Genetics

Dihybrid Crosses

Targets

9. I can explain the Law of Independent Assortment
10. I can predict the possible genotypes and phenotypes of a cross between BbTt and BbTt

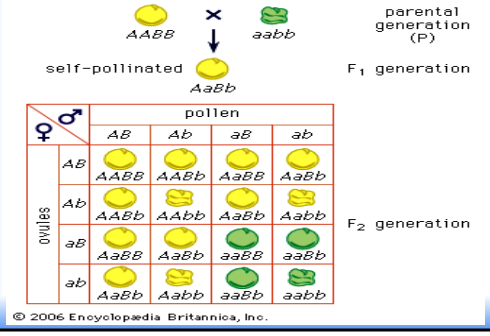
Mendel's Experiments

- Conducted experiments that examined the inheritance of 2 different traits:
  Ex: flower color and pea shape
- Wondered if traits would be passed on together or separately
- Using purebred plants, he conducted many experiments using a variety of trait combinations
  Ex: flower color and pea shape
  pea shape and pod color

Mendel's Results

- The F1 generation of crossing 2 purebred plants would result in heterozygous plants:
  - The plants all expressed the dominant gene but carried the gene for the recessive trait *(how did he know that?)*
- When Mendel crossed the F1 generation which was heterozygous for both traits, he discovered that the F2 generation expressed all combinations of the 2 traits

Cross 2 purebred plants



Mendel's Conclusion

Law of Independent Assortment

- Allele pairs, one from mom and one from dad, separate independently of each other during meiosis.

Dihybrid Crosses are used to show how alleles independently sort

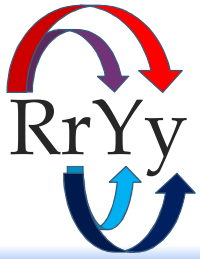
- Process (steps) are just like monohybrid crosses (single trait) with one extra step

Process for doing dihybrid problems

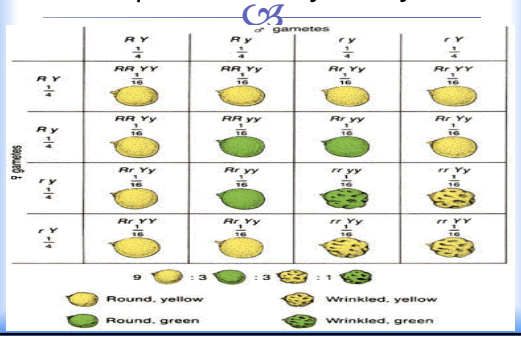
Step 1: Identify dominant and recessive traits
Step 2: Identify the phenotypes of each parent
Step 3: Identify the genotypes of each parent
Step 4: Determine possible allele combinations using FOIL method
Step 5: Complete Punnett Square
Step 6: Write out phenotypes and ratios
Step 7: Write out genotypes and ratios

Step 4: Use F.O.I.L. to identify all possible allele combinations:

RY, Ry, rY, ry



Use combinations to fill in Punnett Square: RY, Ry, rY, ry



Practice Problem

In mice, the ability to run normally is a dominant trait. Mice with this trait are called running mice (R). The recessive trait causes mice to run in circles. These are called waltzing mice (r). Black hair (B) is dominant over brown hair (b).

Complete a cross between a mouse that is heterozygous for running and black hair with a mouse that is homozygous for running and black hair.