It’s In Your Genes!

You have likely heard the phrase “It is in their genes” when people talk about families of really tall people, or a family of great basketball players. However, it is not as simple as this.

Genes do not directly make you tall or give you the ability to sink 3-pointers. Genes are actually just sequences of DNA that make up a code - a genetic code. The genetic code is a living cell’s instructions for how to build a protein. Proteins are actually what is responsible for traits, the characteristics an organism gets from its parents. Some traits are observable, like height, eye color, and hair curliness; others are not as obvious, like bone strength, lactose-intolerance, and red blood cell shape.

Proteins are large complex molecules that are responsible for most of the functions and chemical reactions in living cells. Proteins are also an essential part of the structural components of body tissues, such as hair, skin, and muscles. In total, humans have about 19,000 genes, each making a different protein.

The code, or sequence, of a gene, determines the shape, or structure, of the protein. When a mistake is made copying the genetic code from one generation to the next, this error causes a change to the structure of the protein. These mistakes are very rare, for example in humans, our genetic code is made up of about 3 billion molecules of DNA, and on average there are only 64 mutations when we pass the code on to the next generation.

When the structure of the protein is different, it changes the function of the protein, and thus the trait. For example, a protein with a certain structure will produce straight hair, but if the protein structure is changed, it can cause curly hair. It is the structure of the protein that allows us to exhibit so many different traits.