

11-5 Linkage and Gene Maps

Gene Linkage

Thomas Hunt Morgan's research on fruit flies led him to the principle of linkage.

Morgan discovered that many of the **more than 50 *Drosophila* genes** he had identified appeared to be **"linked" together**.

They seemed to violate the principle of independent assortment.

Morgan and his associates grouped the linked genes into four linkage groups.

Each linkage group assorted independently but all the genes in one group were inherited together.

Each chromosome is actually a group of linked genes.

Morgan concluded that Mendel's principle of independent assortment still holds true.

Chromosomes assort independently, not individual genes.

Gene Maps

Crossing-over during meiosis sometimes separates genes that had been on the same chromosomes onto homologous chromosomes.

Crossover events occasionally separate and exchange linked genes and produce new combinations of alleles.

Alfred Sturtevant, a student of Morgan, reasoned that the farther apart two genes were, the more likely they were to be separated by a crossover in meiosis.

Recombination frequencies can be used to determine the distance between genes.

Sturtevant created a **gene map** showing the relative locations of each known gene on one of the *Drosophila* chromosomes.

If two genes are close together, the recombination frequency between them should be low, since crossovers are rare.

If they are far apart, recombination rates between them should be high.

