

**Project 3.2.6 Supplement D:**

**Standard Genetic Code**

In Project 3.2.6 you use DNA sequences that encode proteins. A simple understanding of biochemistry will help you understand the data in this lesson. Although simplified, the following explanation is a good start.

The material inside living organisms falls mostly into four groups:

* Carbohydrates (sugars, starches, celluloses) – for short-term energy storage
* Lipids (fats and oils) – for long-term energy storage
* Proteins – for doing everything from digestion to muscles to thinking
* DNA/RNA – for storing information about how to make proteins

The building blocks for proteins are 20 different types of amino acids, and these amino acids are strung together one after another when a protein is built. The instructions for building each particular protein are encoded in DNA in the cell nucleus. The instructions are transcribed from DNA into RNA, which then leaves the nucleus and travels to the ribosome where the instructions are used by translating the RNA code into protein. The code of DNA/RNA nucleotides come in sets of three bases called a codon. Most of these codons are translated to an amino acid, but a few of the codons signal for the ribosome to let go of the growing protein, thus stopping translation.

All known life on earth shares essentially the same genetic code and uses the system in which three nucleotides are used to encode each amino acid. Which amino acids are encoded by which three-nucleotide sequences has only very slight variation across the kingdoms of life. The system below is the standard coding table, which describes the pattern by which RNA transcribed from nuclear DNA is translated to amino acids.

In the table below, the amino acids are given by name, by their standard three-letter code, and by their standard single-letter symbol.

