

Figure A: The Genetic Code

	U	C	A	G	
U	Phe Phe Leu Leu	Ser Ser Ser Ser	Tyr Tyr stop stop	Cys Cys stop Trp	U C A G
C	Leu Leu Leu Leu	Pro Pro Pro Pro	His His Gln Gln	Arg Arg Arg Arg	U C A G
A	Ile Ile Ile Met	Thr Thr Thr Thr	Asn Asn Lys Lys	Ser Ser Arg Arg	U C A G
G	Val Val Val Val	Ala Ala Ala Ala	Asp Asp Glu Glu	Gly Gly Gly Gly	U C A G

Genes are made of a series of four nucleotide bases (A, C, G, and T) that line up, one after another, as a nucleotide chain. For a gene to be used to make a protein, the DNA must first be copied into a message (a related molecule called mRNA), which can then be sent out of the cell nucleus to a ribosome, where proteins are assembled. This mRNA molecule is much like DNA, except that its chemical structure is formed using ribose instead of deoxyribose, and one of the bases, thymine (T), is substituted with uracil (U). The order, or sequence, of the nucleotides in mRNA determine how to assemble a protein. Amino acids are the building blocks of a protein. That is, individual amino acids are assembled one after another into what is called a "polypeptide" chain. This polypeptide is then folded and arranged into a protein. Each amino acid that is added to a growing polypeptide chain is indicated by a specific set of three nucleotide bases within the mRNA. Each possible "triplet" set of nucleotide bases is called a codon.

The particular amino acid specified by each codon sequence on mRNA is indicated in the above table. The first base of a codon is indicated on the left side of the table, the second base on top, and the third base is indicated on the right side.

Since RNA is constructed from four types of nucleotides, there are 64 possible triplet sequences or codons (4x4x4). Three of these possible codons specify the termination of the polypeptide chain. They are called "stop codons." That leaves 61 codons to specify only 20 different amino acids. Therefore, most of the amino acids are represented by more than one codon. The genetic code is thus said to be "degenerate."

The Key for the above table:

Ala: Alanine Cys: Cysteine Asp: Aspartic acid Glu: Glutamic acid
 Phe: Phenylalanine Gly: Glycine His: Histidine Ile: Isoleucine
 Lys: Lysine Leu: Leucine Met: Methionine Asn: Asparagine
 Pro: Proline Gln: Glutamine Arg: Arginine Ser: Serine
 Thr: Threonine Val: Valine Trp: Tryptophane Tyr: Tyrosine

A = adenine G = guanine C = cytosine T = thymine U = uracil