

Concept 11.5

There are two main steps from gene to protein.

Review: Genetic information flows from DNA to RNA to protein.

1. DNA base triplets are transcribed into RNA codons
2. Codons are translated into a sequence of amino acids
3. Amino acids form polypeptides

Transcription: DNA to RNA

There are three types of ribonucleic acids (RNAs) involved in making proteins from the instructions carried in genes.

Messenger RNA	mRNA
Transfer RNA	tRNA
Ribosomal RNA	rRNA

Starting with transcription mRNA is transcribed from a DNA template.

- Resembles DNA replication
- Only one of the DNA strands serves as a template for the new mRNA
- The two DNA strands separate
- RNA bases pair with complementary DNA bases (RNA has uracil instead of thymine)
- RNA polymerase is the transcription enzyme that links the RNA nucleotides together
- Specific sequences of DNA nucleotides tell the RNA polymerase where to begin and end

Editing the RNA Message:

- In prokaryotic cells the mRNA serves as the messenger molecule.
- In eukaryotic cells the RNA transcribed in the nucleus is modified before it leaves the nucleus as mRNA to be translated.
- RNA transcripts have stretches of noncoding nucleotides called introns.
- The coding regions of the RNA transcript that will remain in the mRNA are called exons.
- Before the RNA leaves the nucleus, the introns are removed and the exons are joined together, producing an mRNA molecule. This process is called RNA splicing.

Translation: RNA to Protein

Translation of mRNA requires enzymes and energy such as ATP. The key components are ribosomes, and transfer RNA (tRNA).

Transfer RNA (tRNA) - translates the three letter codons of mRNA to the amino acids that make up proteins.

To perform this task, a tRNA molecule must

1. become bound to the appropriate amino acid .
2. recognize the appropriate codon in the mRNA.

To perform both functions there is a different version of tRNA molecule that matches each codon.

At one end of the tRNA is a specific triplet base called an anticodon. During