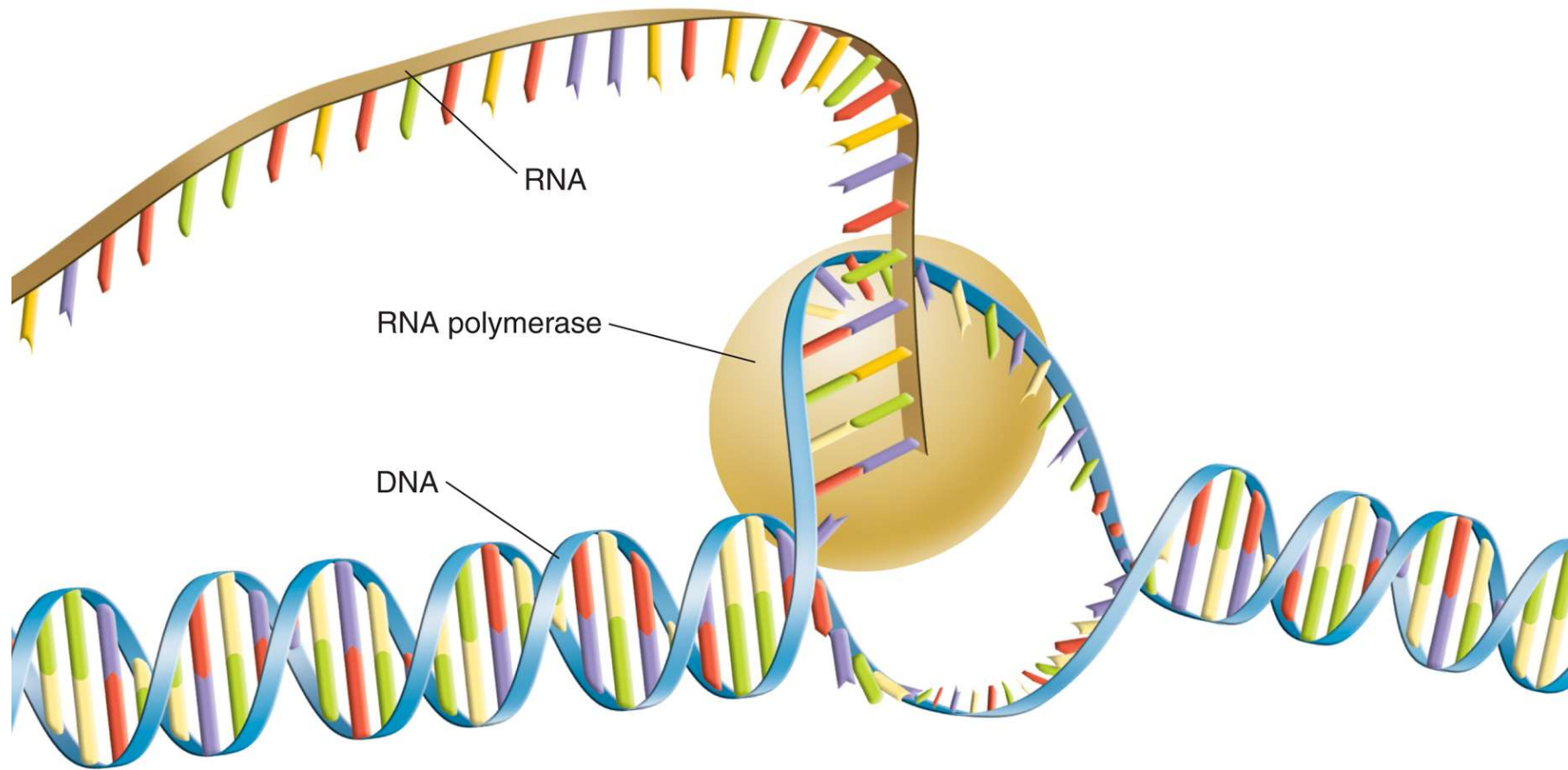


12-3 RNA and Protein Synthesis



12-3 RNA and Protein Synthesis

Genes are coded DNA instructions that control the production of proteins.

Genetic messages can be decoded by copying part of the nucleotide sequence from DNA into RNA.

RNA contains coded information for making proteins.

The Structure of RNA

RNA consists of a long chain of nucleotides.

Each nucleotide is made up of a 5-carbon sugar, a phosphate group, and a nitrogenous base.

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.

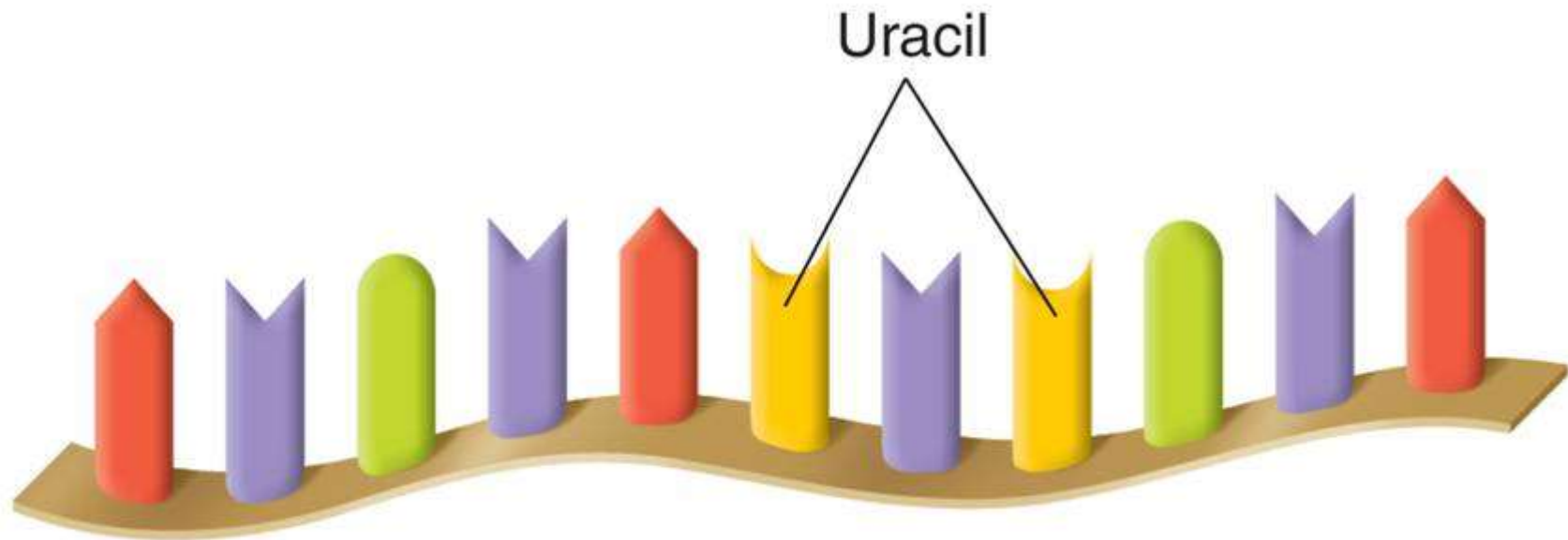
Types of RNA



There are three main types of RNA:

- messenger RNA (mRNA)
- ribosomal RNA (rRNA)
- transfer RNA (tRNA)

12-3 RNA and Protein Synthesis → Types of 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).

12-3 RNA and Protein Synthesis → Types of RNA

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.

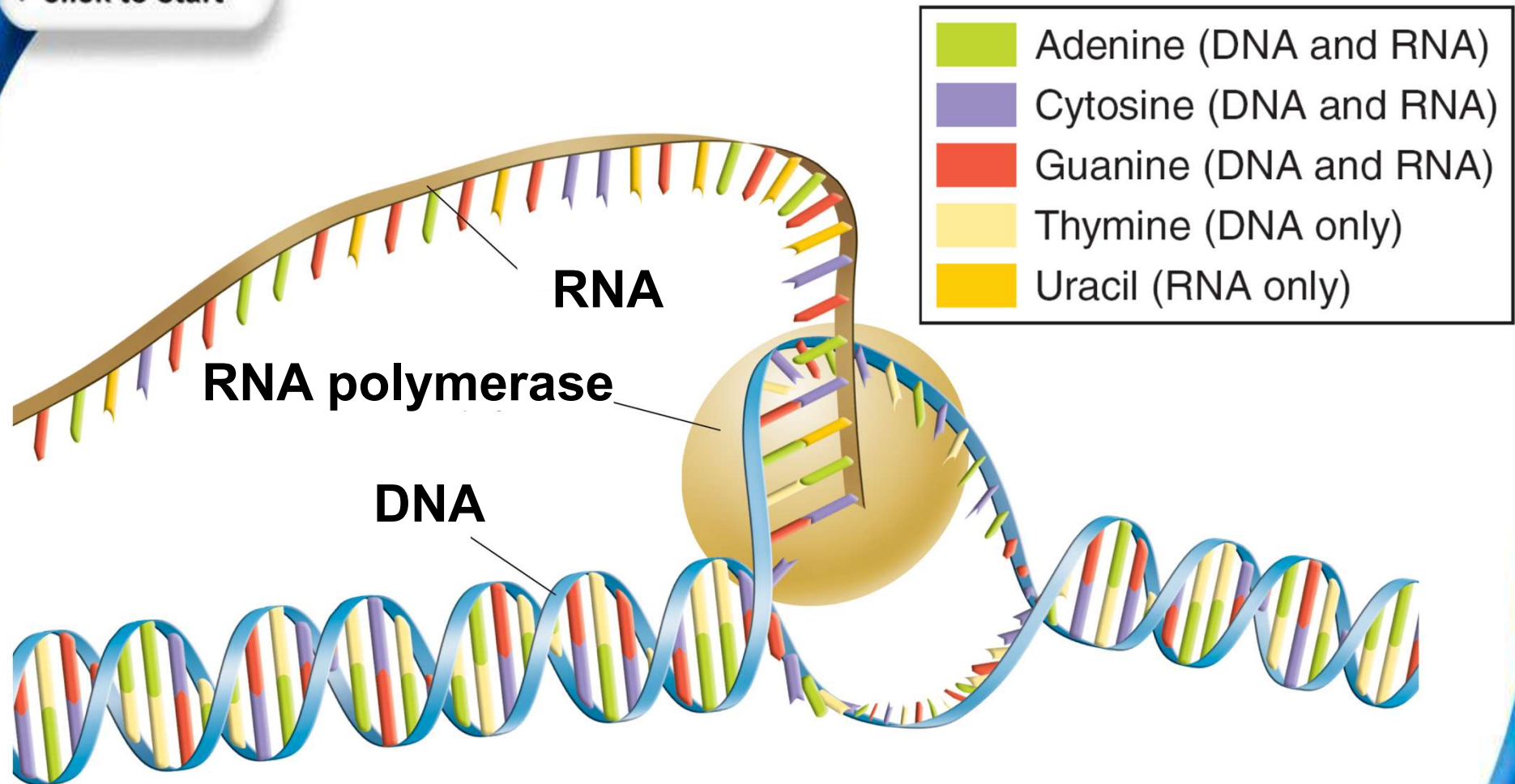
12-3 RNA and Protein Synthesis → Transcription

RNA polymerase binds only to regions of DNA known as **promoters**.

Promoters are signals in DNA that indicate to the enzyme where to bind to make RNA.

12-3 RNA and Protein Synthesis → Transcription

movie
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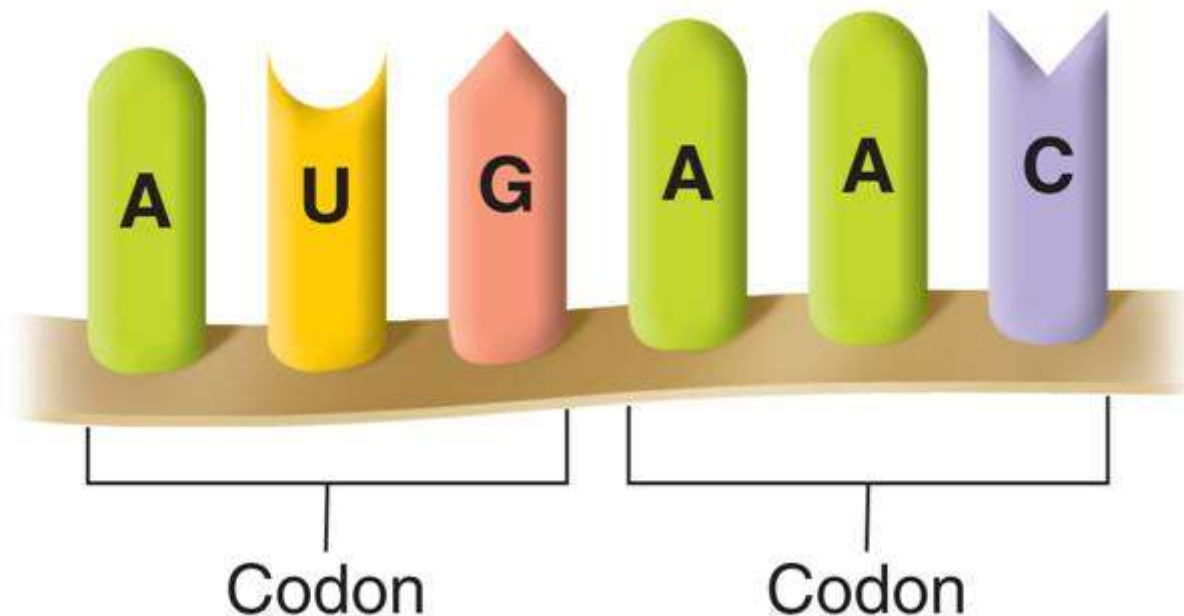
The Genetic Code

The genetic code is the “language” of mRNA instructions.

The code is written using four “letters” (the bases: A, U, C, and G).

12-3 RNA and Protein Synthesis → The Genetic Code

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



Each codon specifies a particular amino acid that is to be placed on the polypeptide chain.

Some amino acids can be specified by more than one codon.

There are twenty amino acids needed by living things.

12-3 RNA and Protein Synthesis → The Genetic Code

