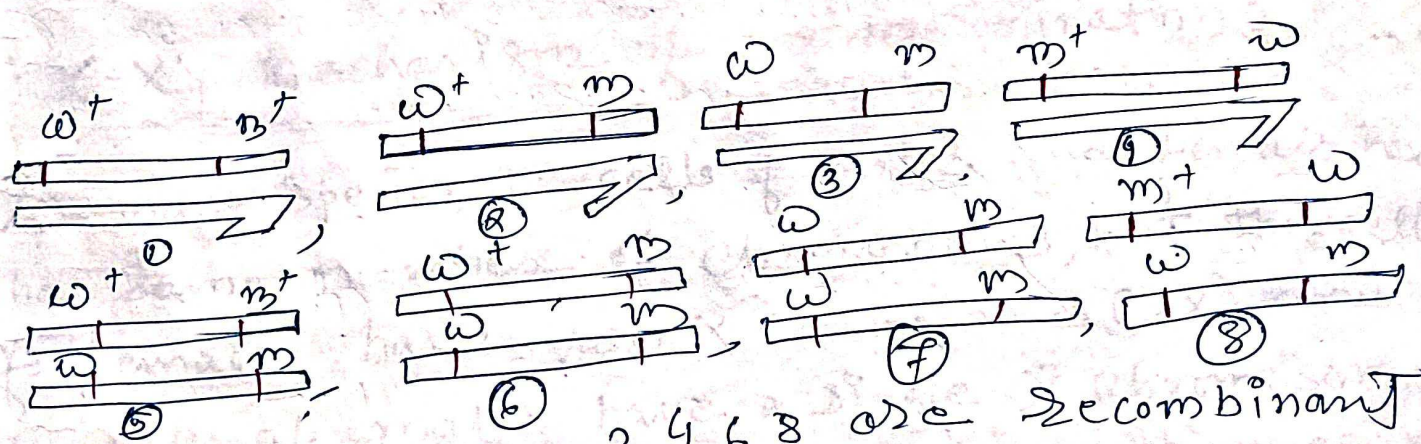
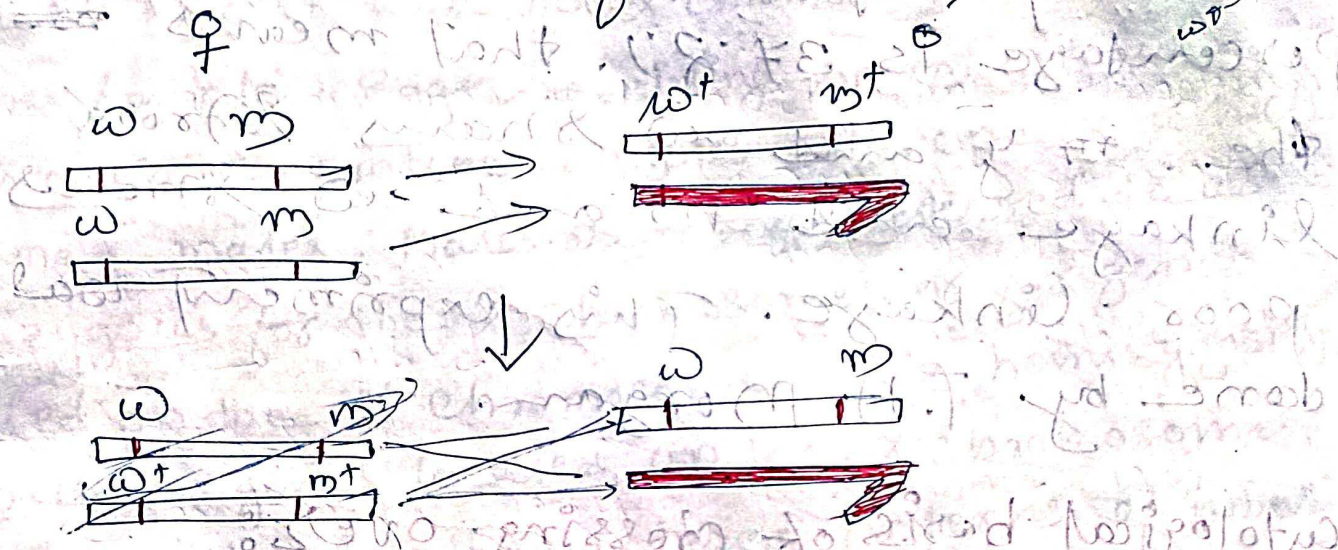
Cross between yellow body (y) ~~and~~ white eye (w) and brown body (y+) • Red eye (w+) Drosophila melanogaster.



Here we see, the recombination ratio is only ~~15~~ 1.3%, i.e, the genes are in same chromosome ~~at~~ close proximity to each other. →

① Example :

Another example of linkage is



~~phenotype~~ Here 2, 4, 6, 8 are recombinant and their phenotypic ratio is 37.2% and 1, 3, 5, 7 are

parental phenotype and there ratio is 62.8%.

Here we see in the first example recombination percentage is 1.3% and in example two, recombination percentage is 37.2%. that means the y and w shows strong linkage and m and w shows poor linkage. This experiment was done by T.H. Morgan.

Cytological basis of crossing over:

