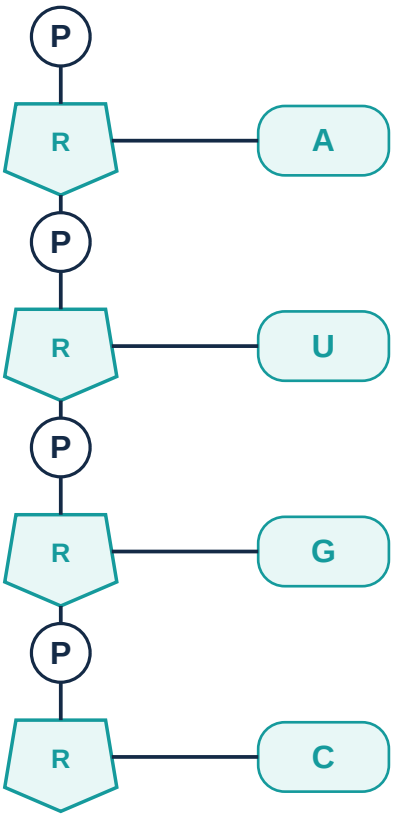
RNA: one polynucleotide strand

RNA stands for ribonucleic acid. Messenger RNA (mRNA) is one example: a single strand whose base sequence carries information for making a polypeptide.

A SHORT RNA SEGMENT



P = phosphate; R = ribose. Bases attach to sugars. The chain is shown straight for clarity, not as a rigid rod.

1. RIBOSE SUGAR

Each RNA nucleotide has a five-carbon ribose sugar, a phosphate group and one nitrogenous base. Ribose has an OH group at carbon 2-prime where deoxyribose has H.

2. FOUR STANDARD BASES

RNA contains adenine (A), uracil (U), guanine (G) and cytosine (C). Uracil takes the place of thymine in the standard RNA alphabet.

3. A COVALENT BACKBONE

Phosphodiester bonds link adjacent nucleotides through sugar and phosphate. The bases vary along the chain; their order forms the base sequence.

SINGLE-STRANDED DOES NOT MEAN UNABLE TO FOLD

RNA is usually single-stranded. Complementary regions within one molecule can pair and form folds: A with U, and C with G. Such local pairing does not turn the molecule into two separate strands.

Component schematic, not a structural formula. Only four nucleotide residues are shown; a real mRNA is much longer. mRNA is not the only RNA type: tRNA and rRNA have other roles.

RNA components and common forms: NHGRI, Ribonucleic Acid (RNA).
Ribose, nucleotide links and RNA structure: OpenStax Biology 2e, section 3.5.

Scope: Cambridge Biology 9700 syllabus, section 6.1, outcome 5, p. 24.

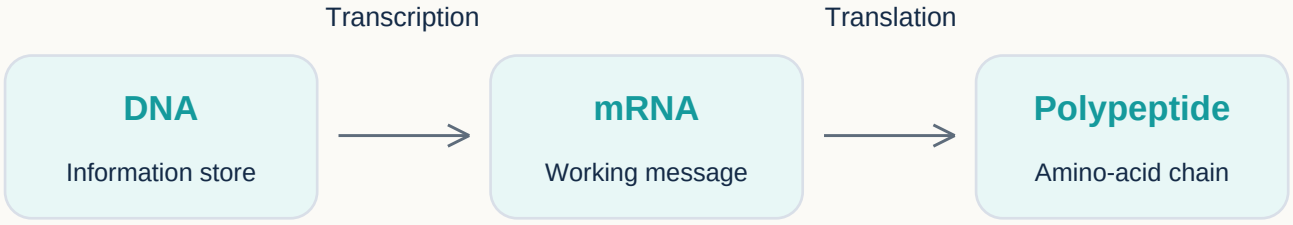
A working message, not a DNA strand

Messenger RNA carries a transcribed copy of information from DNA. Its sequence can be read by a ribosome during protein synthesis.

1. COMPARE RNA WITH DNA

FEATURE	RNA (mRNA)	DNA
Sugar	Ribose	Deoxyribose
Standard bases	A, U, C, G	A, T, C, G
Typical strands	One	Two
Backbone links	Phosphodiester	Phosphodiester

2. FOLLOW THE INFORMATION



In a eukaryotic cell, mRNA made from nuclear DNA can leave the nucleus through a nuclear pore. Ribosomes in the cytoplasm read the message to assemble a polypeptide. Transcription and translation are covered in the following lessons.

CONNECT STRUCTURE WITH FUNCTION

The order of RNA bases carries the message. In the translated region, groups of three bases form codons; each specifies an amino acid or a stop signal. The mRNA remains a nucleic acid while it is read - it is not converted into protein.

Do not describe mRNA as a piece cut out of DNA. It is a newly synthesised RNA molecule, with ribose and uracil, made using DNA as a template.

Messenger RNA and its role: NHGRI, Messenger RNA (mRNA).
RNA-DNA comparison and protein-synthesis context: OpenStax Biology 2e, section 3.5.

Scope: Cambridge Biology 9700 syllabus, section 6.1, outcome 5, p. 24.