Genetics & Probability

Between 1856 and 1863, Gregor Mendel cultivated and tested some 28,000 pea plants in the garden of his monastery in Vienna. His experiments brought forth two generalizations which became known as Mendel's Laws of Heredity.

- What are 'traits'?
- What are 'genes'?
- What are 'alleles'?

Mendel's Law of Segregation

1. Alleles are different versions of genes that impact the same characteristic. Each human has a gene that controls height, but there are variations among these genes.
2. For each characteristic, an organism inherits two alleles (one from each parent) since somatic cells are produced from 2 gametes.
3. The two genes for each character segregate during the production of gametes.
4. These alleles may be the same (true-breeding organisms), or different (hybrids). If the two alleles differ, then the dominant allele is fully expressed in the organism's appearance; the other, the recessive allele, has no noticeable effect on the organism's appearance.

    - What is a 'dominant' trait?
    - What is the 'genotype'?
    - What is the 'phenotype'?
    - What is 'heterozygous'?
    - What is 'homozygous'?
    - What is 'codominance'?

An example... Tall v. dwarf plants (Tall = T dwarf = t)

Genotypic ratio:

Phenotypic ratio:

Mendel's Law of Independent Assortment

Mendel's experiments mixing one trait always resulted in a 3:1 ratio between dominant and recessive phenotypes. The Law of Independent Assortment states that the emergence of one trait will not effect the emergence of another.

Setting up a Punnett Square...

A coin toss:

Homozygous dominant = % =
Heterozygous = % =
Homozygous recessive = % =

Genetic variation #1: Heterozygotes

Homozygous dominant = % =
Heterozygous = % =
Homozygous recessive = % =

Genetic variation #2: Homozygote v. Heterozygote

Homozygous dominant = % =
Heterozygous = % =
Homozygous recessive = % =

Genetic variation #3: Homozygotes

Homozygous dominant = % =
Heterozygous = % =
Homozygous recessive = % =