

The Role of RNA

- RNA stands for **ribonucleic acid**.
- RNA is a **nucleic acid** like DNA, consisting of a long chain of nucleotides.
- RNA uses the base sequence copied from DNA to produce **proteins**.
- Ultimately, **cell proteins result in phenotypic traits**.

Comparing RNA and DNA

● There are three important differences between RNA and DNA:

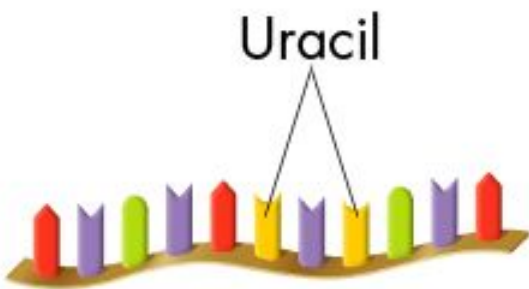
1. The sugar in RNA is **ribose** instead of deoxyribose.
2. RNA is generally **single-stranded** and not double-stranded.
3. RNA contains **uracil** in place of thymine.

Functions of RNA

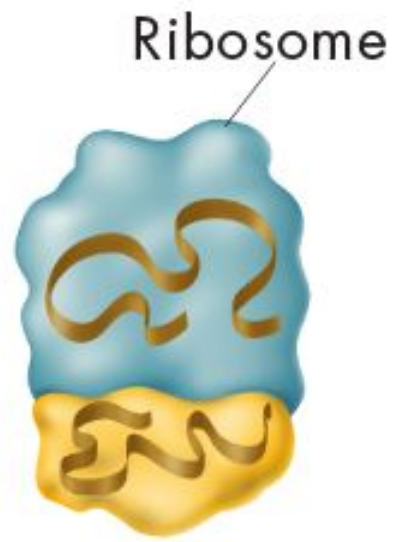
- Think of an RNA molecule, as a disposable copy of a segment of DNA, a **working copy of a single gene.**
- RNA has many functions, but most RNA molecules are involved in **protein synthesis.**
- RNA controls the assembly of **amino acids** into **proteins.**
 - Each type of RNA molecule specializes in a different aspect of this job.

Types of RNA

- There are three main types of RNA are:



messenger RNA



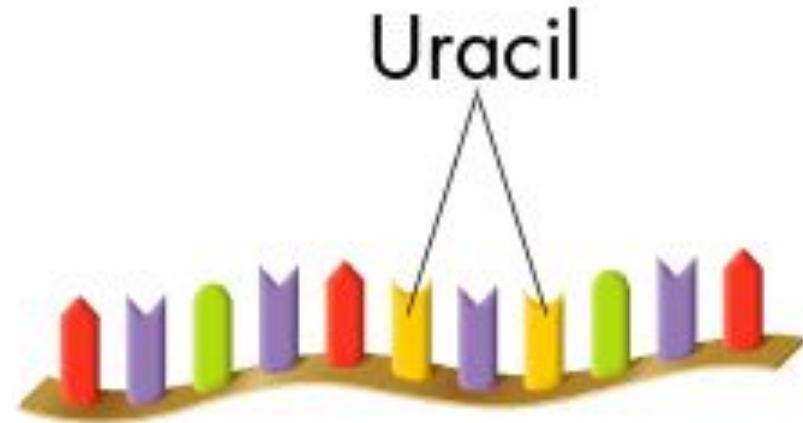
ribosomal RNA



transfer RNA

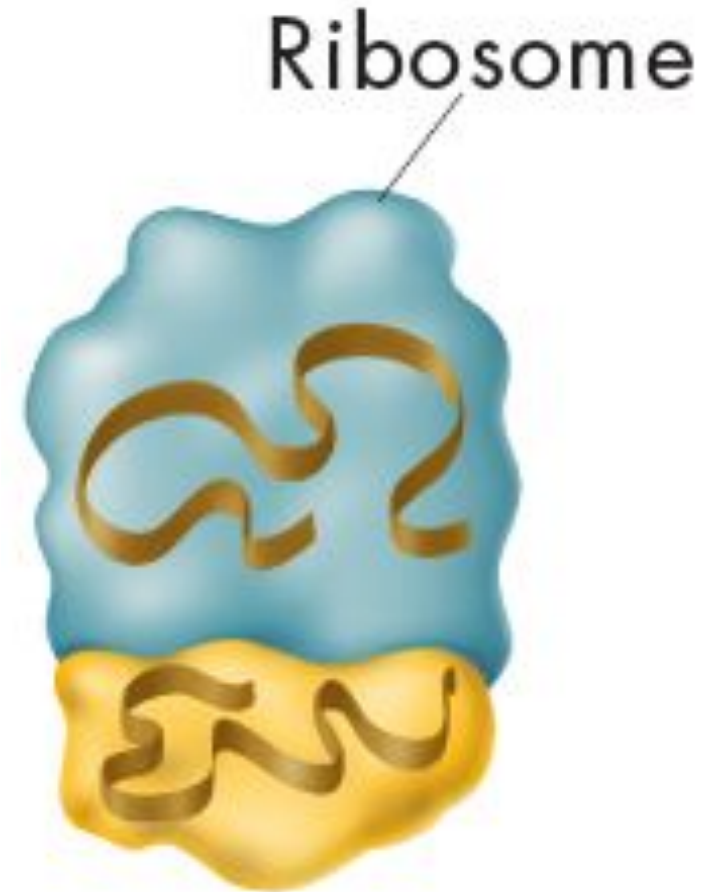
Types of RNA

- **mRNA carries copies of instructions for protein synthesis from the nucleus to ribosomes in the cytoplasm.**



Types of RNA

- **rRNA forms an important part of both subunits of the ribosomes**, the cell structures where proteins are assembled.



Types of RNA

- **tRNA carries amino acids to the ribosome and matches them to the coded mRNA message.**



The Central Dogma of Biology

- The central dogma of biology is that **information is transferred from DNA to RNA to protein.**

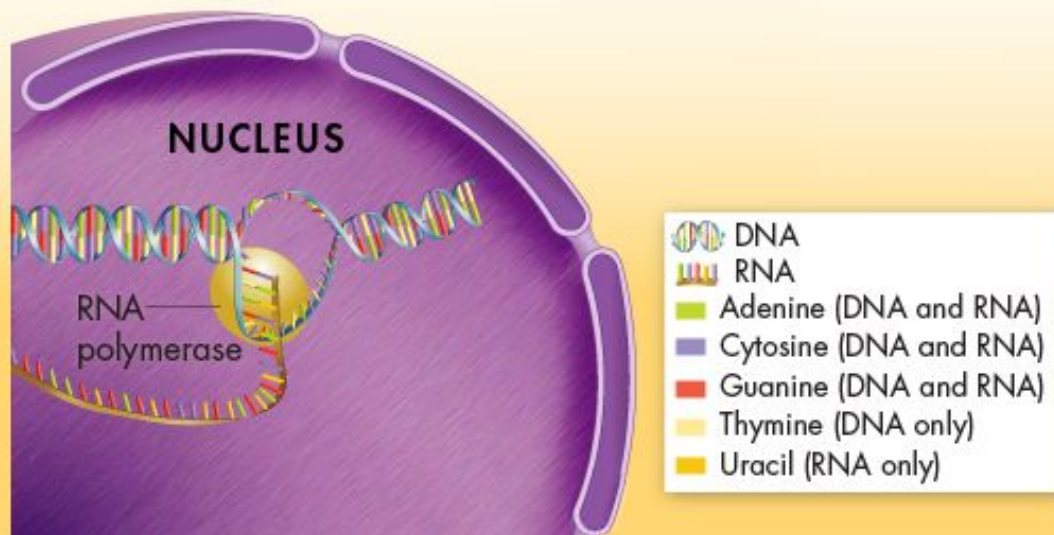


Transcription

- Most of the work of making RNA takes place during **transcription**.
- During transcription, **segments of DNA serve as templates to produce complementary mRNA molecules**.
- The base sequences of the transcribed mRNA **complement** the base sequences of the template DNA.

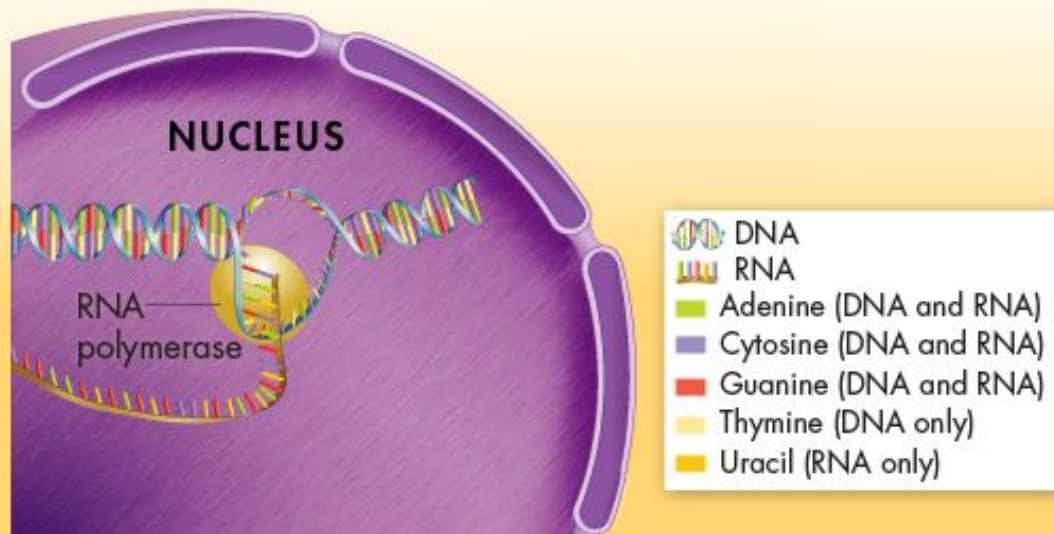
Transcription

- Transcription requires an enzyme, known as **RNA polymerase**, that is similar to DNA polymerase.
- RNA polymerase **binds to DNA during transcription and separates the DNA strands.**



Transcription

- RNA polymerase then uses one strand of DNA as a **template** from which to **assemble nucleotides into a complementary strand of mRNA.**



Promoters

- RNA polymerase binds only to **promoters, regions of DNA that have specific base sequences.**
- Promoters are signals in the DNA molecule that show RNA polymerase exactly where to **begin making mRNA.**
- Similar signals in DNA cause transcription to **stop when a new mRNA molecule is completed.**
- When a molecule of mRNA is completed, it is exported **from the nucleus into the cytoplasm.**

DNA vs RNA Video

