

TRANSCRIPTION ---2

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RNA POLYMERASES

- ▶ RNA polymerase synthesizes RNA in the direction of 5'-3' that means DNA template is read in 3'-5' direction.
- ▶ Ribonucleotides required -- ATP, GTP, CTP & UTP.
- ▶ The **prokaryotic RNA polymerase** is a multimeric enzyme consisting of six subunits, two identical α -subunits, similar but not identical β and β' and ω sixth is σ factor.

$2\alpha, \beta, \beta', \omega$ -- core enzyme

$2\alpha, \beta, \beta', \omega + \sigma$ --- Holoenzyme




Transcription in Prokaryotes


Three stages

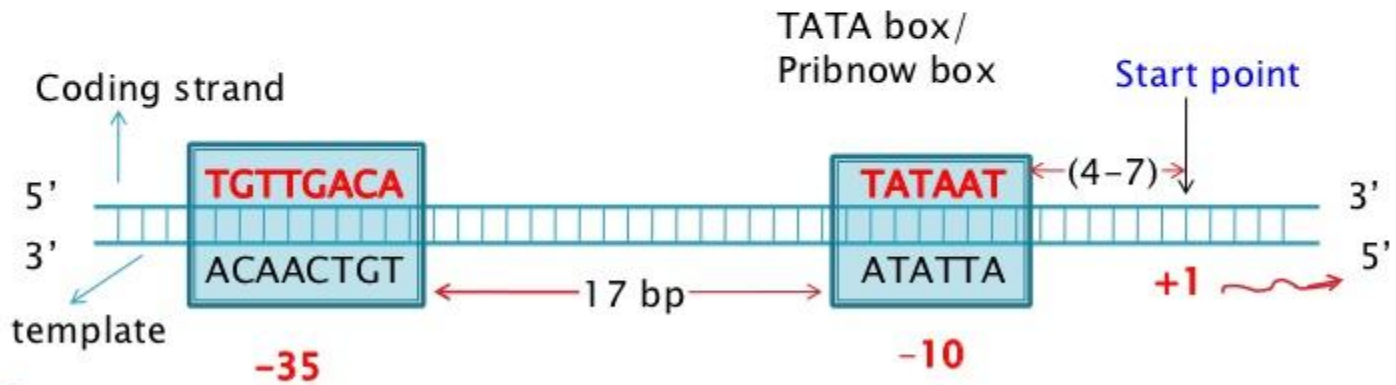
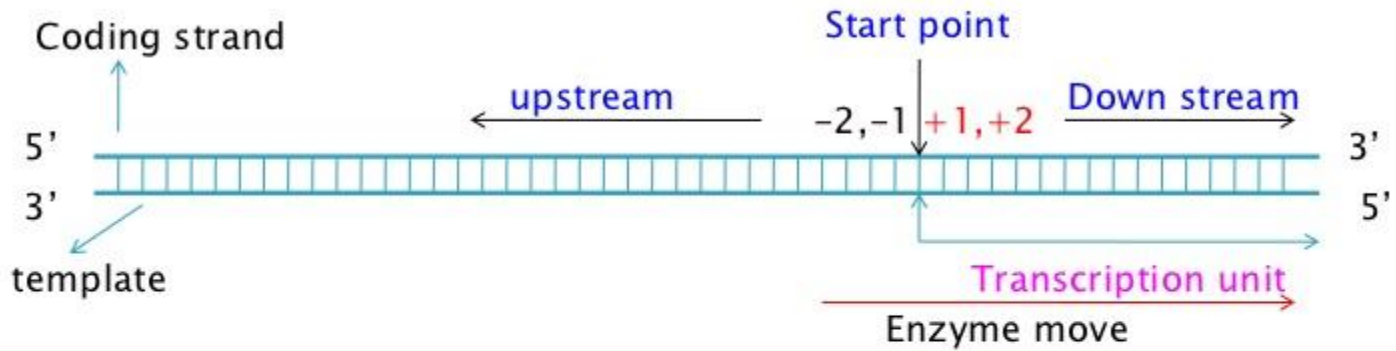
- ▶ Initiation phase: RNA-polymerase recognizes the **promoter** and starts the transcription.
- ▶ Elongation phase: the RNA strand is continuously growing.
- ▶ Termination phase: the RNA-polymerase stops synthesis and the nascent RNA is separated from the DNA template.



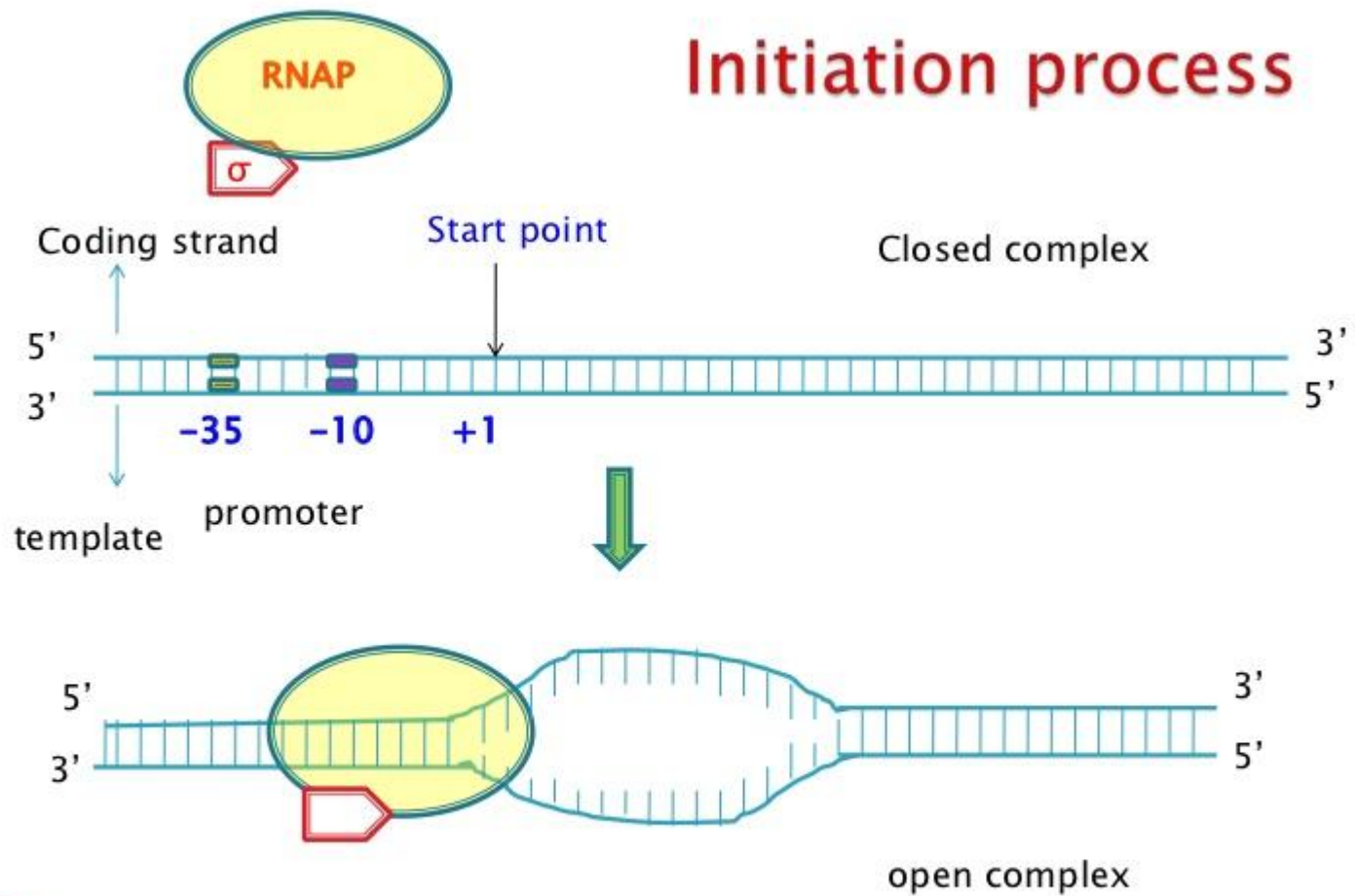
Initiation

- ▶ Involves the interaction of RNAP with DNA at a specific site or sequences of DNA.
 - ▶ *The sequence of DNA needed for RNA polymerase to bind to the template and accomplish the initiation reaction defines the promoter.*
 - ▶ Promoter are the characteristic sequences of DNA that direct the RNA polymerases to initiate the transcription.
 - ▶ usually located on coding strand.
 - ▶ Simplest type of promoters found in prokaryotes.
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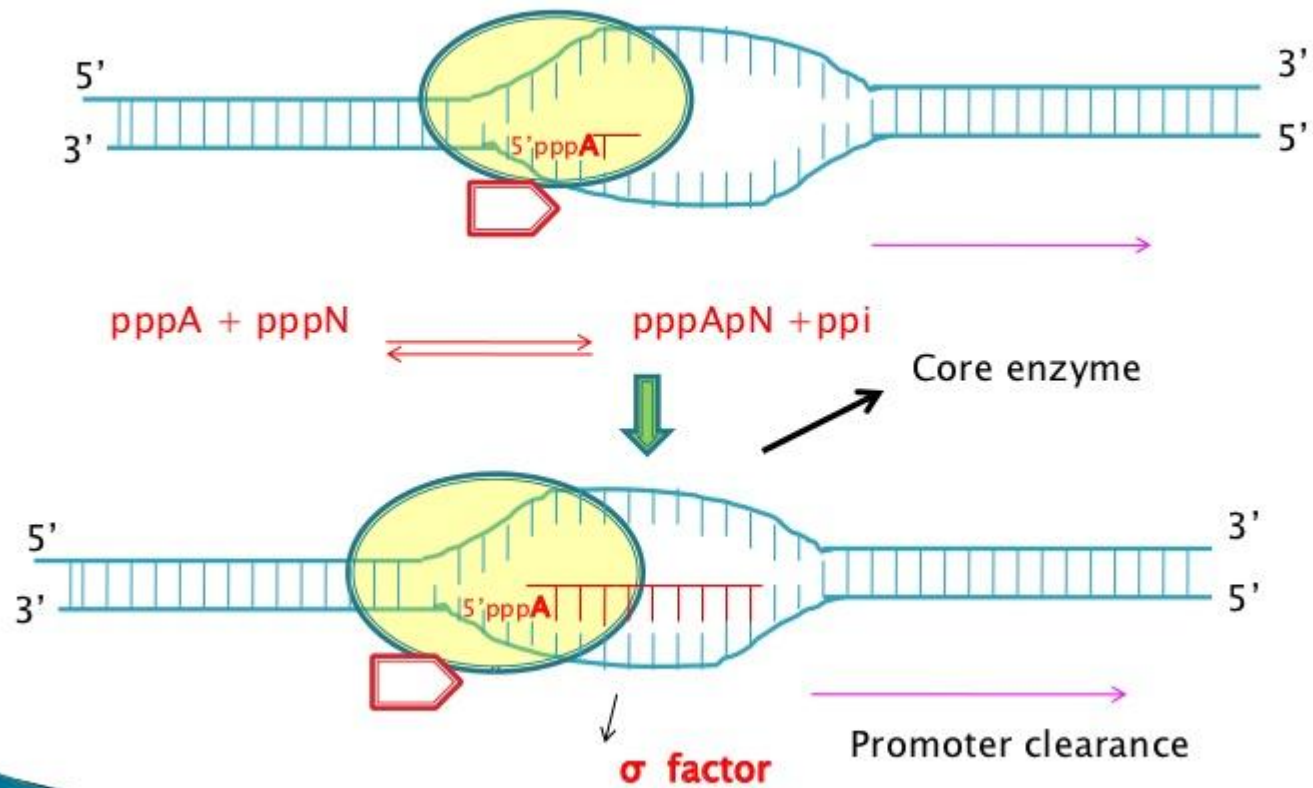
- ▶ Two general types of sequence elements are found.
 - ▶ One sequence element is believed to promote initial binding of the enzyme RNAP.
 - ▶ Other element usually has high content of adenine & thymine.
 - ▶ These sequences are 6 to 8 nt in length and located about -35 & -10 bp upstream of the start point of transcription.
 - ▶ These are on coding strand indicates duplex DNA required for transcription.
 - ▶ Change in only one base pair in promoter region decrease the rate of transcription
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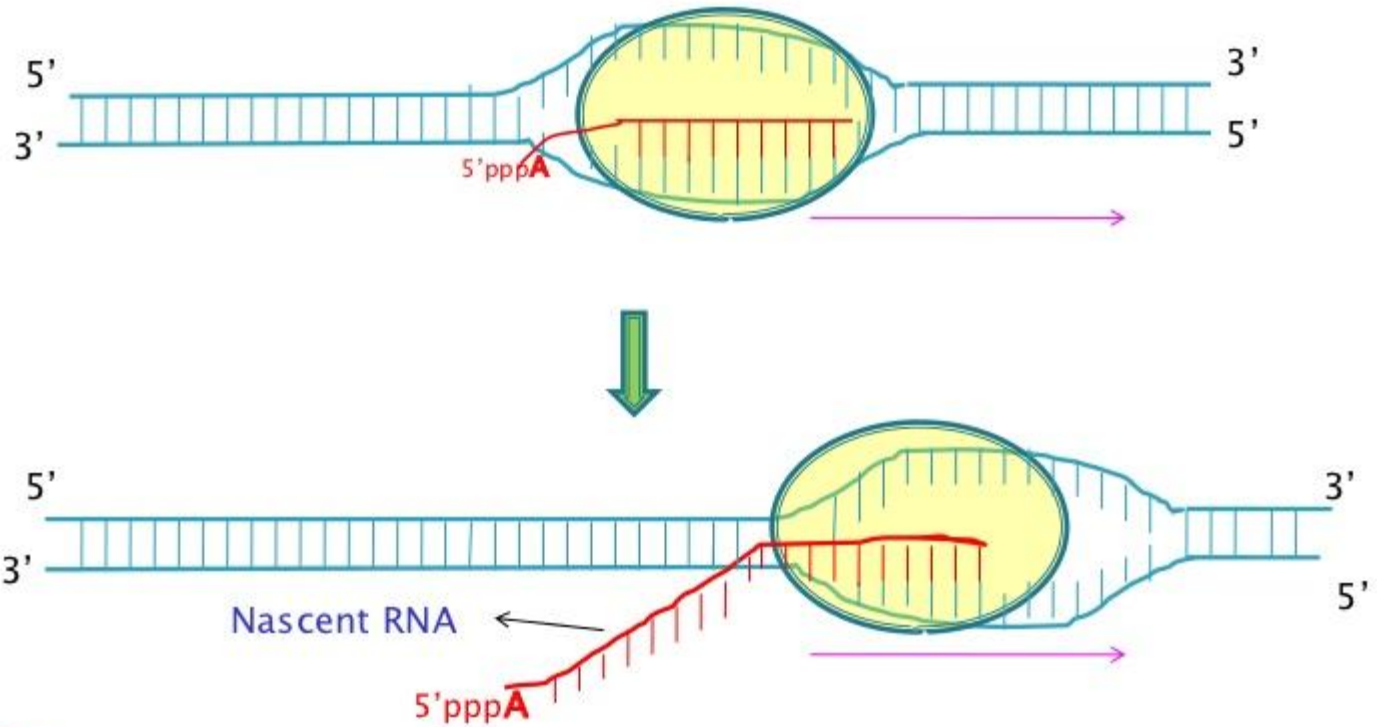
Initiation process



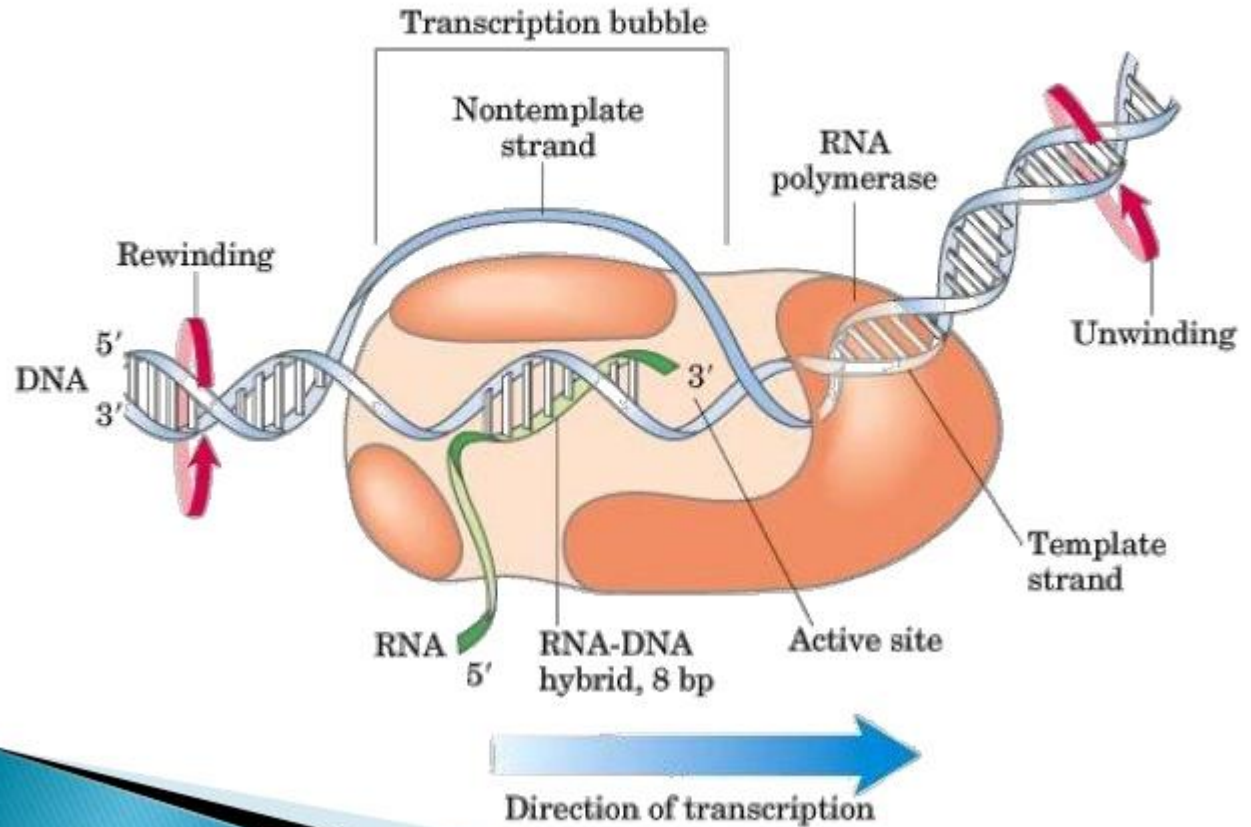
Initiation



Elongation



Transcription bubble



Termination

- ▶ The transcribed region of DNA template contain stop signals.
- ▶ Prokaryotes have two classes of termination signals.
 - ▶ 1. relies on protein factor called rho(ρ)
rho-dependent termination.
 - ▶ 2 other is rho-independent termination.



TERMINATION



Nascent RNA

Rho factor identifies
stop signal



Rho



