



Transcription Process

Presented By :

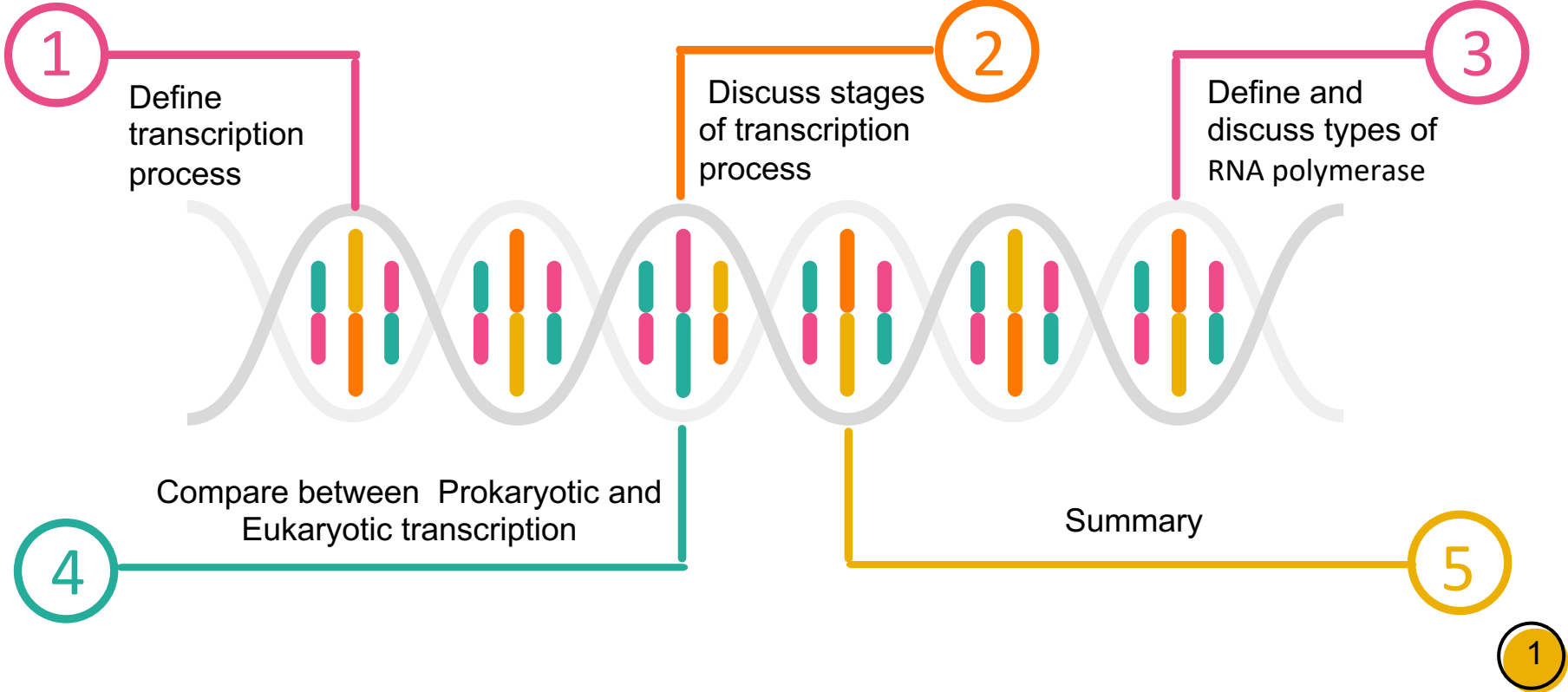
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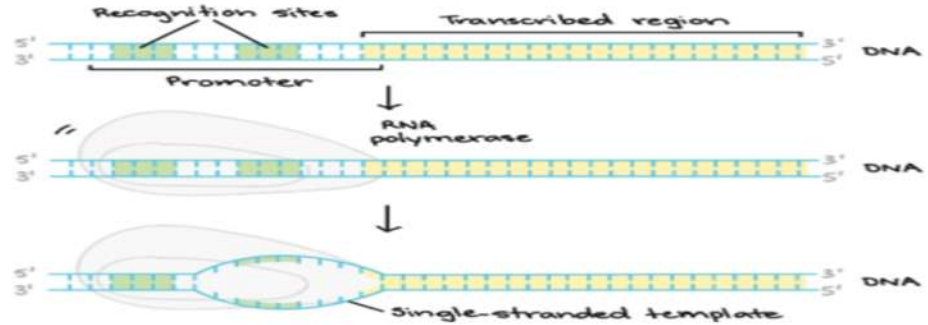
Transcription Process

- Transcription is the first step in gene expression. It involves copying a gene's DNA sequence to make an RNA molecule. Transcription is the process of copying out the DNA sequence of a gene in the similar alphabet of RNA.

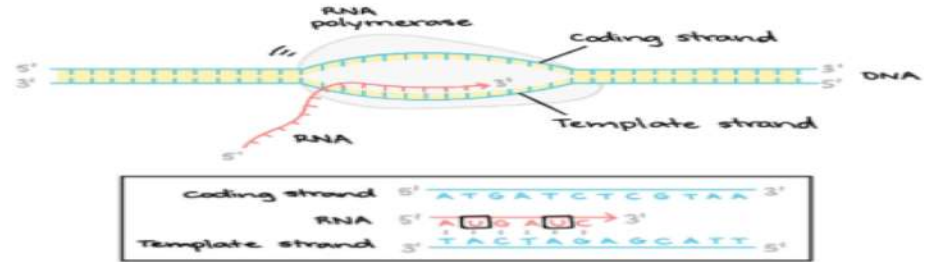


Stages of Transcription Process

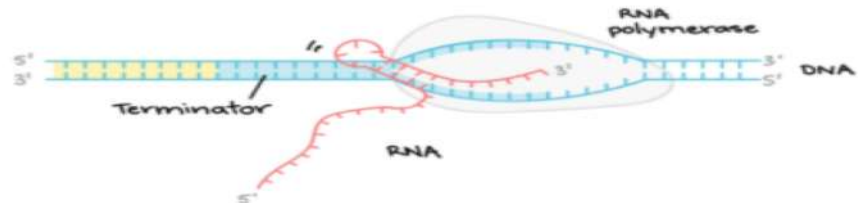
01 Initiation RNA polymerase binds to a sequence of DNA called the promoter, found near the beginning of a gene.



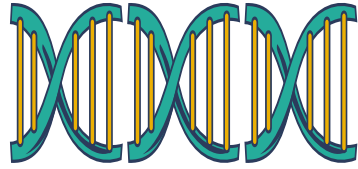
02 Elongation One strand of DNA, the template strand, acts as a template for RNA polymerase



03 Termination Sequences called terminators signal that the RNA transcript is complete

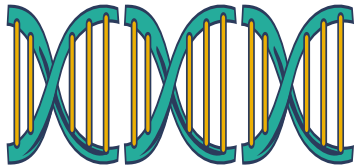


RNA Polymerase



Define of RNA polymerase

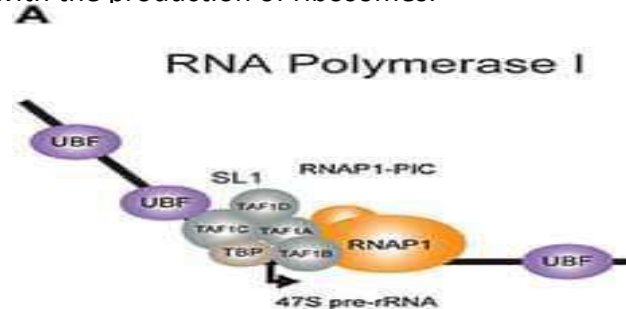
While prokaryotes like bacteria have one RNA polymerase that transcribes all types of RNA, eukaryotes like plants and mammals can have numerous forms of RNA polymerase.

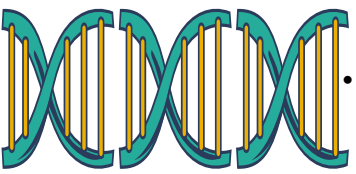


Types of RNA polymerase I

RNA polymerase I

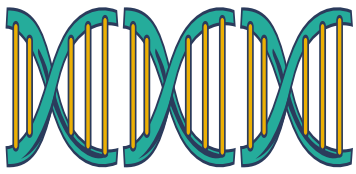
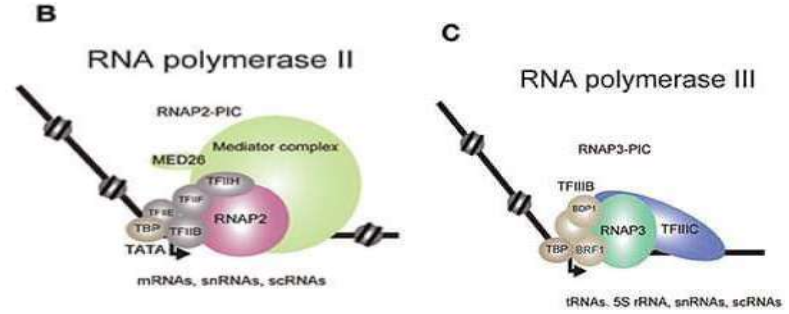
RNA polymerase I2 is responsible for synthesizing most ribosomal RNA (rRNA) transcripts. These transcripts are produced within the nucleolus, a region within the nucleus where ribosomes are assembled. The availability of rRNA molecules produced by RNA polymerase can impact essential functions of cell biology since these transcripts are directly involved with the production of ribosomes.





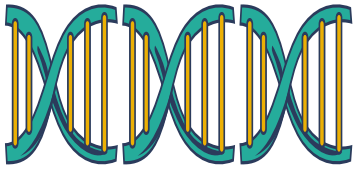
RNA polymerase II

- RNA polymerase II transcribes protein-coding genes into messenger RNA (mRNA). This 12-subunit enzyme works as a complex that directly influences gene expression through its production of pre-mRNA transcripts. Once the pre-mRNAs are released by RNA polymerase II within the nucleus, biochemical modifications prepare these transcripts for translation. RNA polymerase II also produces micro RNA (miRNA) molecules. These non-coding transcripts can mediate gene expression and the activity of mRNAs after transcription.



RNA polymerase III

- RNA polymerase III transcribes rRNA genes into small RNAs like transfer RNA (tRNA) and 5S rRNA. These smaller RNA transcripts play a role in normal cell function throughout the nucleus and cytoplasm



RNA polymerase IV and V

- Exclusively found in plants, RNA polymerase IV and V are transcription enzymes that evolved as specialized forms of RNA polymerase II. Both enzymes produce small interfering RNA (siRNA) transcripts, which play a role in the silencing of plant genes.

Prokaryotic Vs Eukaryotic Transcription

Prokaryotic

Site

Transcription occurs in the cytoplasm.

RNA

polymerase

A single RNA polymerase synthesizes all types of RNA.

Initiation

Generally, no proteins are required.



Eukaryotic

Transcription occurs inside the nucleus.

Site

Three types of RNA polymerase.

RNA

polymerase

It requires proteins called transcription factors.

Initiation

Prokaryotic Vs Eukaryotic transcription

Prokaryotic

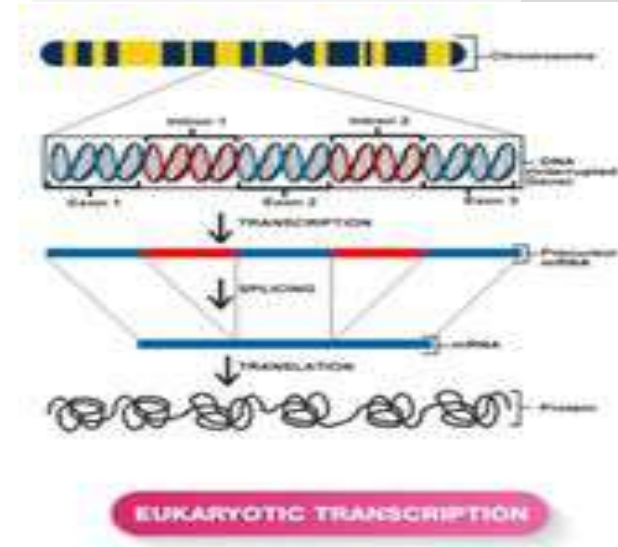
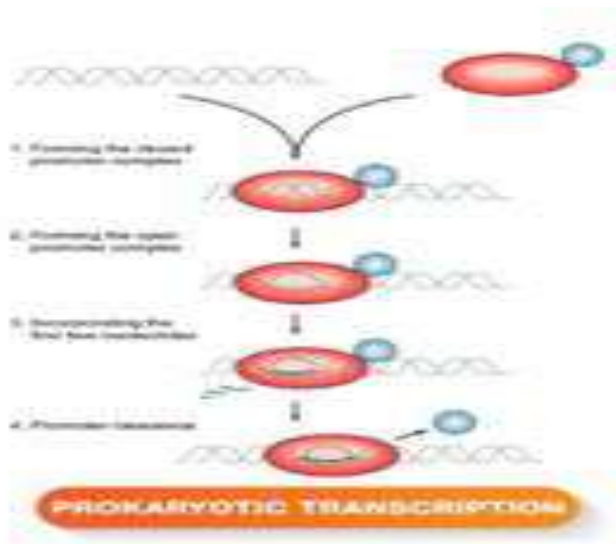
Eukaryotic

Transcriptional unit

Polycistronic

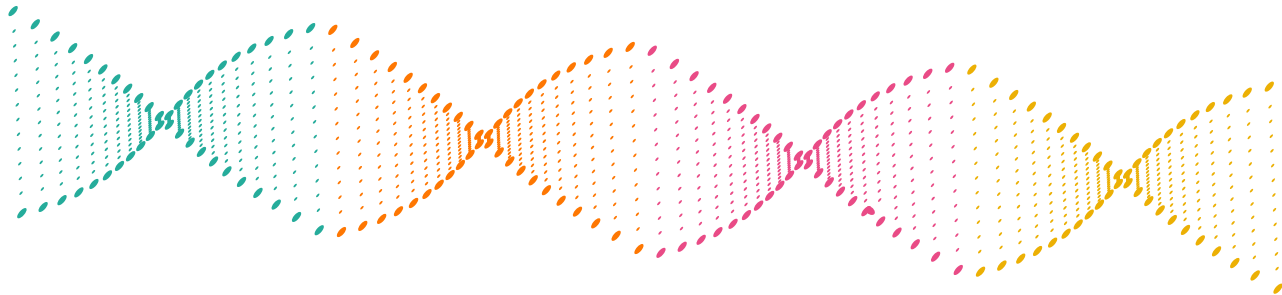
Monocistronic

Transcriptional unit



Summary

- Transcription is the process of copying out the DNA sequence of a gene in the similar alphabet of RNA.
- The stages of transcription (initiation , elongation and termination)
- While prokaryotes like bacteria have one RNA polymerase that transcribes all types of RNA
- Types of RNA polymers (I , II , III also types IV and V)
- Compare between prokaryotic and eukaryotic according to (Site , RNA polymerase , Initiation and Transcription unit)



References



1

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Thank You !

