

# Chapter 4: RNA, Protein Synthesis and Genetic Mutation

(TB, Ch. 12-, p. 300)

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## Genes, amino acids and proteins

A gene is a small part of your DNA located in a specific place on a particular chromosome.

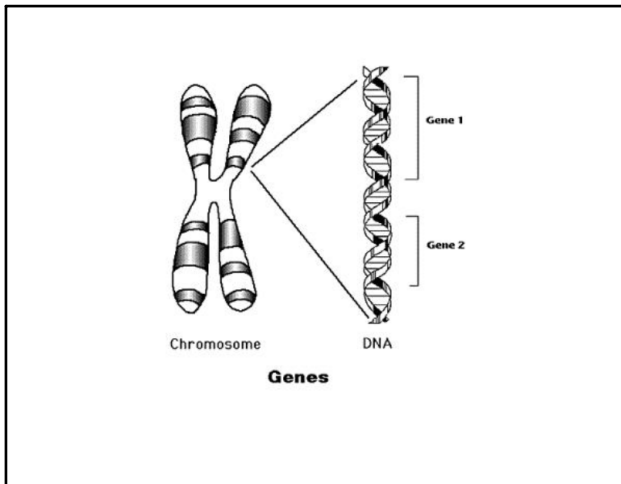
It can codes for the creation of a specific amino acid. Many amino acids are in turn assembled in a chain to form a protein.

Other genes code for the the order in which to assemble amino acids to form particular proteins.

How does all this happen?



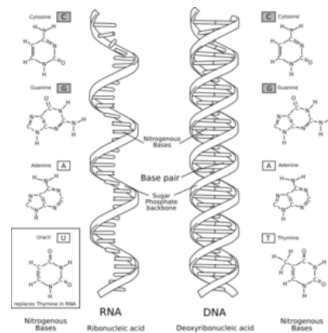
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## RNA

In order to be able to "read" and use the coded instructions stored in our DNA, the cell must first create a copy of the necessary DNA called RNA.



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## Comparing and Contrasting DNA and RNA

DNA	RNA
Chain of nucleotides	Chain of nucleotides
Deoxyribose sugar (used in backbone)	Ribose sugar (used in backbone)
Double Helix	Single Helix (mostly)
Thymine nucleotide (T)	Uracil Nucleotide (U)
Adenine, Guanine, Cytosine nucleotides	Adenine, Guanine, Cytosine nucleotides

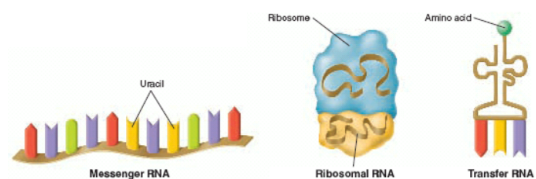
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RNA controls the assembly of amino acids and therefore is involved in the synthesis of proteins.

For this, three types of RNA are necessary:

- 1) messenger RNA (mRNA)
- 2) ribosomal RNA (rRNA)
- 3) transfer RNA (tRNA)

figure 12-12, p. 300

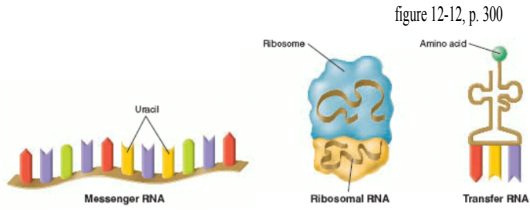


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**Messenger RNA** carries the information coded in the DNA to the rest of the cell.

**Ribosomal RNA** is a component of ribosomes, the location where proteins are assembled.

**Transfer RNA** transfers each amino acid to the ribosome in the order coded on the mRNA



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**How is RNA created?**

RNA is created by copying a section of DNA and creating complementary strand of nucleotides that will not remain attached to the DNA.

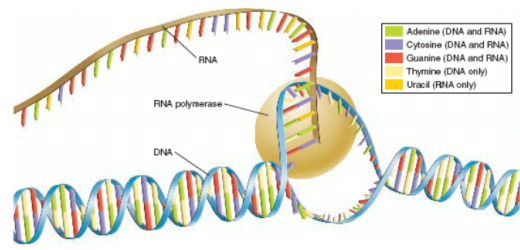


figure 12-14, p. 301

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The process of creating RNA this way is called **transcription**, and is handled by an enzyme called **RNA polymerase**.

RNA polymerase binds to a particular location on the DNA called a **promoter**. A promoter is a specific sequence of nucleotides that indicated the start of a gene to be translated into RNA.

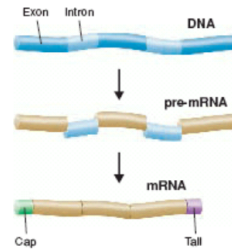
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ATTCAGAACGGTACGTATTGGCTAGAGTCT
| | | | | | | | | | | | | | | | | |
TAAGTCTTGCCATGCATAACCGATCTCAGA
    
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Once the DNA has been copied into a strand of RNA, the RNA must be edited.

Each strand of RNA is made of **introns** and **exons**. The introns are not necessary for protein synthesis and are removed from the RNA before it leaves the nucleus.



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figure 12-15, p. 302

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Read pages 302 - 306 for a preview of protein synthesis.

Answer the following questions:

- 1) How many amino acids are there?
- 2) What is a codon?
- 3) How many nucleotide trios are possible? Why aren't there as many amino acids?
- 4) Summarize the steps of protein synthesis (if possible).

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