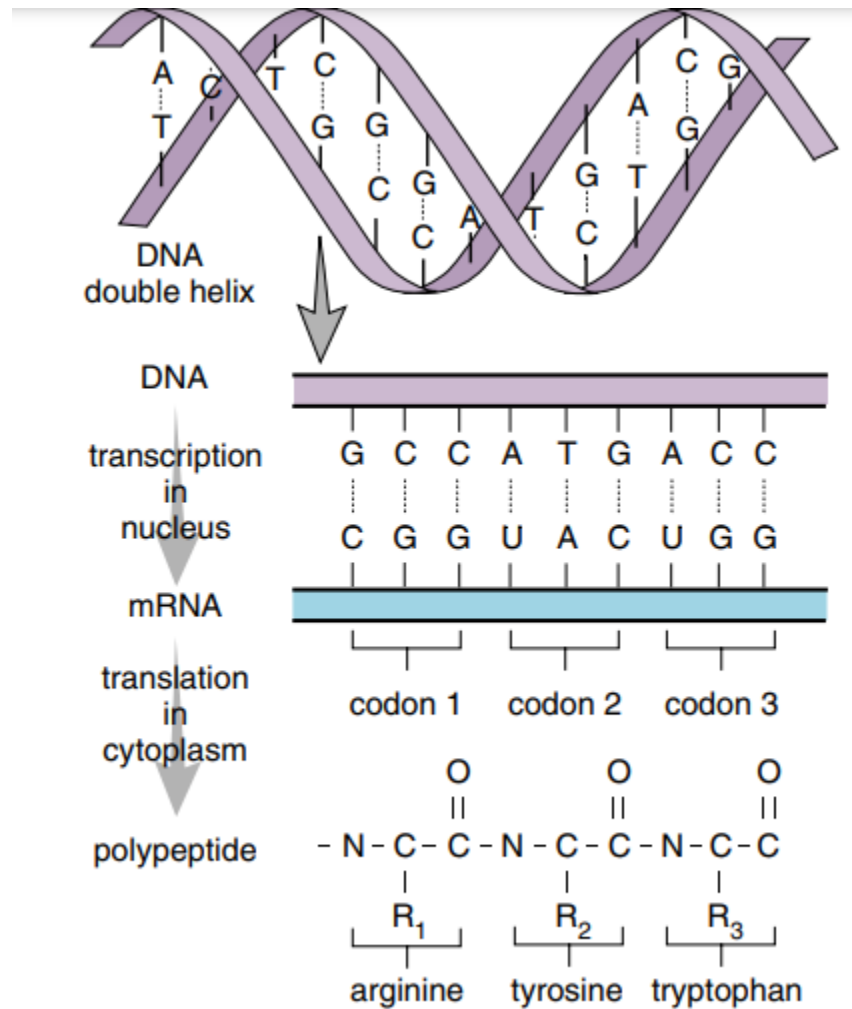


The Genetic Code

DNA has a particular sequence of bases, and a polypeptide has a particular sequence of amino acids. This suggests that DNA contains coded information. Each three-letter unit of an mRNA molecule is called a **codon**.



DNA replication

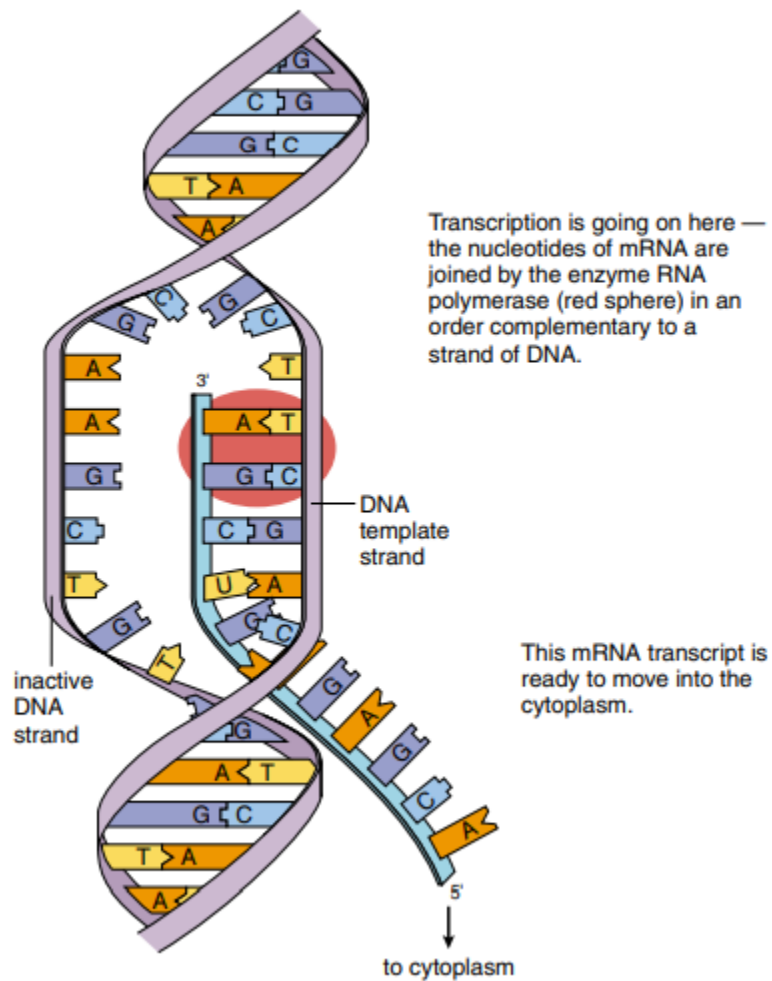
Each time a cell divides, each of its double strands of DNA splits into two single strands. Each of these single strands acts as a template for a new strand of complementary DNA. As a result, each new cell has its own complete genome. This process is known as DNA replication.

Transcription

Transcription is the process by which DNA is copied (transcribed) to mRNA, which carries the information needed for protein synthesis.

During transcription, a segment of the DNA helix unwinds and unzips, and complementary RNA nucleotides from an RNA nucleotide pool in the nucleus pair with the DNA nucleotides of one strand.

The RNA nucleotides are joined by an enzyme called **RNA polymerase**, and an mRNA molecule results. Therefore, when mRNA forms, it has a sequence of bases complementary to DNA; wherever A, T, G, or C is present in the DNA template, U, A, C, or G is incorporated into the mRNA molecule. In this way, the code is transcribed, or copied. Now mRNA has a sequence of codons, three bases that are complementary to the DNA triplet code.



Translation

The process by which mRNA directs protein synthesis with the assistance of tRNA is called translation.

During translation, the sequence of codons in mRNA specifies the order of amino acids in a polypeptide. This is called translation because the sequence of DNA and then RNA bases is translated into a sequence of amino acids. Translation requires several enzymes and two other types of RNA: transfer RNA and ribosomal RNA.

