GENETICS

Genetics—study of inheritance of traits

Traits are encoded by genes, regions of DNA that are transcribed and translated.

Alleles—alternate forms of the same gene. For example, eye lash length can be long or short.
  Inherit one allele from each parent (inherited 1 copy of each chromosome from each parent so that you have 2 copies of each chromosome) unless a trait is sex-linked (see later).

  Can have 2 copies of the same allele – homozygous
  Can have 1 copy of each allele—heterozygous

Assigned a “letter” in order to predict the inheritance of a trait. Also, the letter is either capital case (if trait is dominant) or small case (trait is recessive). Can have one of three combinations of letters—LL (dominant, homozygous), Ll (dominant, heterozygous), or ll (recessive)

Some alleles are dominant over the other allele. If you have two different alleles (heterozygous), and only one of the alleles is responsible for your features. For example, if you received the long eye lash allele from your mother and the short eyelash allele from your father, you would be heterozygous for eyelash length. However, you would have long eyelashes (not short or medium). Dominant alleles are assigned capital letters; long lashes are LL (homozygous) or Ll (heterozygous).
Other alleles are *recessive*. In example above, short eye lashes are recessive—need 2 copies of the same allele to have the characteristic. So short eye lashes would be ll.

**Genotype**—combination of alleles that you have inherited—LL, Ll, or ll

**Phenotype**—what you look like. Do you have long or short eyelashes?

**Multialleles**—traits controlled by greater than 2 alleles, skin color, eye color

**Co-dominance**—both alleles contribute to the phenotype. Blood type is an example.

**Incomplete dominance**—dominant trait does not completely mask the recessive trait; blending of traits. Examples are plumage color of birds and flower color.

**Sex determination**—have 2 sex chromosomes X and Y. If you have 2 X’s—female; XY is a male. Determined by father; mother always gives an X.

**Sex linkage** when inheritance of a trait depends on the sex chromosome (usually the X); see nonrandom distribution of the phenotype relative to the sex of the offspring. Example is hemophilia.

**Monohybrid cross**—when you cross 2 individuals differing in 1 trait (long vs. short eyelashes). Obtain some offspring that are heterozygous (hybrids) for that trait.

**Dihybrid cross**—cross 2 individuals that differ with respect to 2 traits (yellow peas and round peas)
Punnett square—way to predict genotypes and phenotypes of offspring from parents of known genotype

Pedigree—traces the inheritance of a trait over several generations in a family.