Transcription

RNA: extended from 5' to 3'; single-stranded;

Transcription initiates at promoters: binding of RNA polymerase, accessory proteins

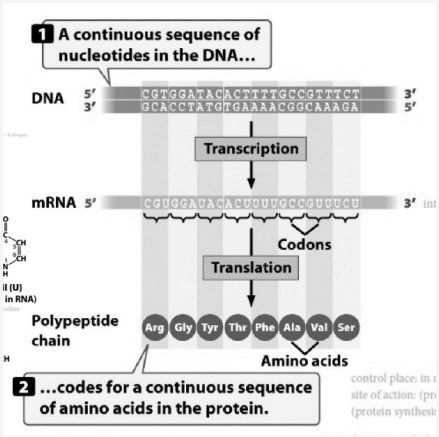
The process of transcription consists of **initiation, elongation, and termination**

5'-capping, 3'-polyadenylation

Transcription is the synthesis of RNA from a DNA template

DNA need to be unwrapped from histone core for transcription to proceed

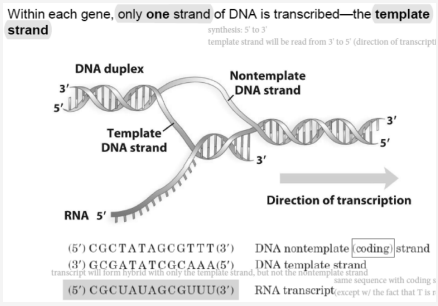
Central dogma



Central dogma

Central dogma of molecular biology: information flows from gene to protein.

Transcription



Transcription

RNA polymerase adds ribonucleotides to 3'-OH end, following Watson-Crick base pairing

The RNA strand is complementary and antiparallel to the DNA template.

U instead of T is used.

Transcription Requires:

RNA polymerases: enzymes that catalyze the synthesis of RNA

Accessory proteins: e.g. sigma factor, general transcription factors

DNA template

Ribonucleotides

Functions of RNAs

All RNA come from transcription.

Only mRNA produce protein.

mRNA	Nucleus and cytoplasm

Carries genetic code for proteins

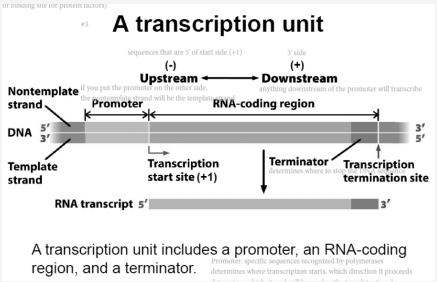
tRNA	Cytoplasm

Helps incorporate amino acids into polypeptide chain

rRNA	Cytoplasm

Structural and functional components of the ribosome

A transcription unit



A transcription unit includes a promoter, an RNA-coding region, and a terminator.

Initiation

1. RNA polymerase binds to promoter DNA sequences

2. RNA polymerase separates the DNA strand to create a transcription bubble (promoter opening)

3. Ribonucleoside triphosphate are added

4. Polymerase moves past the promoter and becomes stably bound to DNA (promoter clearance)

Elongation

1. RNA polymerase moves along template strand and elongate the RNA transcript

2. RNA polymerase unwinds duplex ahead of it to expose single strand template. DNA strands behind RNA polymerase pairs again to reform DNA duplex.

3. The growing RNA transcript is extruded through the RNA polymerase

Termination

RNA polymerase dissociates from DNA template when it encounters a terminator sequence.

Pre-mRNA

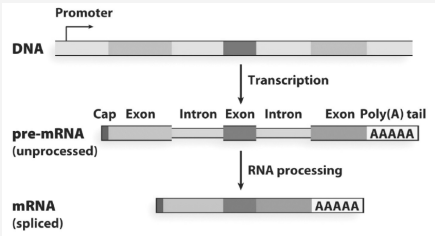
Longer than mRNA

1. Addition of 5' cap

2. Addition of poly(A) tail

3.RNA splicing	introns removed, exons spliced together

mRNA splicing



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