Mini-Lesson: Single Gene Traits

Explain to the students that physical traits are observable characteristics determined by specific segments of DNA called *genes*. Multiple genes are grouped together to form *chromosomes*, which reside in the nucleus of the cell. Every cell (except eggs and sperm) in an individual's body contains two copies of each gene. This is due to the fact that both the mother and the father contribute a copy at the time of conception. This original genetic material is copied each time a cell divides so that all cells contain the same DNA. Genes store the information needed for the cell to assemble proteins, which eventually yield specific physical traits. This unique genetic makeup is called your *genotype*.

Some physical traits can be attributed to variations of a single gene. These observable physical traits make up your *phenotype.* For the traits included in this activity, each gene has two variations: *dominant* and *recessive*. An example of this can be seen in your hairline. The widow's peak trait is *dominant* for this gene (W), while the straight hairline trait is *recessive* (w).

If you inherited:

- 2 widow's peak alleles (genotype WW) = peak hairline
- 1 widow's peak allele and 1 straight hairline allele (genotype Ww) = peak hairline
- 2 straight hairline alleles (genotype ww) = straight hairline

Note: This activity has been simplified by using single-gene traits. However, it is important to explain to students that not all traits exhibit a dominant or recessive pattern of inheritance. Most human genetic traits are influenced by several genes as well as interactions with the environment. The inheritance of complex traits is difficult to predict, and does not follow typical dominant or recessive patterns.