

# RNA



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# Comparing RNA and DNA

Scientists realized there was another nucleic acid that helped to put the genetic code into action

- **RNA (ribonucleic acid):** a nucleic acid that consists of a long chain of nucleotides
- Genes contain coded DNA instructions that tell the cell how to build proteins
  - The first step is to copy part of the base sequence from DNA into RNA
  - RNA then uses these instructions to direct the production of proteins, which help determine an organism's characteristics.
  - DNA is found in the nucleus of the cell
  - RNA is found in the ribosomes in the cytoplasm

# Comparing RNA and DNA

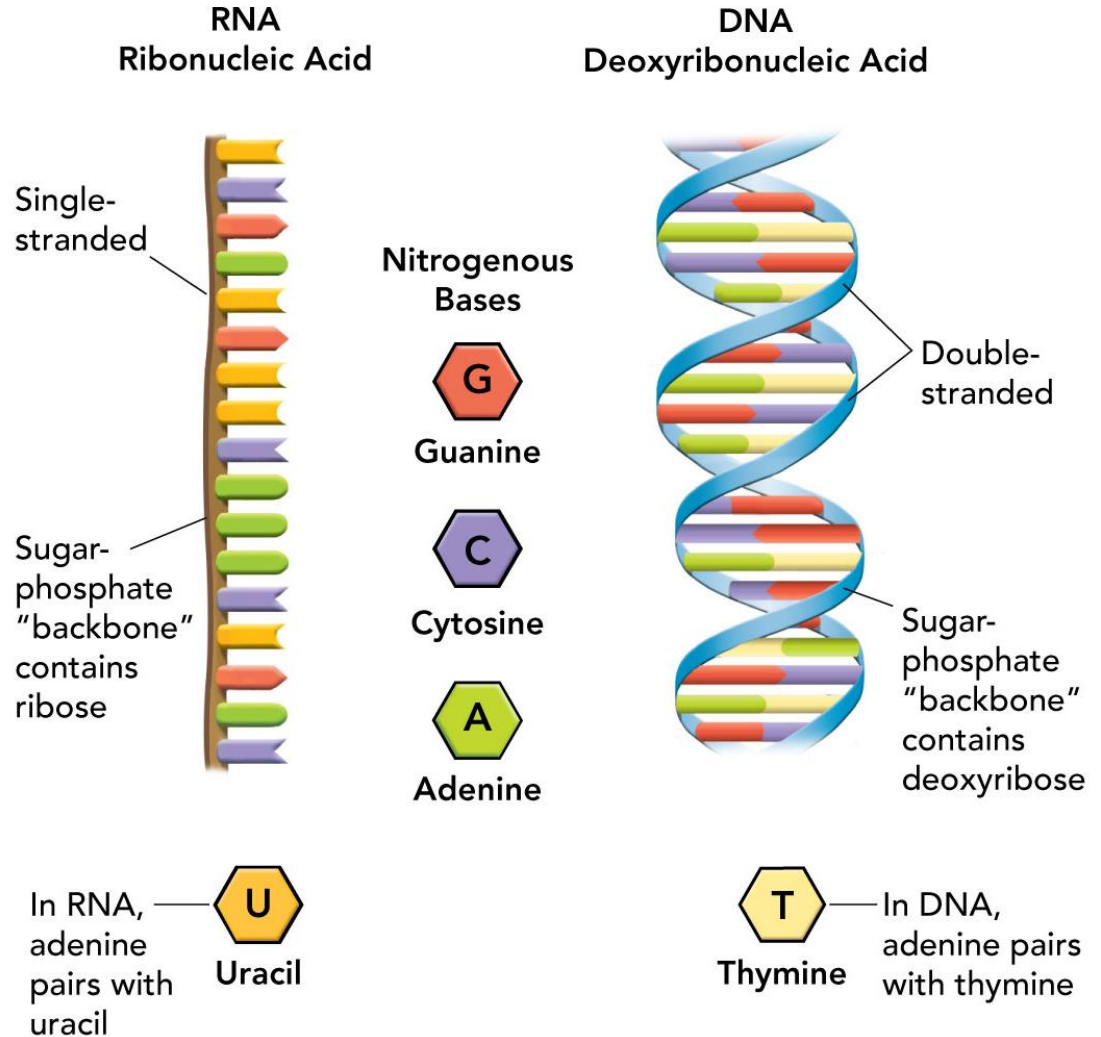
- DNA and RNA both are made of nucleotides and have a 5-carbon sugar, phosphate group, and nitrogenous base.

- The sugar in RNA is ribose instead of deoxyribose.

- RNA is generally single-stranded, not double-stranded.

- RNA contains uracil in place of thymine.

- These differences make it easy for enzymes to tell it apart



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# Types of RNA

RNA has many roles but one of the main focus is protein synthesis

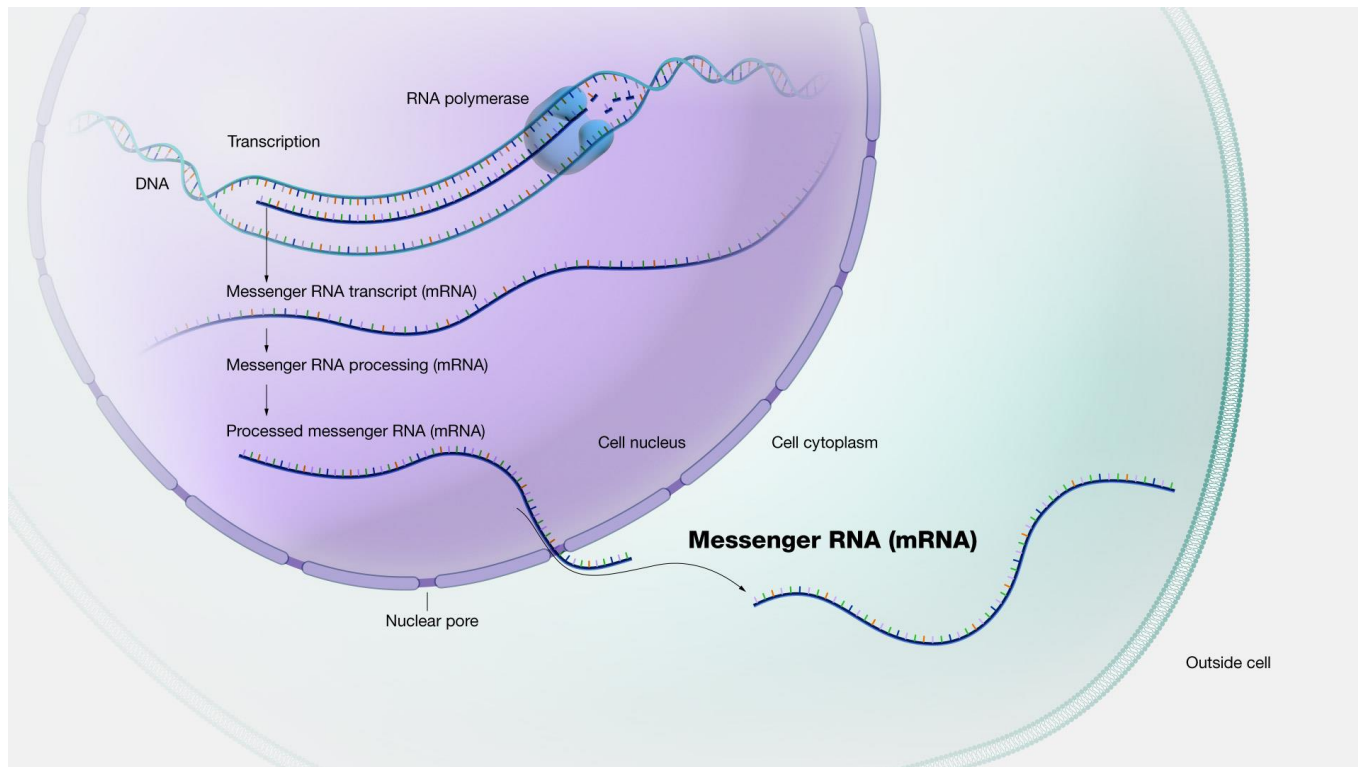
- RNA controls the assembly of amino acids into proteins

The three main types of RNA are:

- Messenger RNA
- Ribosomal RNA
- Transfer RNA

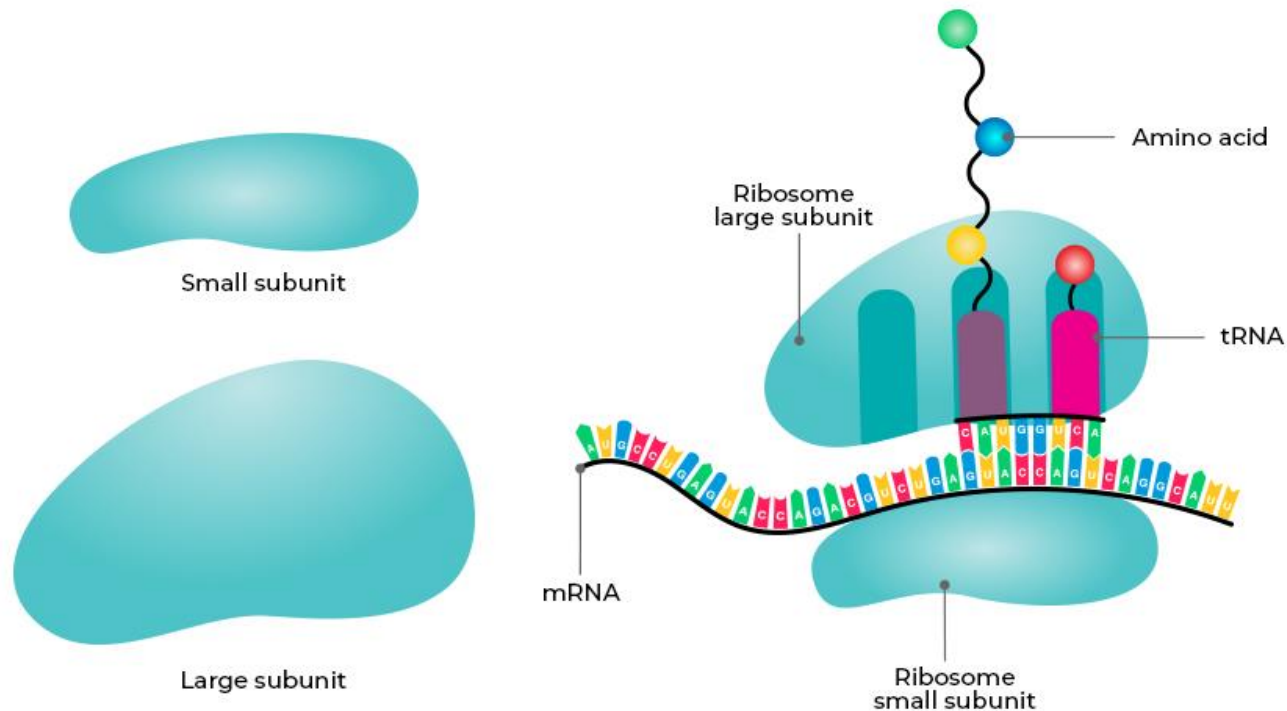
# Messenger RNA

- Messenger RNA is written as mRNA
- An mRNA molecule is a copy of the portion of DNA that will be used to make a protein.
- After being made in the nucleus, mRNA travels to ribosomes in the cytoplasm, the site of protein synthesis.



# Ribosomal RNA

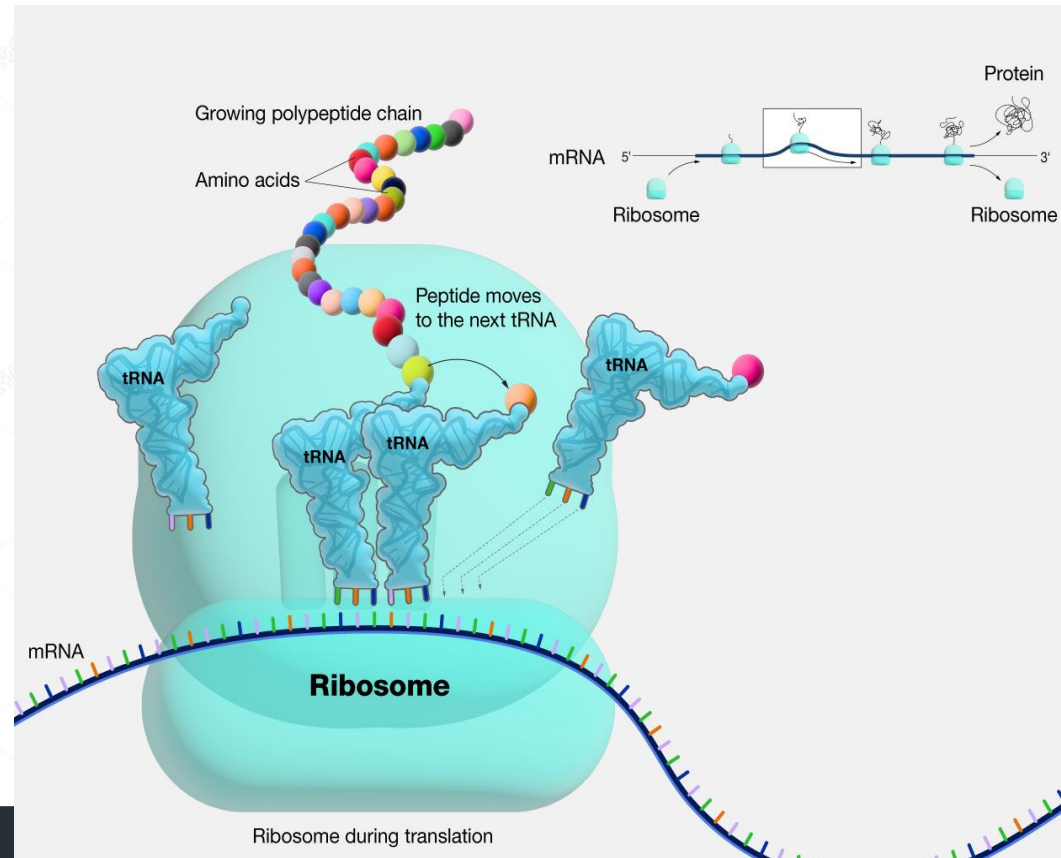
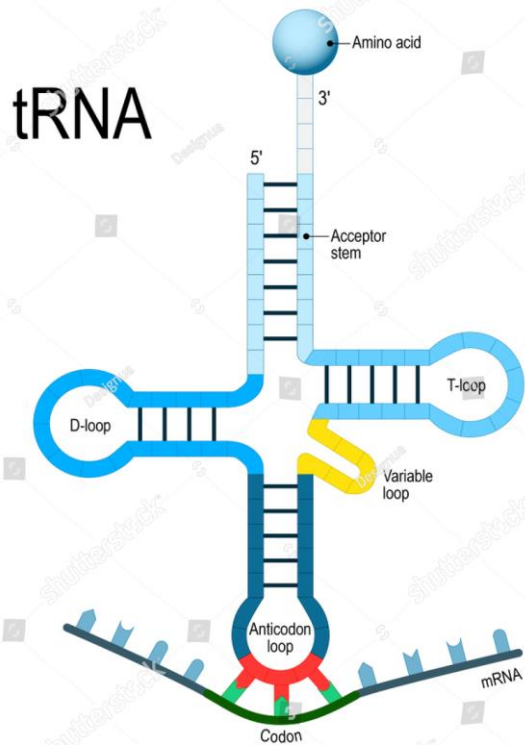
- Protein synthesis occurs on ribosomes, which are made up of two subunits.
- These subunits consist of several molecules of ribosomal RNA (rRNA) and as many as 80 different proteins.





# Transfer RNA

During protein synthesis, transfer RNA molecules (tRNA) carry amino acids from the cytoplasm to the mRNA.



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# RNA Synthesis: Transcription

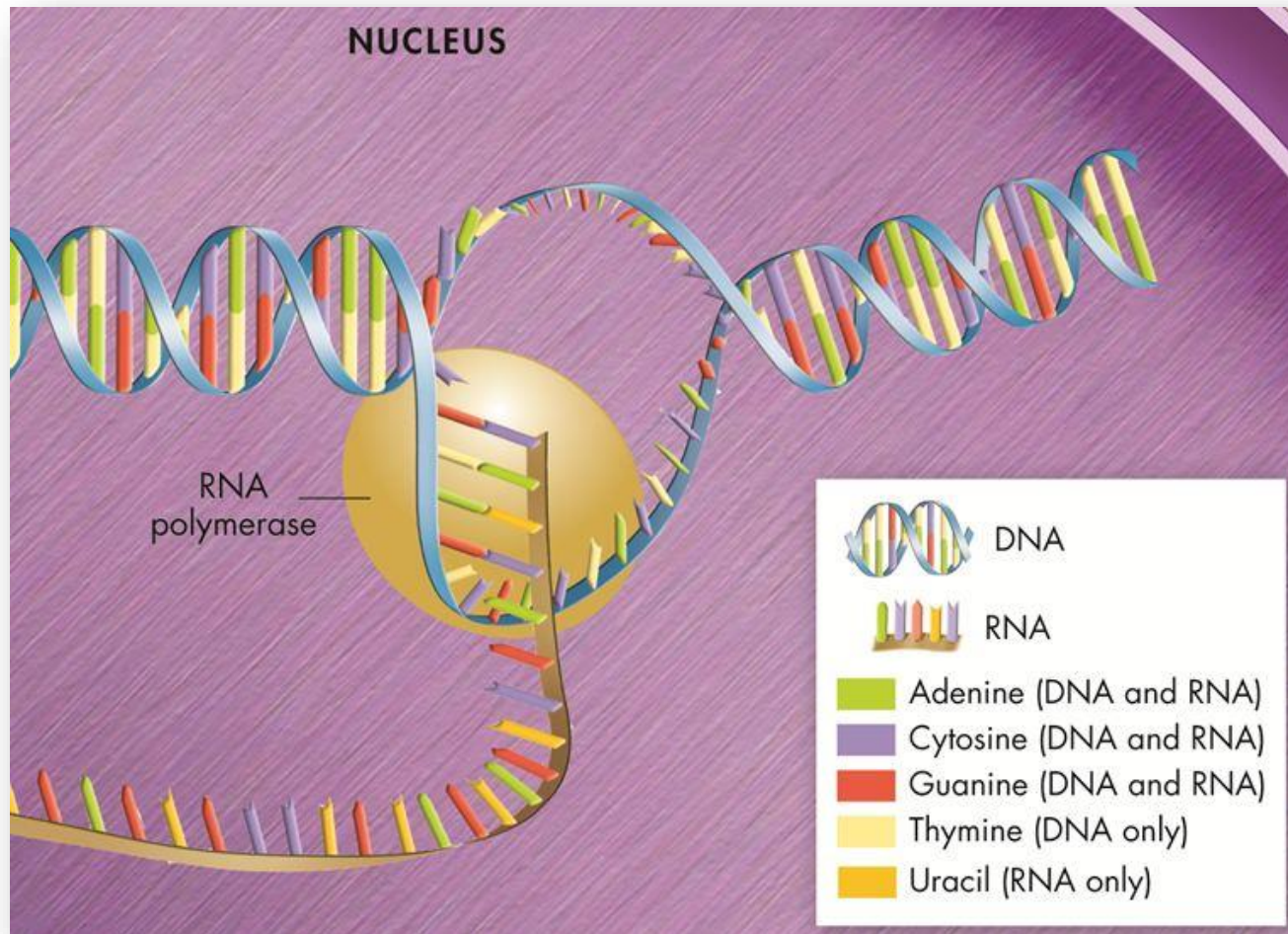
**Transcription:** the process of copying a base sequence from DNA to RNA

- Similar to DNA replication but the product is an RNA molecule instead of a duplicate of DNA
- **RNA polymerase:** an enzyme used in the transcription of DNA to RNA
  - First binds to DNA and separates the strands
  - Then uses one strand of DNA as template into a complementary strand of RNA



# RNA Synthesis: Promoters

RNA polymerase binds only to regions of DNA that have specific base sequences. These regions are called **promoters**.



# RNA Synthesis: RNA Editing

New RNA molecules sometimes require a bit of editing before they are ready to be read.

