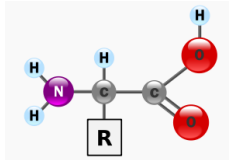


**Protein Synthesis**

Proteins are made up of a single chain of amino acids called a **polypeptide**. There are 20 known amino acids, and these can be joined in any number or order to create a protein.

The order of the amino acids determines the type of protein being created.



An amino acid has a nitrogen compound called an amine, an organic acid compound and one of 20 "R" groups

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**How can DNA and RNA be translated into a protein?**

The genetic sequence of nucleotides (A,C,G, T/U) of DNA and RNA is "read" three nucleotides at a time.

Each 3 letter set is known as a **codon**. A codon instructs the enzymes to add a particular amino acid to the polypeptide.

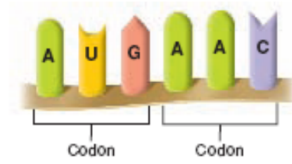


Figure 12-16, p. 302

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Several different codons can code for the same amino acid.

In addition, there are three codons that signal the "end" of protein synthesis (called STOP).

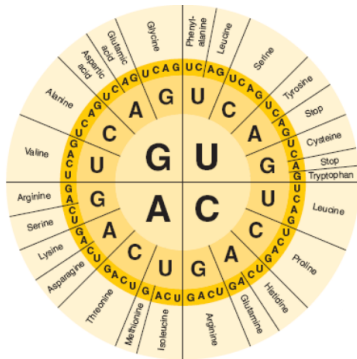


Figure 12-17, p. 3

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What does it look like in practice? (see p. 302 in TB)

The following is a DNA sequence:

TACAGCGTGCCAATT

The complementary mRNA strand would read:

AUGUCGCACGGUAA

Read three bases at a time (in CODONS):

AUG - UCG - CAC - GGU - UAA

START - Serine - Histidine - Glycine - STOP

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Try it yourself!

page 303: Quick Lab

Do all four steps of the procedure, and answer both questions at the end.

You have 15 minutes.



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**Translation**

If the mRNA carries the instructions, how does a polypeptide get put together?

The synthesis of a protein takes place in the cell's ribosomes.

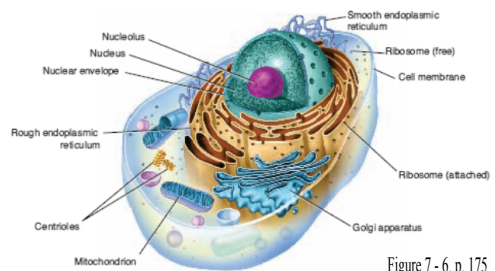


Figure 7 - 6, p. 175

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**Translation** is the act of "reading" a strand of mRNA and assembling the correct polypeptide.

The process takes place in the following steps:

- 1) DNA is **transcribed** into mRNA. The mRNA exits the nucleus and enters the cell's cytoplasm.



Figure 12 - 18, p. 304

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- 2) An mRNA strand attaches to a ribosome. Each codon of the mRNA moves through the ribosome. As each is "read", the appropriate amino acid is added to the polypeptide chain by a strand of tRNA.

Each strand of tRNA carries a specific amino acid, and is matched to a specific codon by its **anticodon** (three complimentary nucleotides).

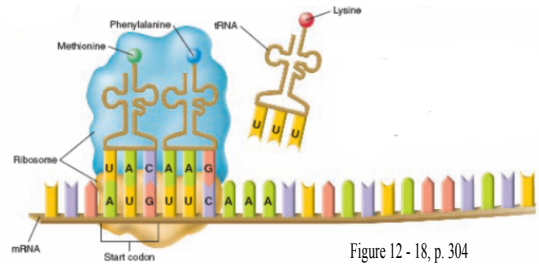
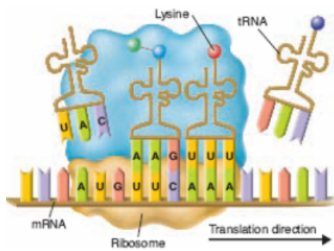


Figure 12 - 18, p. 304

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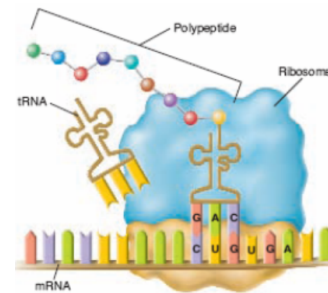
- 3) The ribosome, as well as enzymes, bind the amino acids to one another, and separate them from their tRNA



enter figure 12 - 18, p. 304

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- 4) The polypeptide ends when the STOP codon enters the ribosome. The polypeptide is now a fully formed protein.



enter figure 12 - 18, p. 304

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Oct 9-2:59 PM

Assignment:

Read page 306, (both sections: "The Roles of RNA and DNA" and "Genes and Proteins"), and summarize into your own set of notes.

Oct 9-3:03 PM