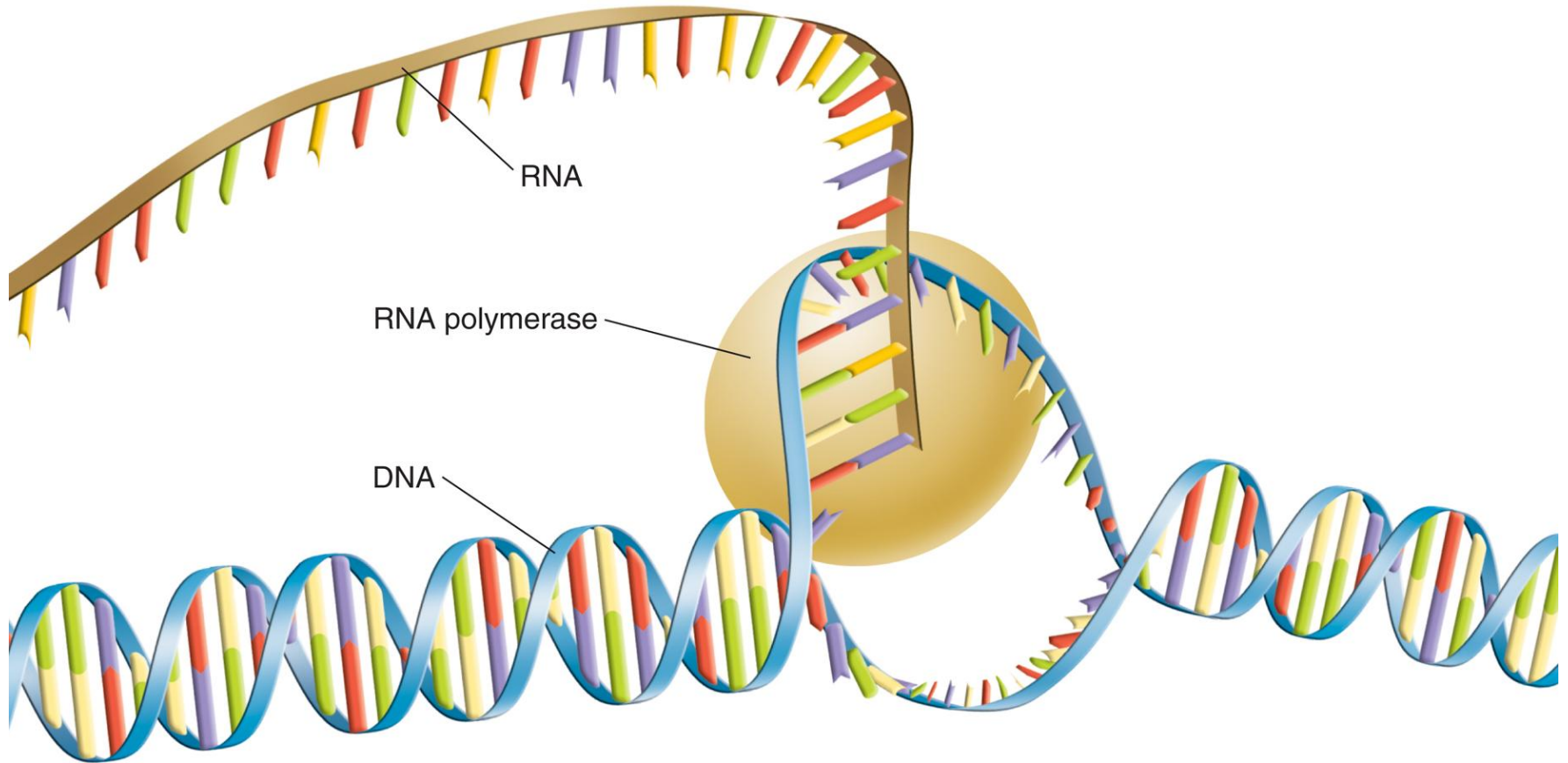


# 12-3 RNA and Protein Synthesis



There are three main differences between RNA and DNA:

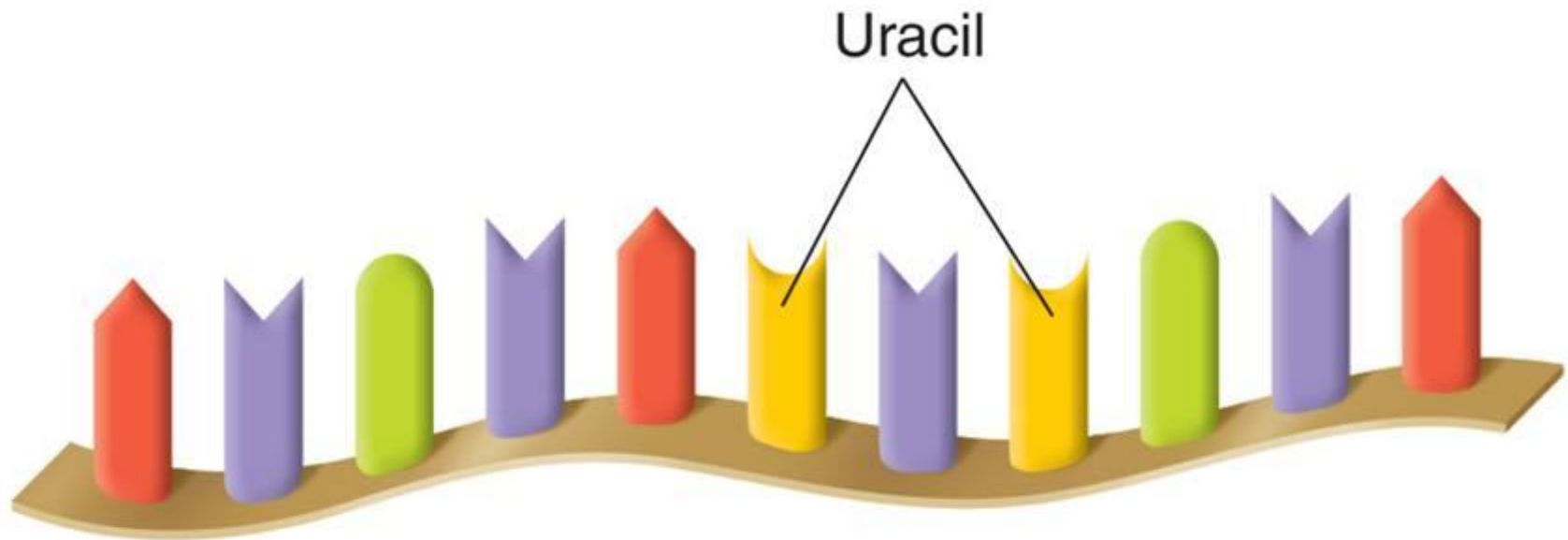
- The sugar in RNA is ribose instead of deoxyribose.
- RNA is generally single-stranded.
- RNA contains uracil in place of thymine.

# Types of RNA



**There are three main types of RNA:**

- messenger RNA
- ribosomal RNA
- transfer RNA



## Messenger RNA

**Messenger RNA (mRNA)** carries copies of instructions for assembling amino acids into proteins.

## Ribosome



## Ribosomal RNA

Ribosomes are made up of proteins and **ribosomal RNA** (rRNA).

Amino acid



Transfer RNA

During protein construction, **transfer RNA** (tRNA) transfers each amino acid to the ribosome.

# Transcription

RNA molecules are produced by copying part of a nucleotide sequence of DNA into a complementary sequence in RNA. This process is called **transcription**.

Transcription requires the enzyme **RNA polymerase**.








**During transcription, RNA polymerase binds to DNA and separates the DNA strands.**

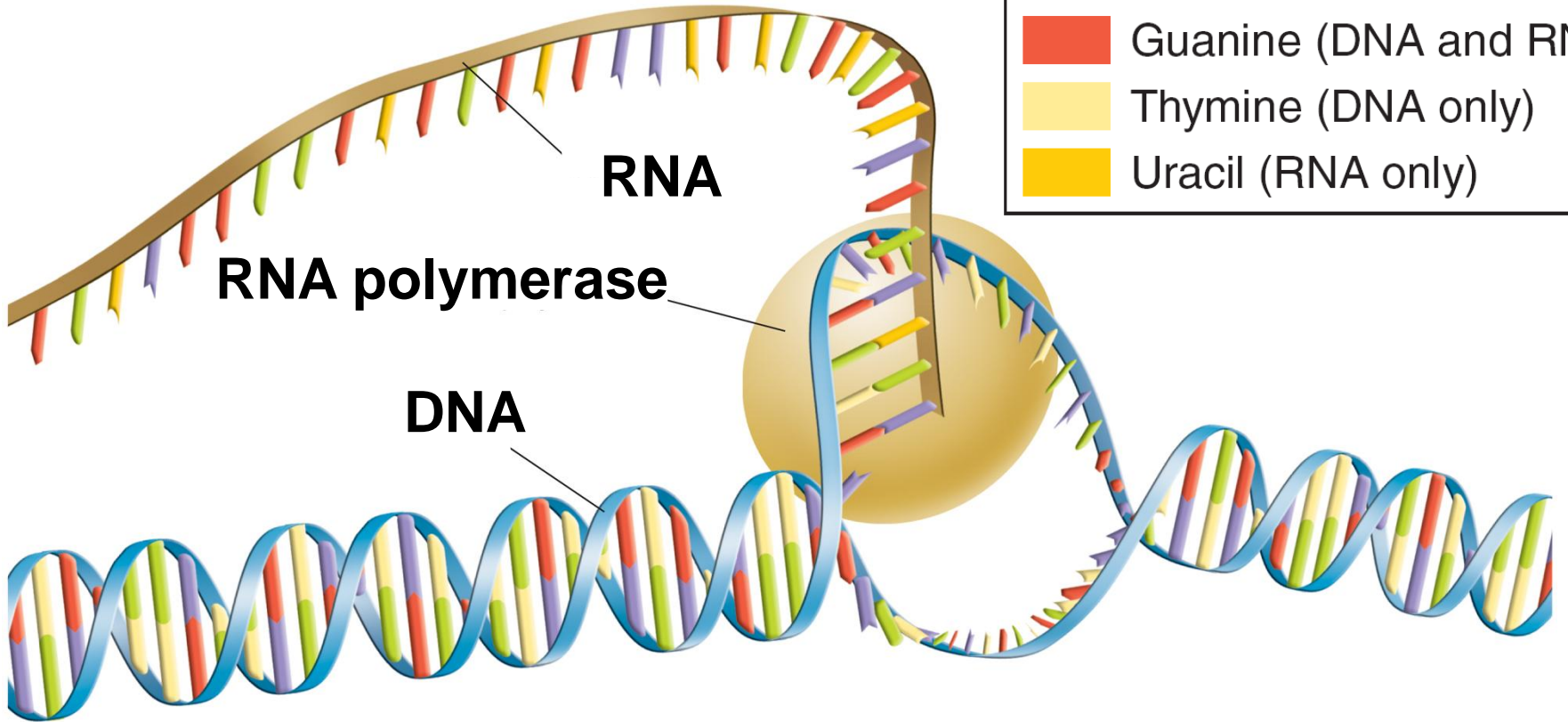
**RNA polymerase then uses one strand of DNA as a template from which nucleotides are assembled into a strand of RNA.**



# 12-3 RNA and Protein Synthesis → Transcription

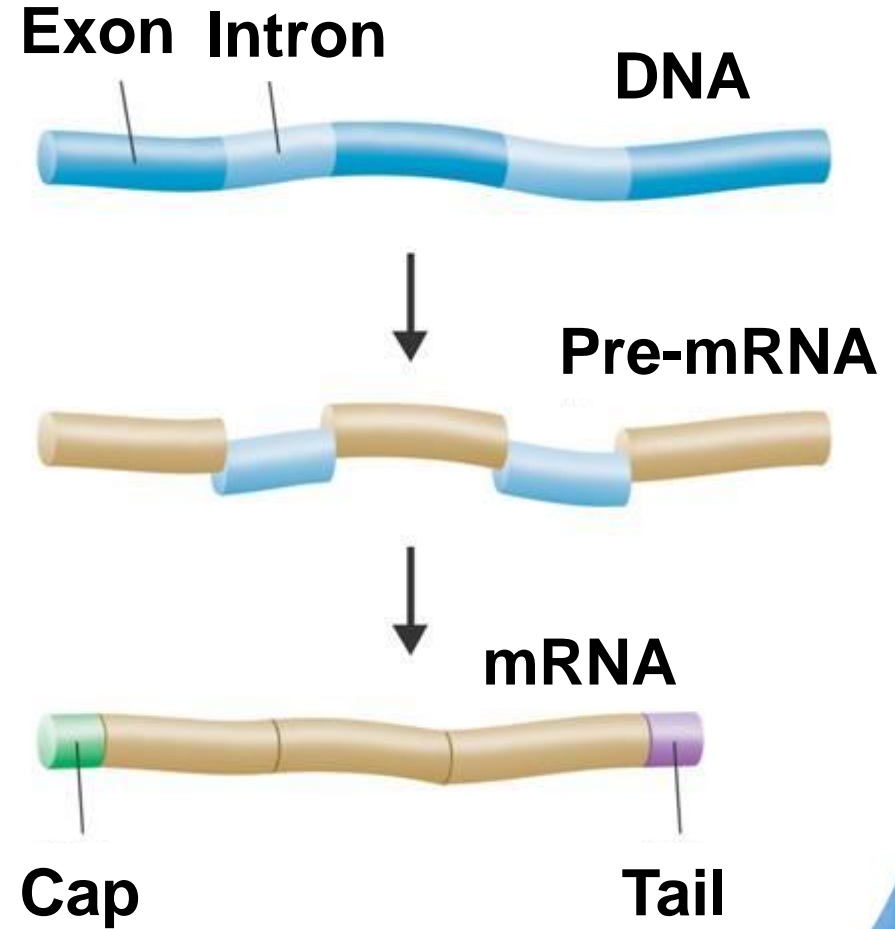
**movie**  
click to start

	Adenine (DNA and RNA)
	Cytosine (DNA and RNA)
	Guanine (DNA and RNA)
	Thymine (DNA only)
	Uracil (RNA only)

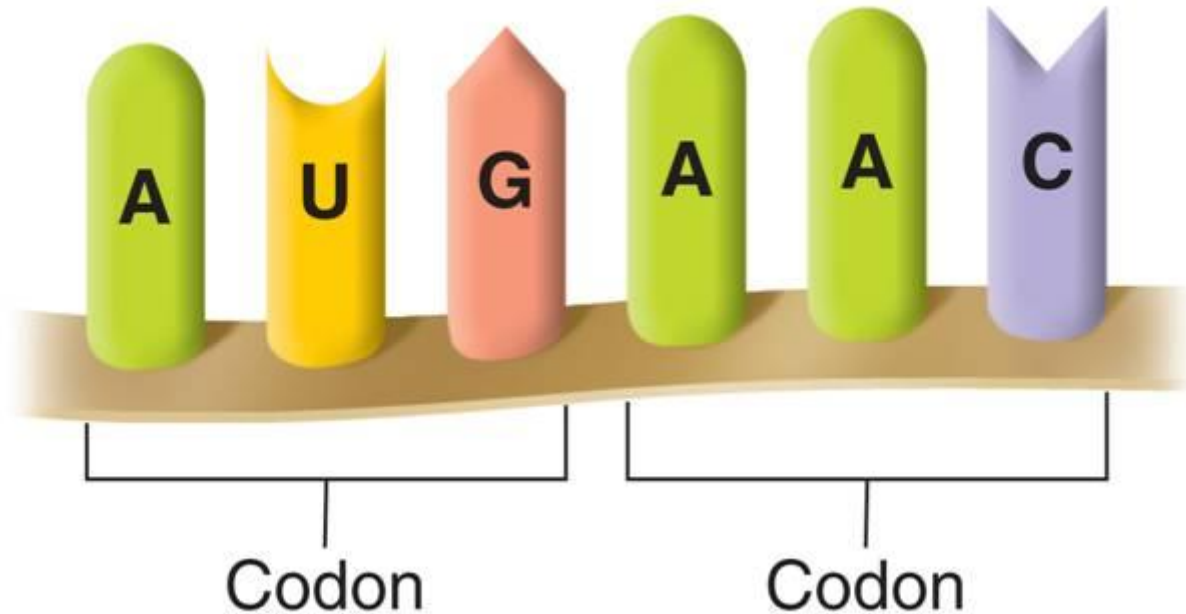


The introns are cut out of RNA molecules.

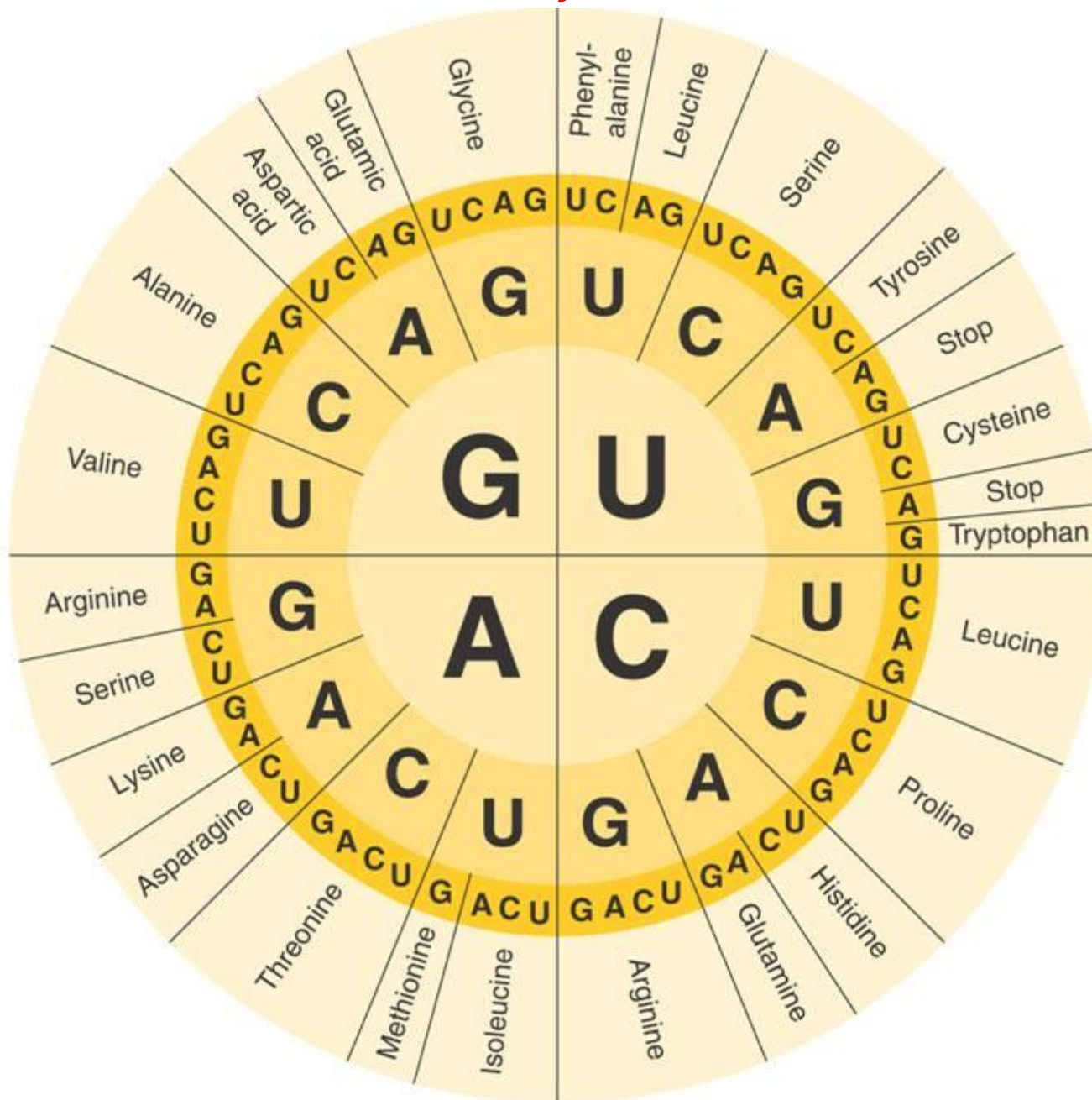
The exons are then spliced together to form mRNA.



A **codon** consists of three consecutive nucleotides on mRNA that specify a particular amino acid.



# 12-3 RNA and Protein Synthesis → The Genetic Code





## What is translation?

# Translation

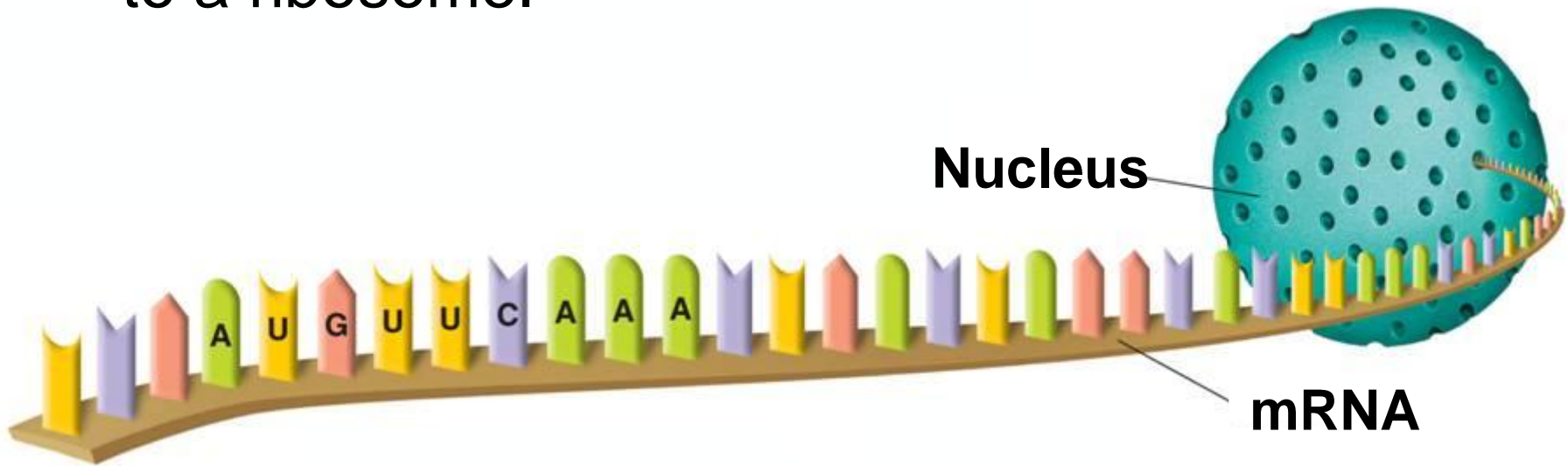
**Translation** is the decoding of an mRNA message into a polypeptide chain (protein).

Translation takes place on ribosomes.



**During translation, the cell uses information from messenger RNA to produce proteins.**

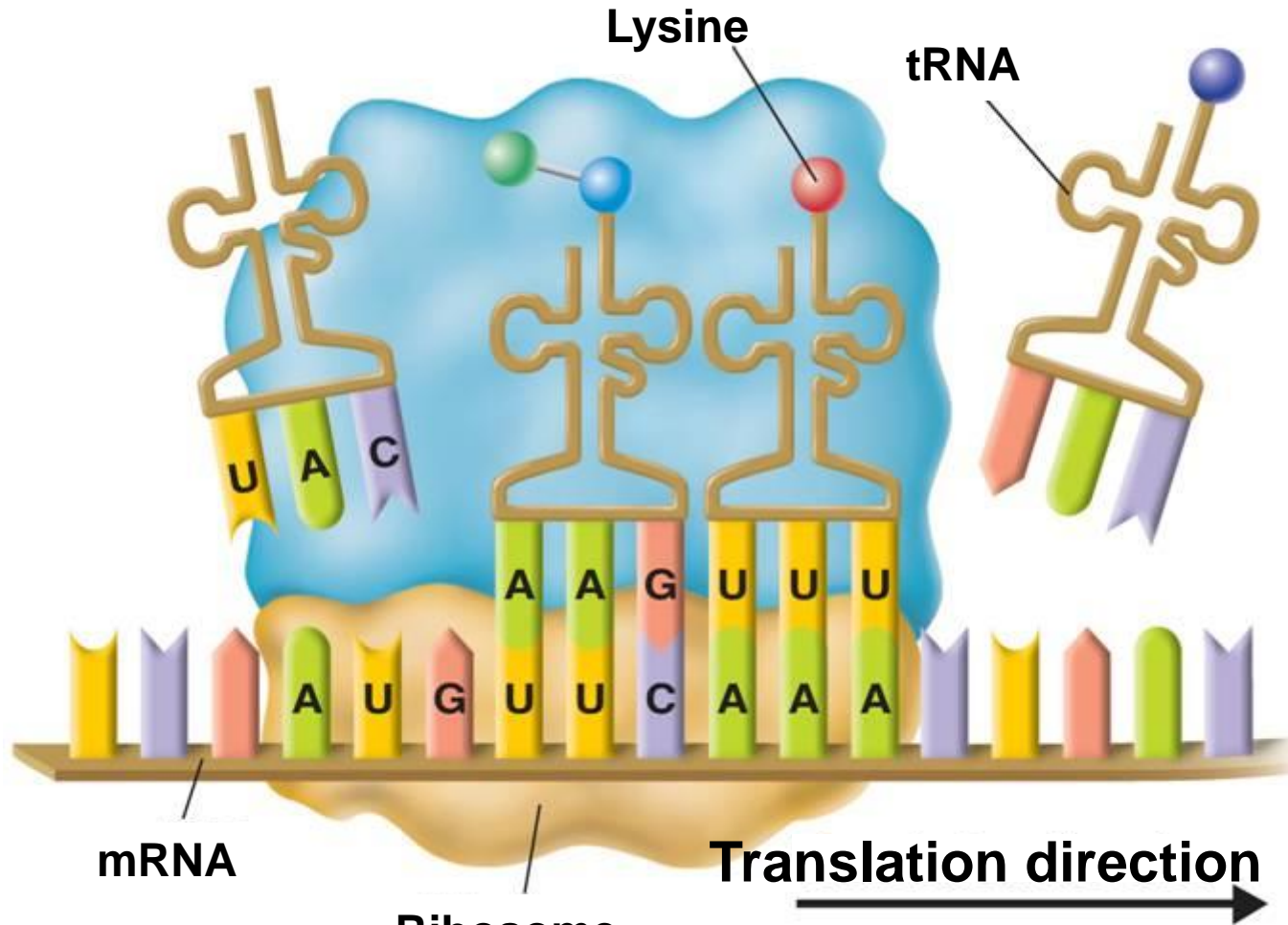
Messenger RNA is transcribed in the nucleus, and then enters the cytoplasm where it attaches to a ribosome.



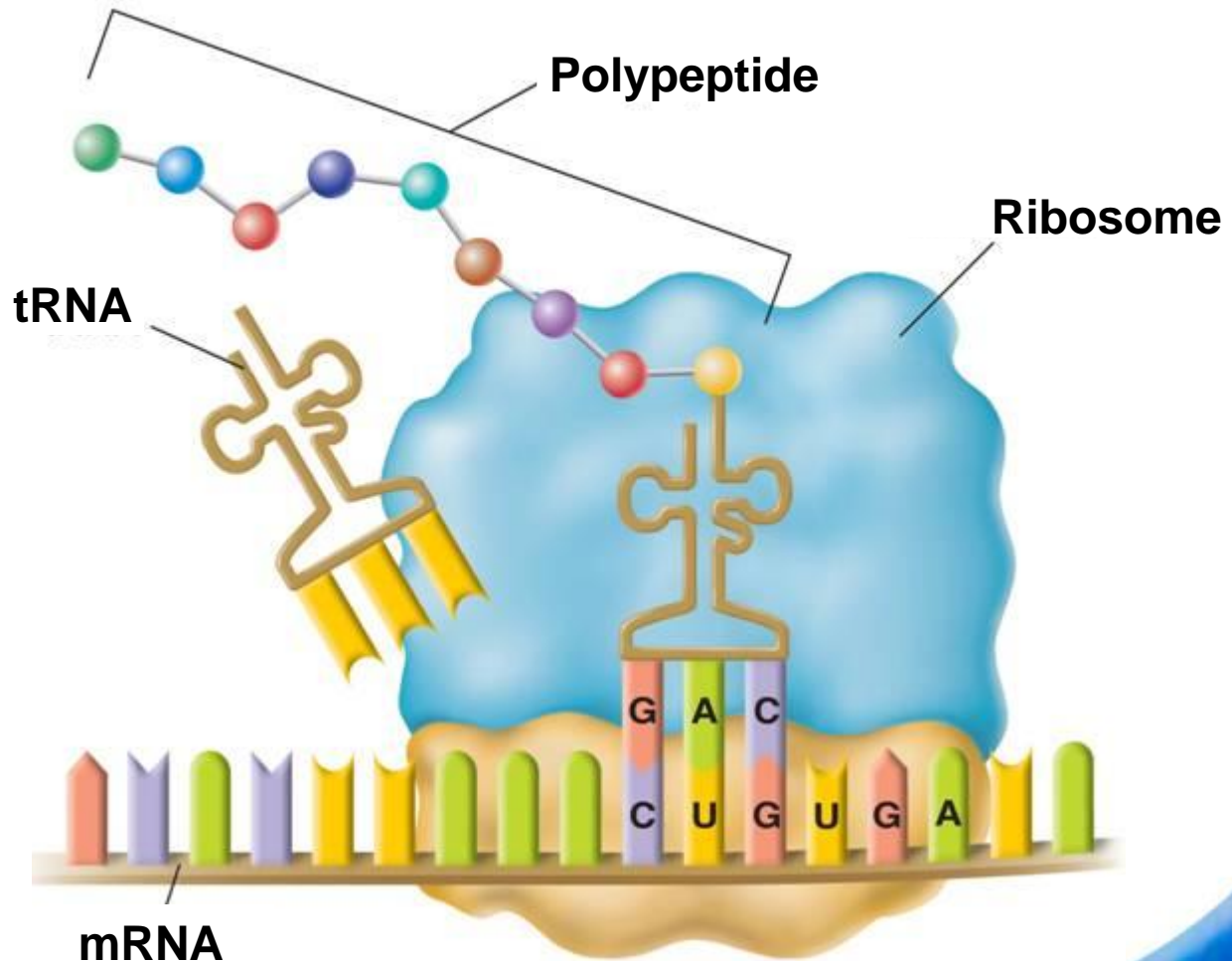




# Protein Synthesis



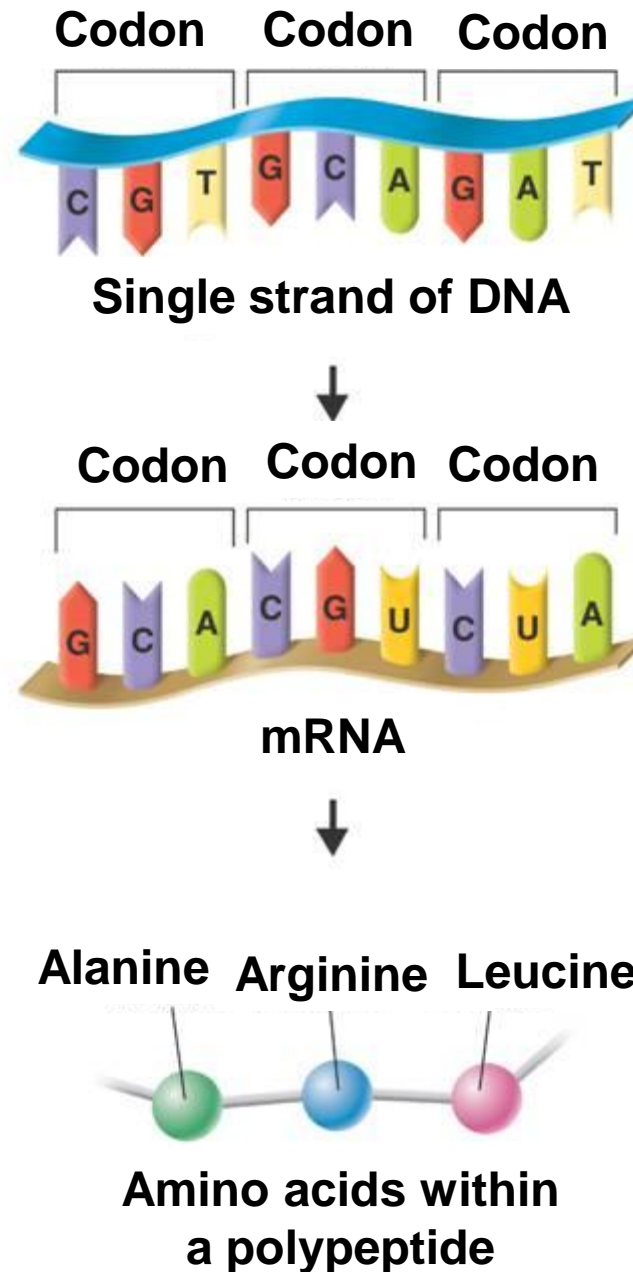
The process continues until the ribosome reaches a stop codon.



## 12-3 RNA and Protein Synthesis → Genes and Proteins

The sequence of bases in DNA is used as a template for mRNA.

The codons of mRNA specify the sequence of amino acids in a protein.



**END OF SECTION**