Genotypic Variation

The DNA inside of the nucleus of the cell contains all of the genetic information the body needs. Each chromosome contains certain genes which lead to expression of specific traits. For each gene, there are two or more variations called alleles. These alleles are located in the same position on the chromosome. Sometimes, new alleles form. This occurs through random mutations. Here, the DNA double helix is unwinding then unzipping into its two complementary strands. DNA is formed of two sugar-phosphate strands, which are showin in grey. These strands are linked by pairs of bases: adenine binds with thymine, and guanine binds with cytosine. The sequence of bases along the strands forms a template for the production of proteins. The change from T to A seen here is a point mutation, and can lead to a different amino acid being incorporated into the intended protein, often significantly changing its properties. Mutations can show themselves as changes in the expressed traits of a population. The finches that expressed different beak shapes and sizes that Darwin recognized is an example of this. As random mutations occurred in the genes that determine beak shape and size, some led to phenotypes that were advantageous. Those animals were able to survive and reproduce more readily than others. If you studied the alleles of these finches historically, you would notice that there were changes from generation to generation. Those birds that were stronger and more successful reproducers carried the mutated and advantageous genes forward. So, within every population is genetic variation caused by different alleles that are expressed, as well as mutations that find their way into the population through environmental pressures.