

## **It's All In the Genes: A classroom study on polygenic inheritance.**

**Intended for Grade: 7<sup>th</sup> grade science**

**Subject: Science**

### **Description:**

For many traits in humans, the genetic traits may be controlled by many genes. These traits may be quantitative in value which include size, shape, weight, height, skin color, eye color and finger ridge patterns (TRC). Typically, polygenic traits have a continuous distribution in a population and the distribution closely represents a bell-shaped curve or normal distribution. Additionally, individuals are affected by environmental factors, and the phenotype is determined by the sum of all the active alleles present in the individual.

This activity will analyze the total finger ridge patterns of your class to determine whether it follows a typical normal distribution.

The total ridge count for a particular finger is obtained by joining the points from the center of the pattern to the triradius (triradii, if more than one) and counting the ridges crossed by this line. A triradius is a point at which three groups of ridges, coming from three directions, meet at angles of about 120 degrees. The Total Ridge Count (TRC) is the sum of the ridge count for the 10 fingers. The pattern type and ridge count are useful in studying variability in human populations because of their objectivity and stability after the fourth fetal month and high genetic component. The average TRC for males is 145 and that for females is 126. For an arch, the ridge count is 0.

### **Objective:**

Students will analyze the total finger ridge patterns (TRC) in class to determine whether it follows a typical binomial distribution, which is a characteristic of traits controlled by the additive effect of many genes (polygenic inheritance). Also, students will study basic DNA structure and gene regulation.

### **Background Material:**

**The following website can provide background material for classroom discussion:**

[http://biology.kenyon.edu/courses/biol114/Chap01/Chapter\\_01b.htm](http://biology.kenyon.edu/courses/biol114/Chap01/Chapter_01b.htm)