Mendel has modelled one experiment, he executed and finally he tested it. This type of cross is knows a test cross (Crossing the unknown genotype with the recessive parent). It can predict the genotype to be tested based on the phenotypic ratio of the cross output.

Probaility laws govern Mendelian inheritance: The Study of dihybrid cross

Initially Mendel did all his experiments by analyzing only one character at a time – monohybrid cross. Based on his results, he has tested his hypothesis of dominance and segregation. After this he wanted to study the inheritance of two characters at a time – the dihybrid cross

The experiment is planned in such a way to analyze the following:

Whether the alleles maintain the association they had in the parental generation: For this he crossed pure breeding spherical seed and yellow seed color pea plant with a wrinkled seed green seed color pea plant. If the alleles maintain he association, he is expecting only the parental types in the F2 generations (Way Cat C2 generation?) If the alleles maintain the association the F2 gametes will be SY and sy. As a result the probability of Spherical and yellow seed peas: wrinkled and green seed peas will be 3:1 (Ie only two pherotypes). If they segregate independently he was expecting four different phenotypes.

The experiment and the results are illustrated as below



He didn't get a 3:1 ratio in F2 generation. New types were obtained in F2. It means that the alleles didn't maintain the same association as seen in the parental types, rather they assorted independently (Law of Independent Assortment).

Mendel and his Mathematics predictions.

You have a 1 rupee coin and 5 rupee coin. You are going to toss it together. What is the probability of getting a tail in both cases? (Are the two events linked to each other or independent?)

Probability of getting a 1 rupee tail = $\frac{1}{2}$. Probability of getting a 5 rupee tail = $\frac{1}{2}$



What Morgan expected is a 1:1:1:1 ratio (Recollect Mendel's dihybrid test cross ratio)

Total individuals = 965+944+206+185 = 2300

Parental types = 965 + 944 = 1909

Non parental types or recombinant types = 391

Recombination frequency =(Recombinant types/Total individuals) X 100 = (391/2300) X 100 = 17%

(We can also write recombination frequency as 0.17 assuming that maximum recombination is 1)

Now we have to see why the new phenotypes (non-parental phenotypes) occurs?



crosses in *Drosophila*. After finding out the frequency he was able to apply for construction of genetic map because the mole the distance between error oci, the more will be the recombination. It means the distance between genes can be calculated based on this. The unit is cm (Centimorgans) or map units (1cM = 1 map unit). The following illustration shows an illustration of genetic mapping by Morgan.



Walther Flemming, the grand father of mitosis discovered chromosomes. He says chromosomes splits longitudinally!