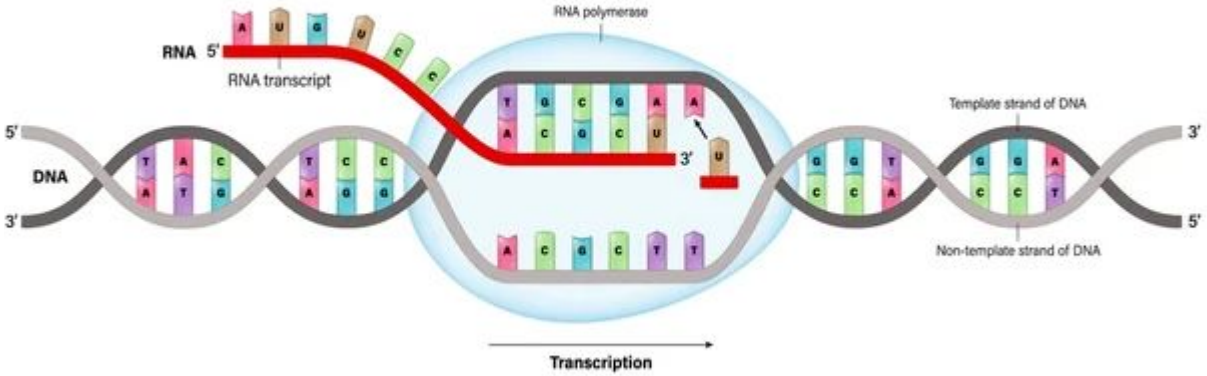
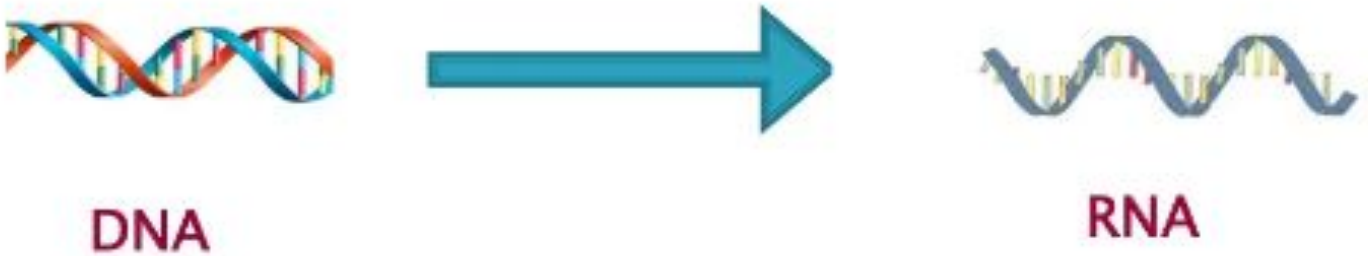
Transcription in Prokaryotes



Definition

Cellular process in which RNA is synthesized using DNA as a template known as **TRANSCRIPTION**.



RNA

- Polymer of ribonucleotide held together by 3'→ 5' phosphodiester bridge & are single stranded.
- Is the only molecule known to function both in the storage & transmission of genetic information & in catalysis.
- All RNAs except the RNA genomes of certain viruses derived from information which is stored permanently in DNA.

RNA

- Three major kinds of RNAs
- mRNA (5-10%)→ transfer information of gene to ribosome i.e. encodes the amino acids sequence .
- tRNA (10-20%) → reads codes on mRNA and transfers appropriate AA to mRNA.
- rRNA (60-80%) → constituents of ribosome.
- Many additional specialized RNAs which has catalytic activity or regulatory functions are present in the cell.

Differences between replication and transcription

	Replication	Transcription
Template	Both strand whole genome	single strand small portion of genome
Primer	yes	no
Enzyme	DNA polymerase	RNA polymerase
Product	dsDNA	ssRNA
Base pair	A-T, G-C	A-U, T-A, G-C
Proof reading	yes	no

Features of transcription

- 1) It is highly selective.
- This selectivity is due to signals embedded in the nucleotide sequence of DNA.
- Specific sequences mark the beginning and end of the DNA segment which is to be transcribed.
- This signals instruct the enzyme

where to start & stop the transcription
when to start,
how often to start .

features

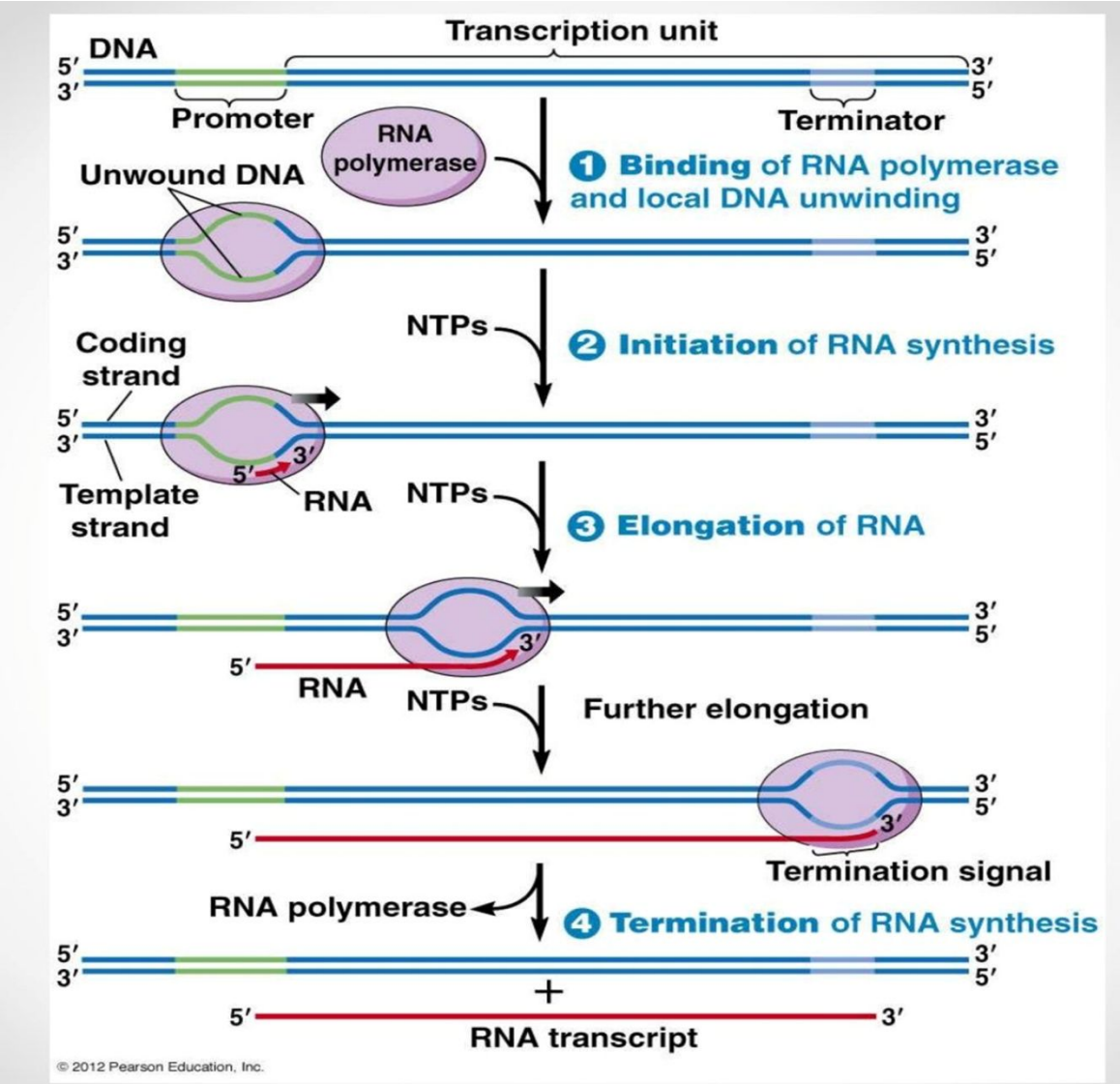
- **2)** Many of the RNA transcripts are synthesized as precursors that is known as primary transcripts.

- Which on modifications & trimming converted into functional RNA .
- **SITE:**
- **Transcription –** Prokaryotes– cytoplasm(all RNAs).
  Eukaryotes– Nucleus & mitochondria
  a) Nucleolus – rRNA
  b) Nucleoplasm –tRNA & mRNA.

Transcription in Prokaryotes

Three stages

- Initiation phase: RNA-polymerase recognizes the **promoter** and starts the transcription.
- Elongation phase: the RNA strand is continuously growing.
- Termination phase: the RNA-polymerase stops synthesis and the nascent RNA is separated from the DNA template.


Transcription unit
DNA
5′
3′
3′
5′
Promoter
Terminator
RNA polymerase
Unwound DNA
1 Binding of RNA polymerase and local DNA unwinding
NTPs
2 Initiation of RNA synthesis
Coding strand
Template strand
RNA
3 Elongation of RNA
Further elongation
Termination signal
RNA polymerase
4 Termination of RNA synthesis
RNA transcript
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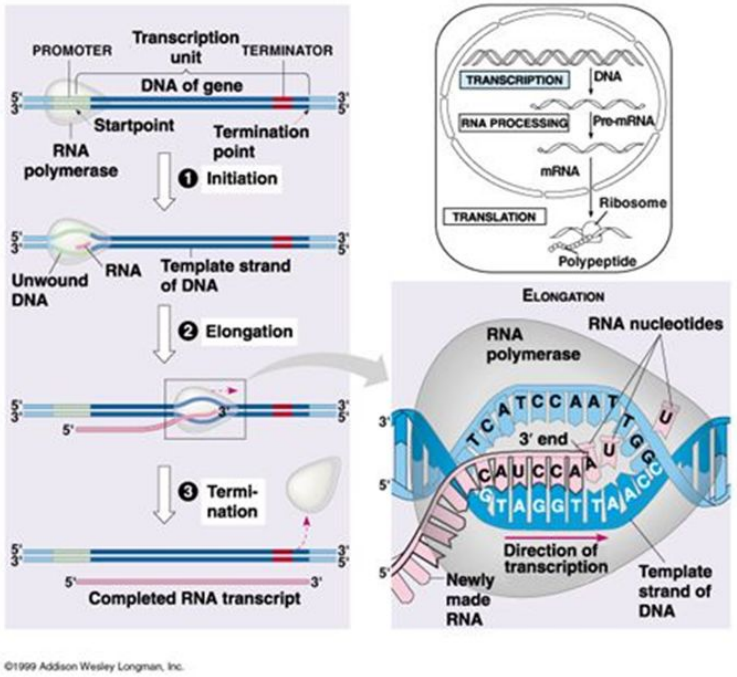
Summary of Transcription in Prokaryotes

- Consists of three stages
  - **Initiation**: attachment of RNA Polymerase to the promotor region on DNA
  - **Elongation**: building of the mRNA from the 3' end of the nucleotide polymer
  - **Termination**: release of RNA polymerase and mRNA following transcription of the terminator region of the DNA




Thank
you!