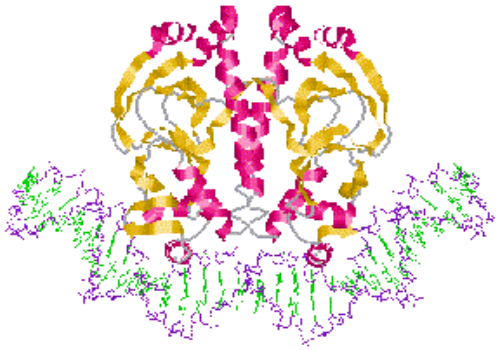
The genetic code and transcription and RNA polymerase enzyme



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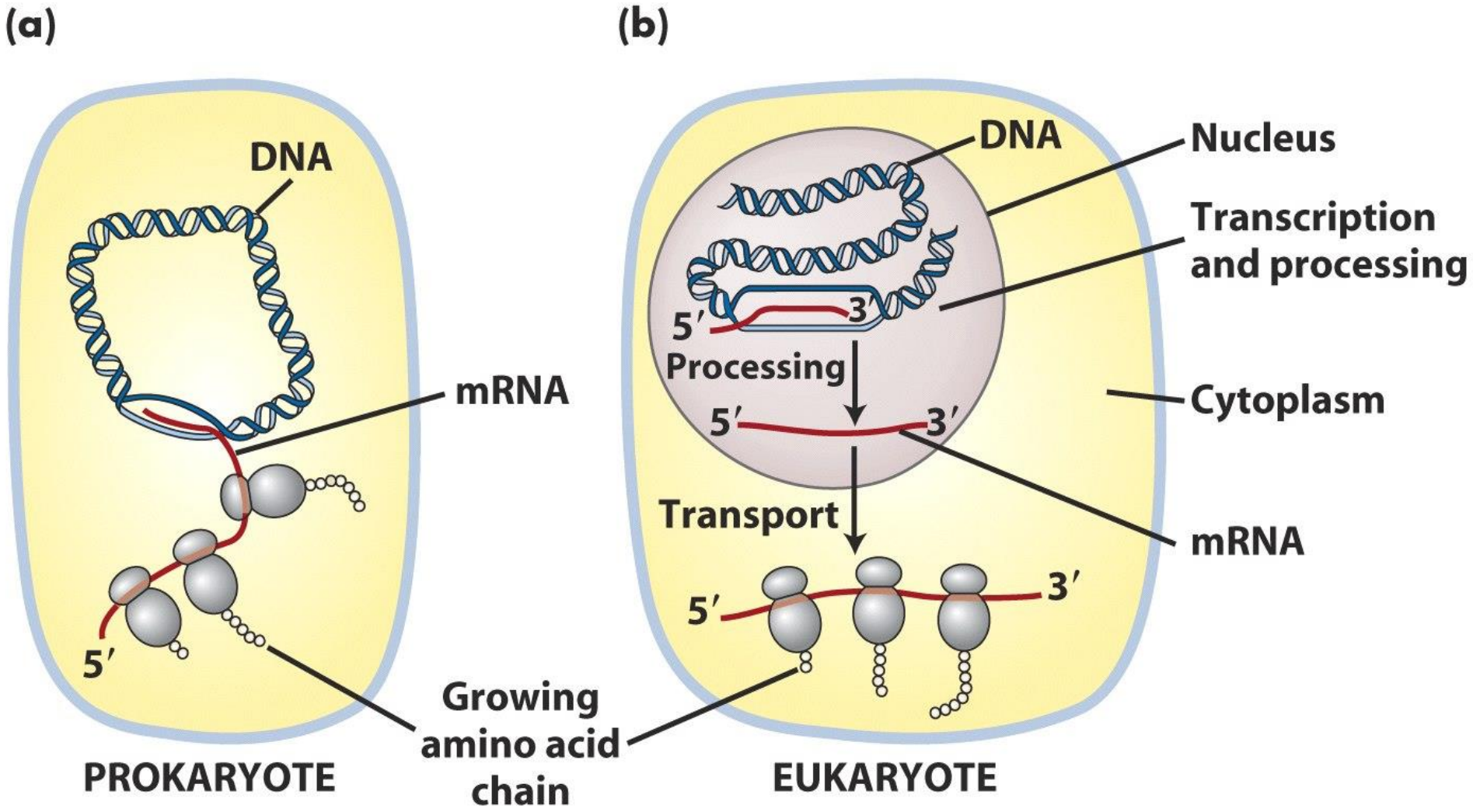
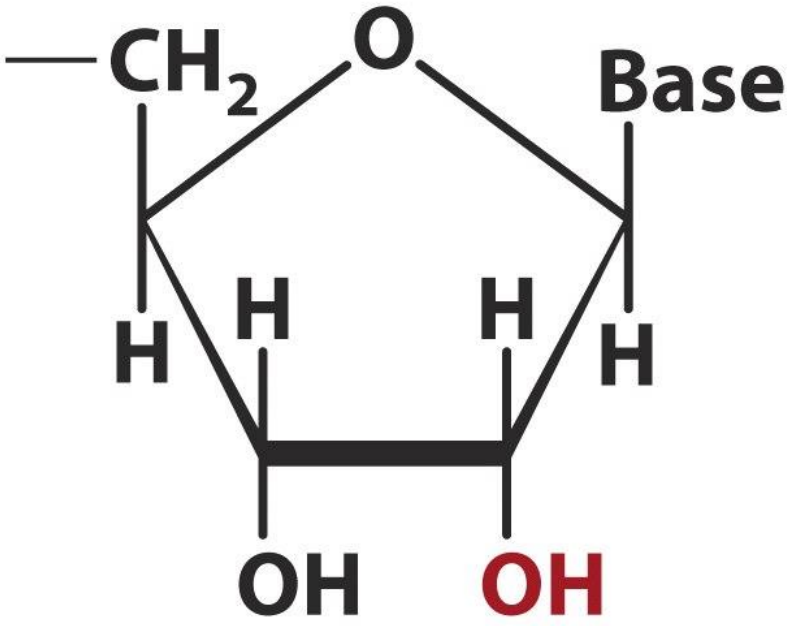
Outline of course

- Genetic information is stored in DNA and encoded in a form that is nearly universal in all living things on Earth.
- The genetic code is initially transferred from DNA to RNA, in the process of transcription..
- RNA’s four ribonucleotides, analogous to an alphabet of four “letters,” can be arranged into 64 different three-letter sequences. Most of these triplet codons in RNA encode one of the 20 amino acids present in proteins.
- Several codons act as signals that initiate or terminate protein synthesis.
- In bacteria, the process of transcription is similar to, but less complex, than in eukaryotes, where the initial transcript must be processed prior to its translation.

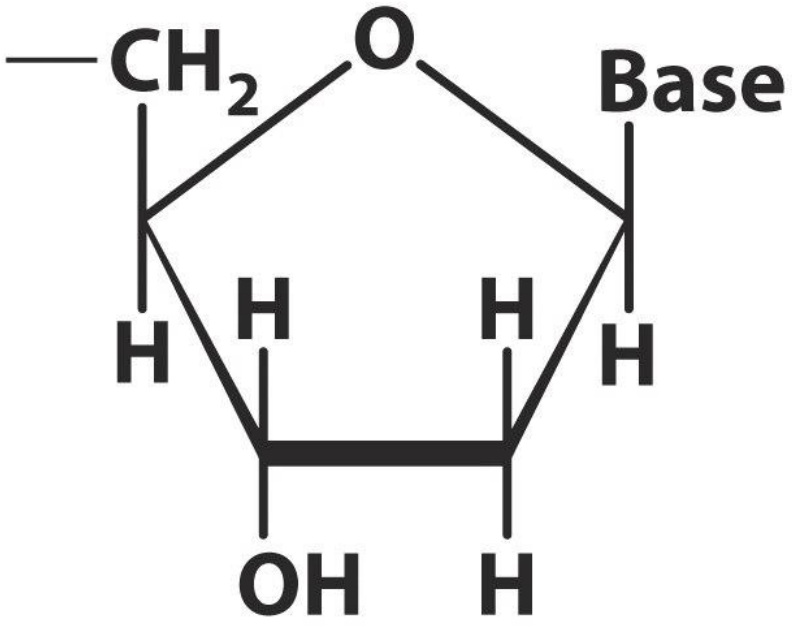
Place of transcription



Ribose - Deoxyribose

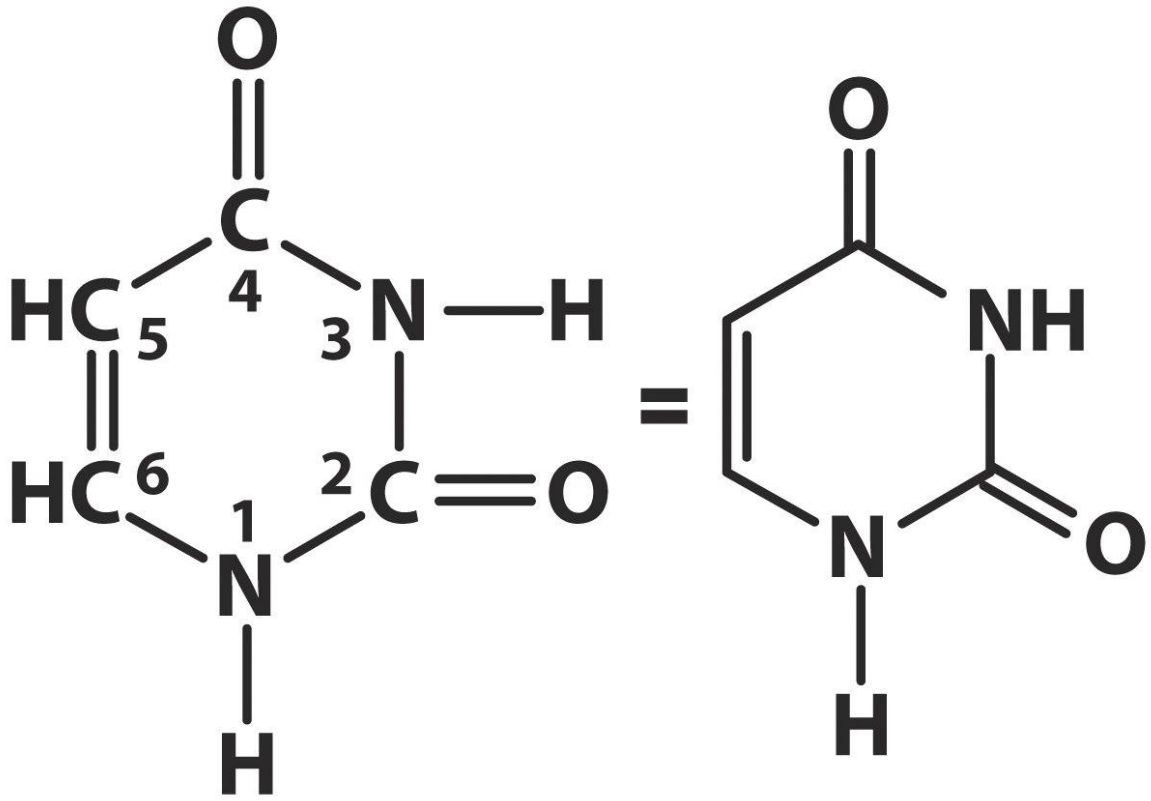


Ribose



Deoxyribose

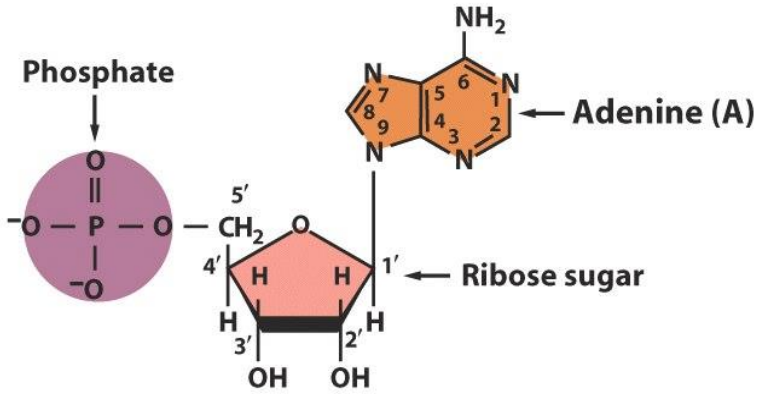
Uracil



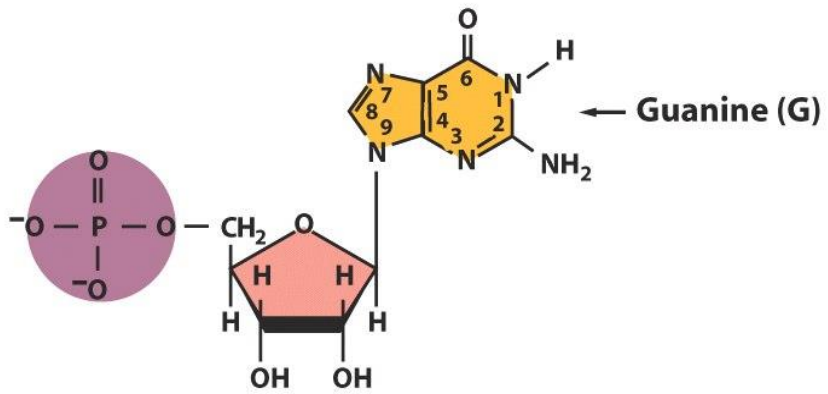
Uracil

Ribonucleotides

Purine ribonucleotides

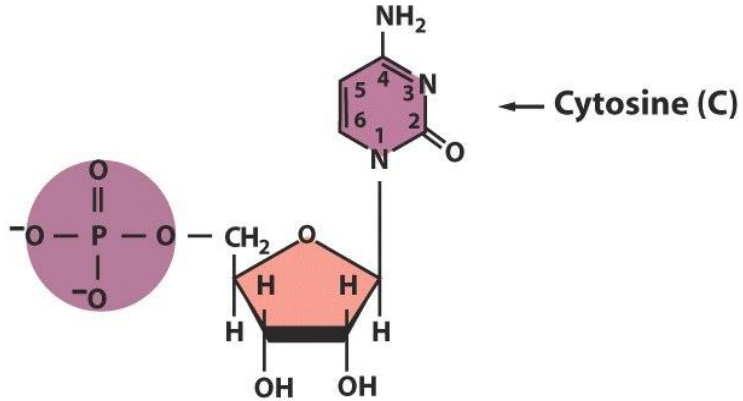


Adenosine 5′-monophosphate (AMP)

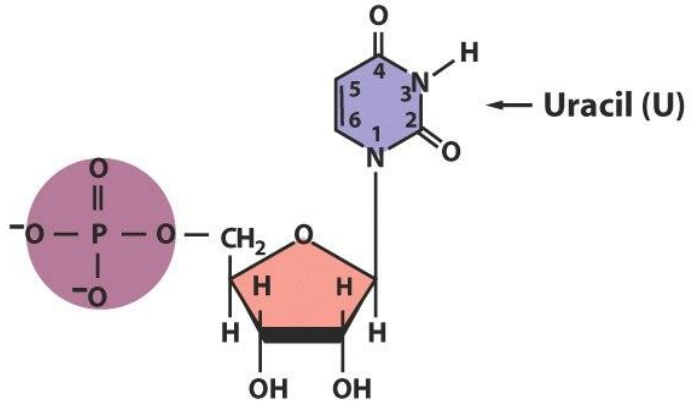


Guanosine 5′-monophosphate (GMP)

Pyrimidine ribonucleotides

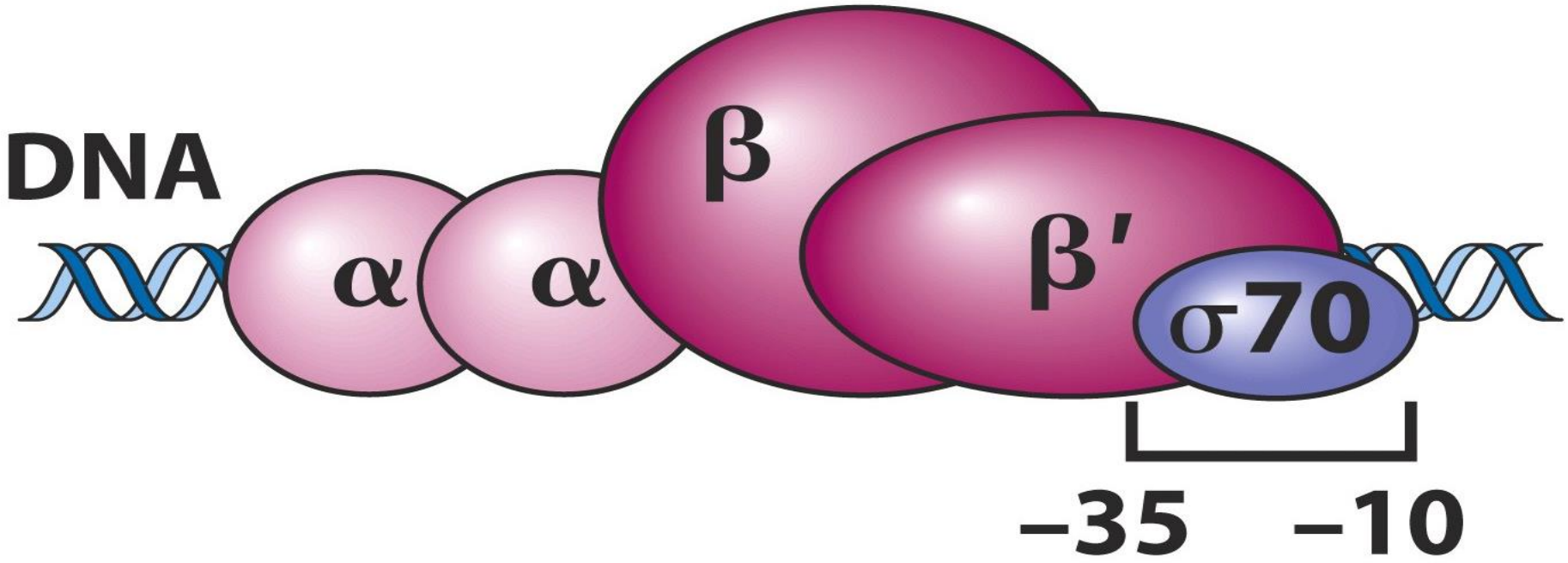


Cytidine 5′-monophosphate (CMP)

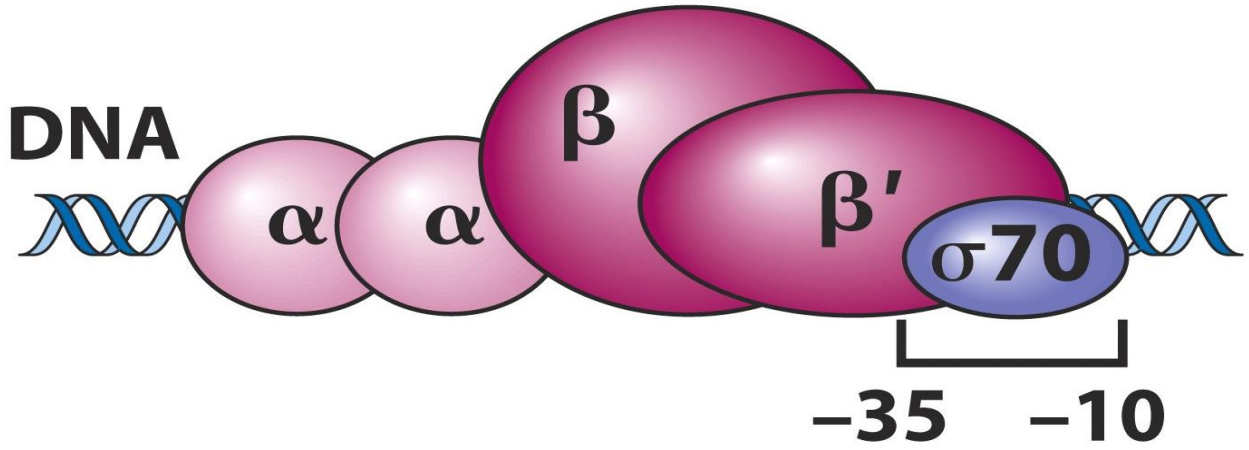


Uridine 5′-monophosphate (UMP)

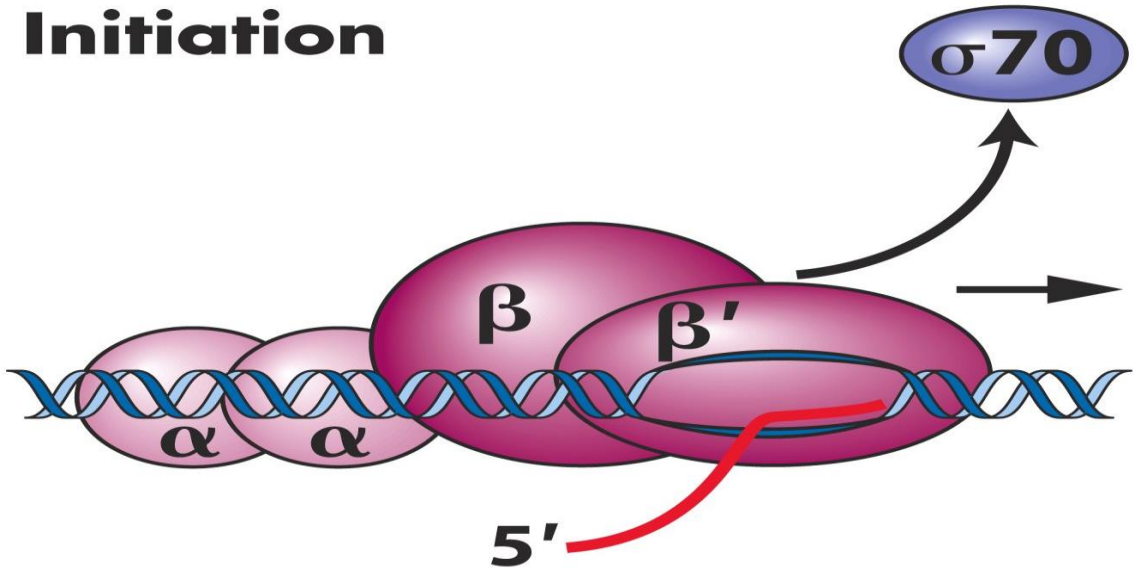
RNA Polymerase



RNA Polymerase

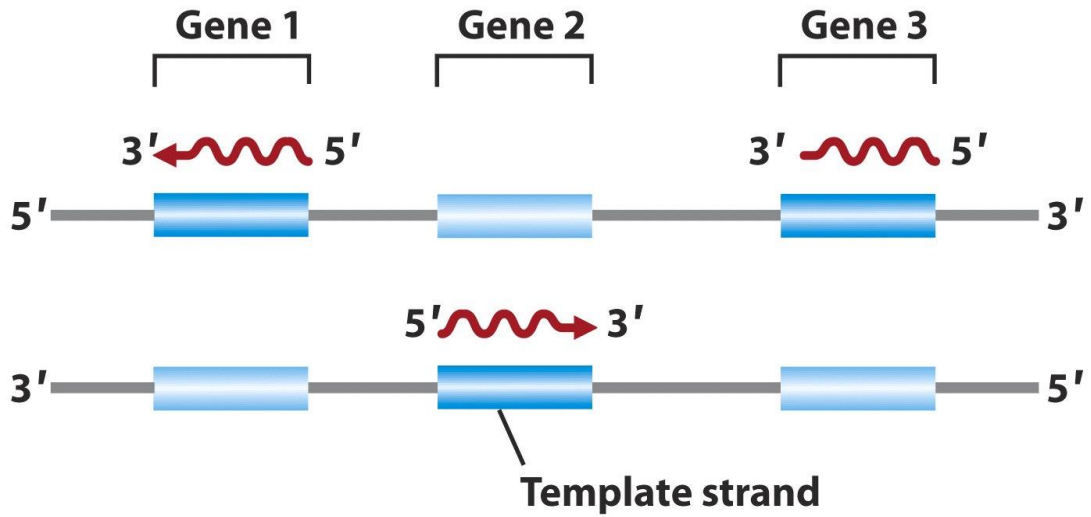


Holoenzyme

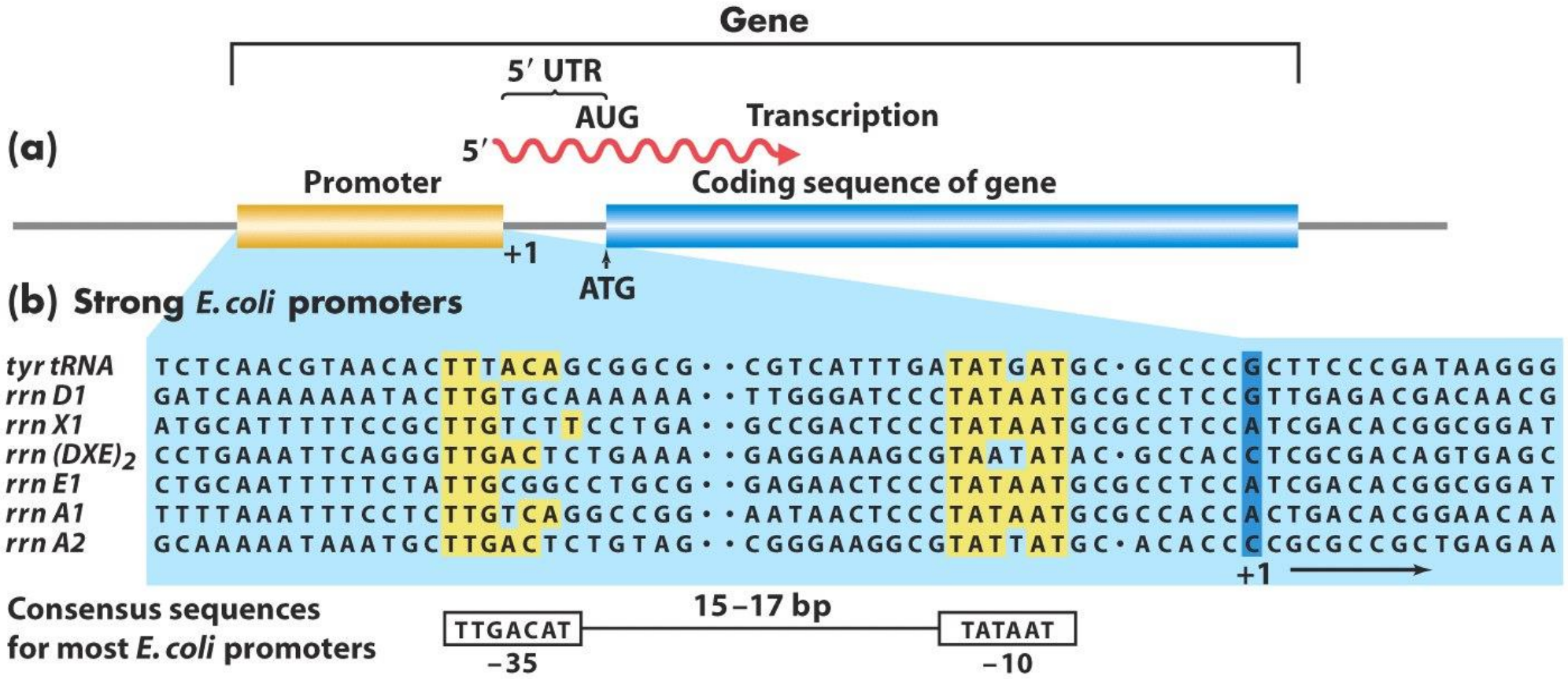


Coreenzym

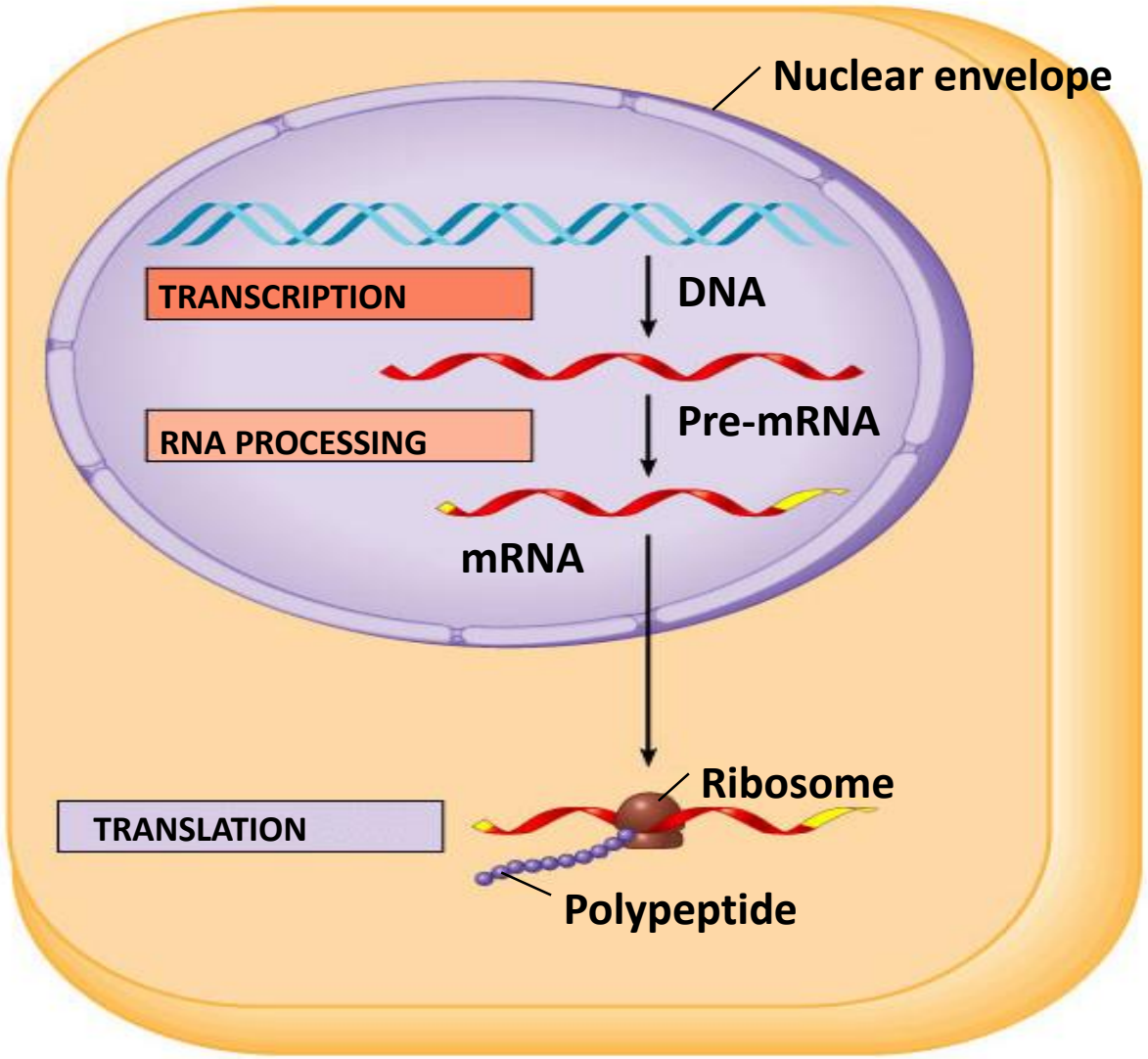
DNA→RNA (Transcription)

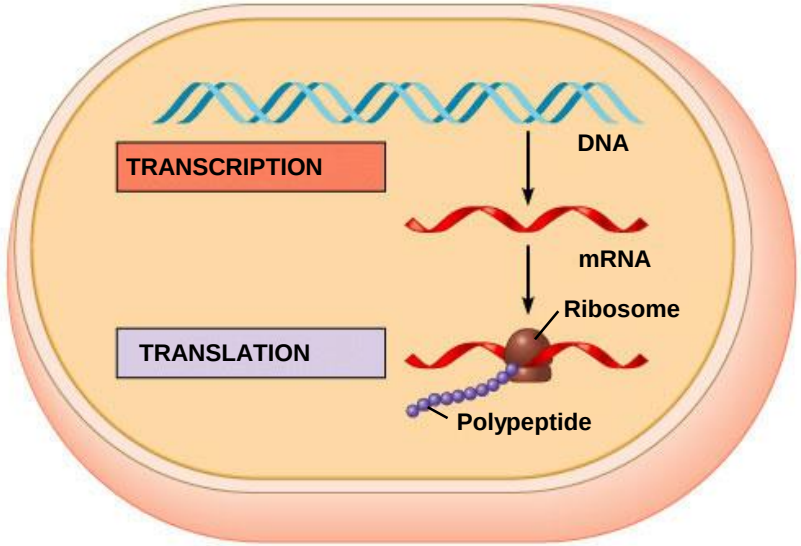


Promotor structure

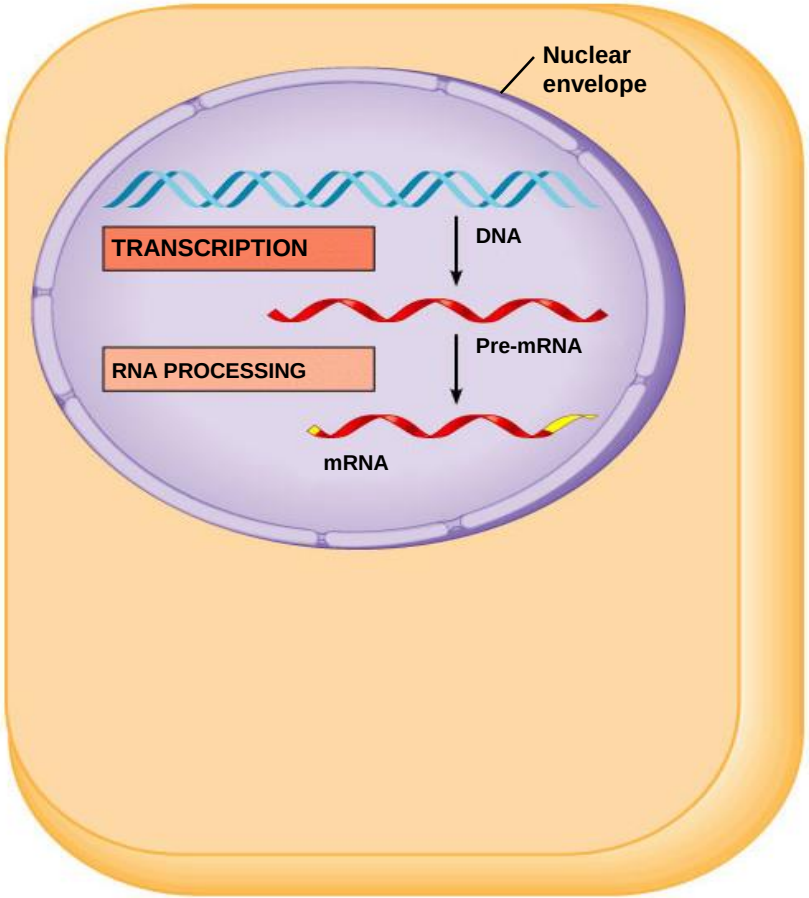


Eukaryote Cell



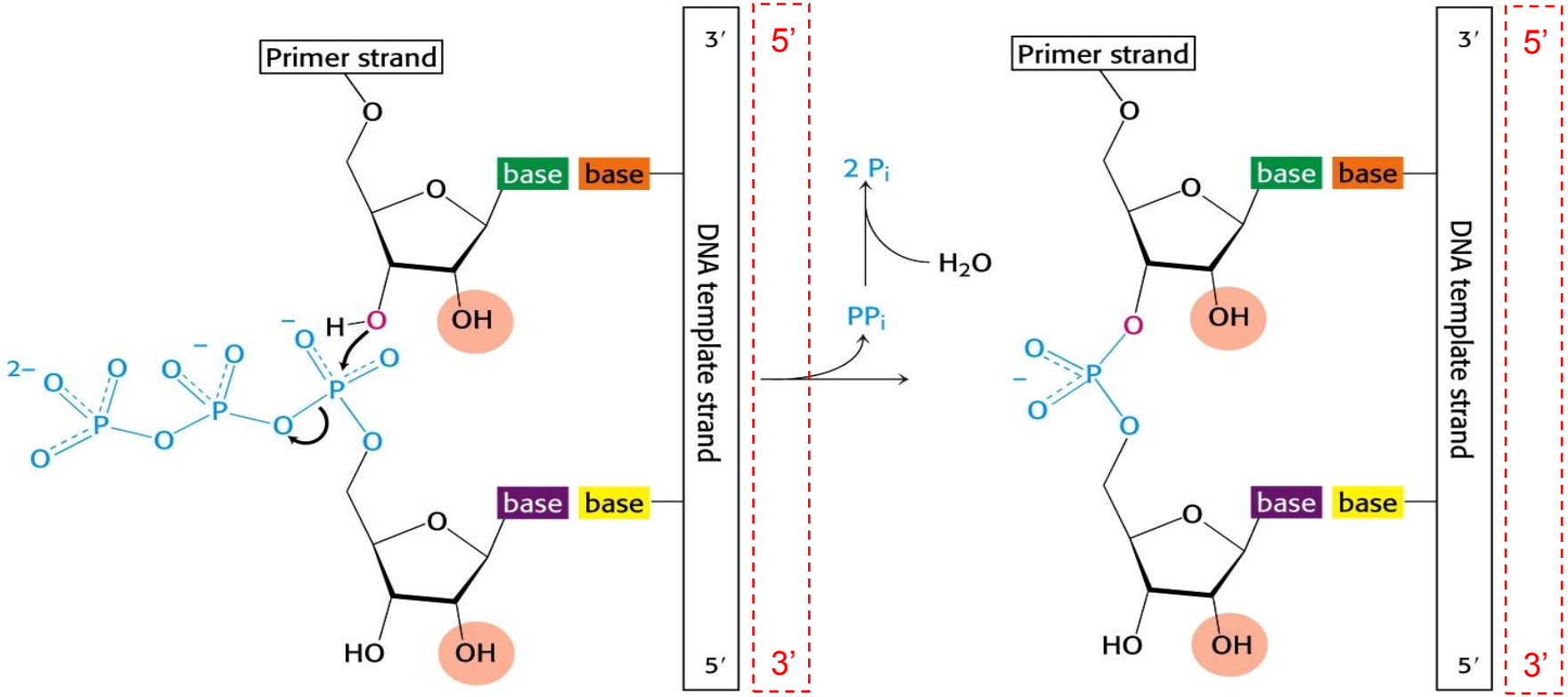


(a) Prokaryotic cell

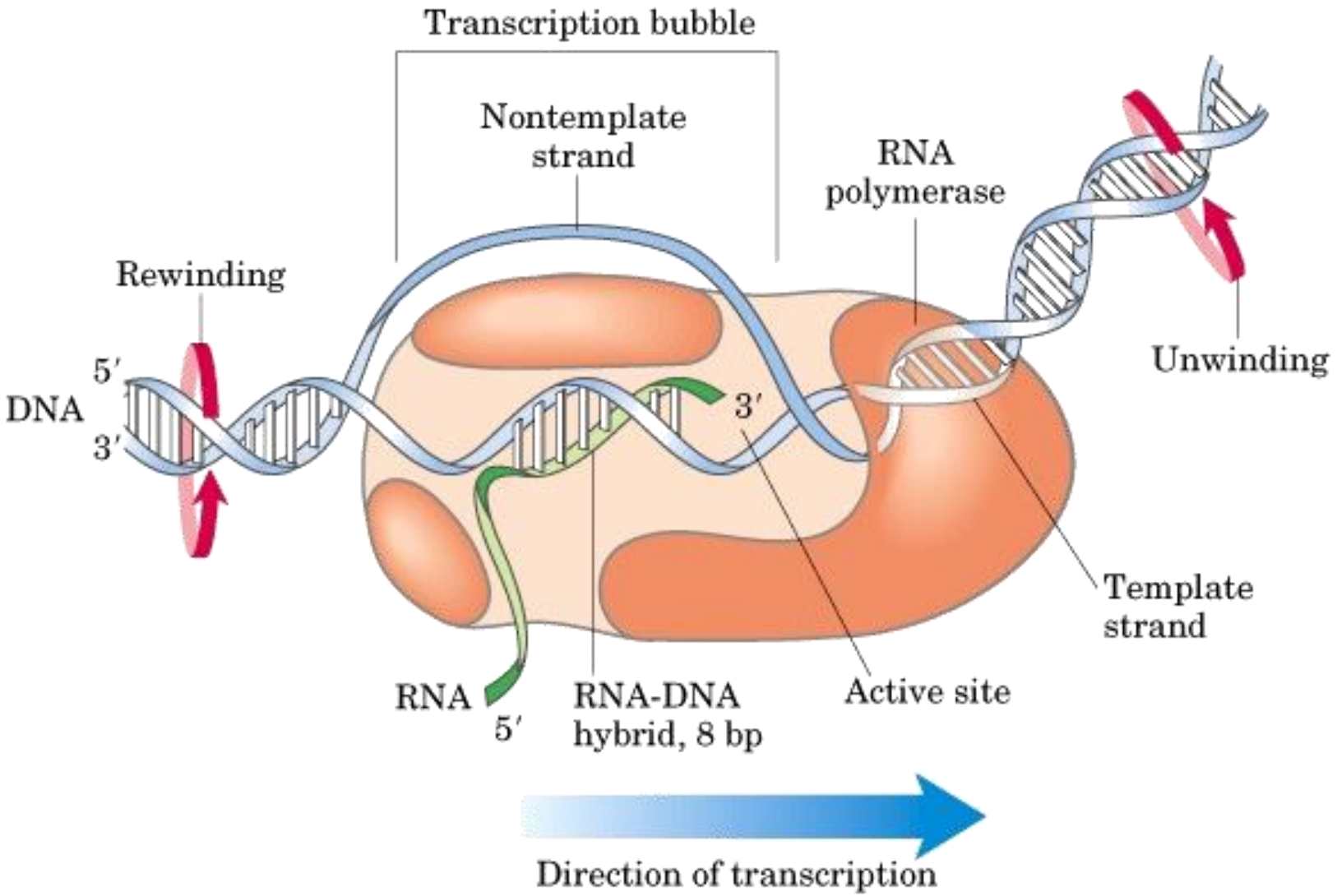


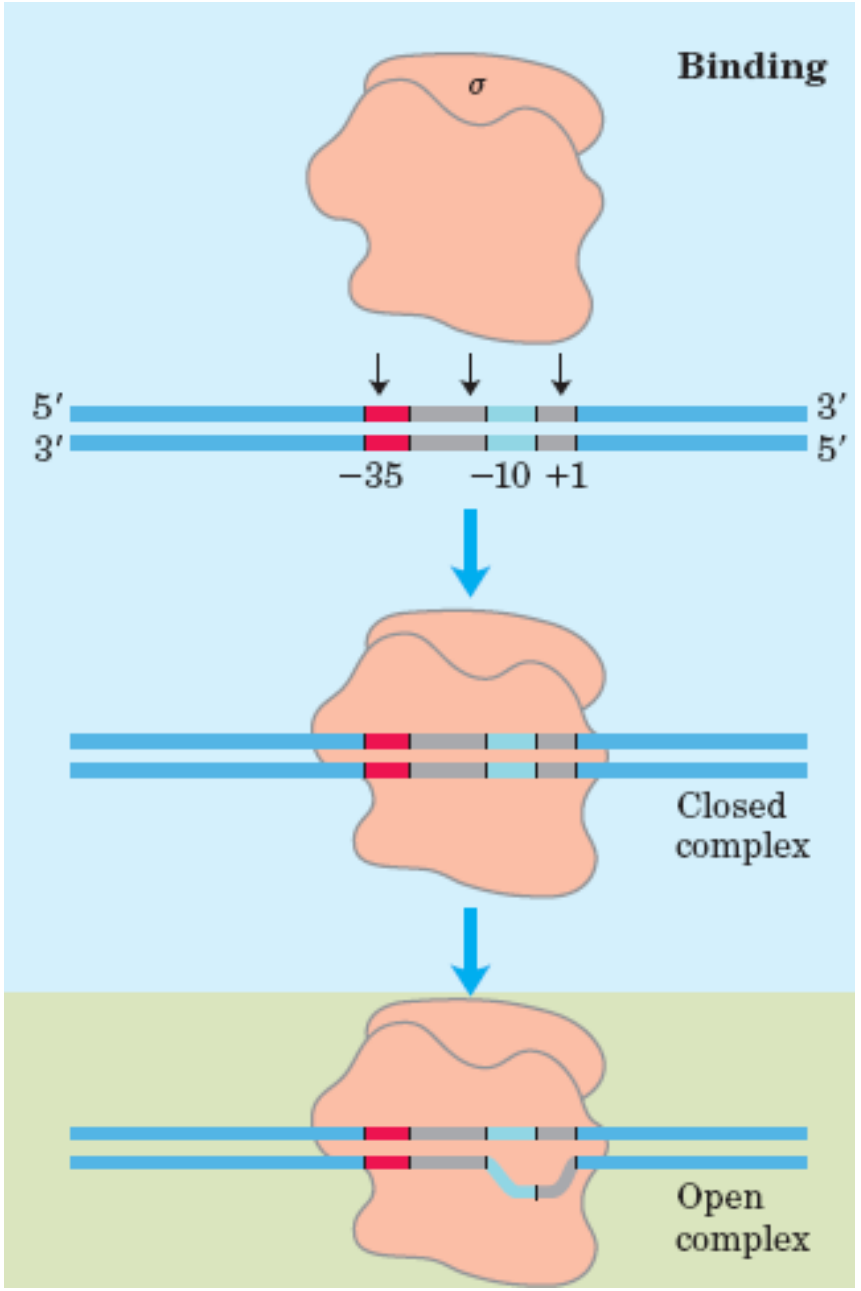
(b) Eukaryotic cell

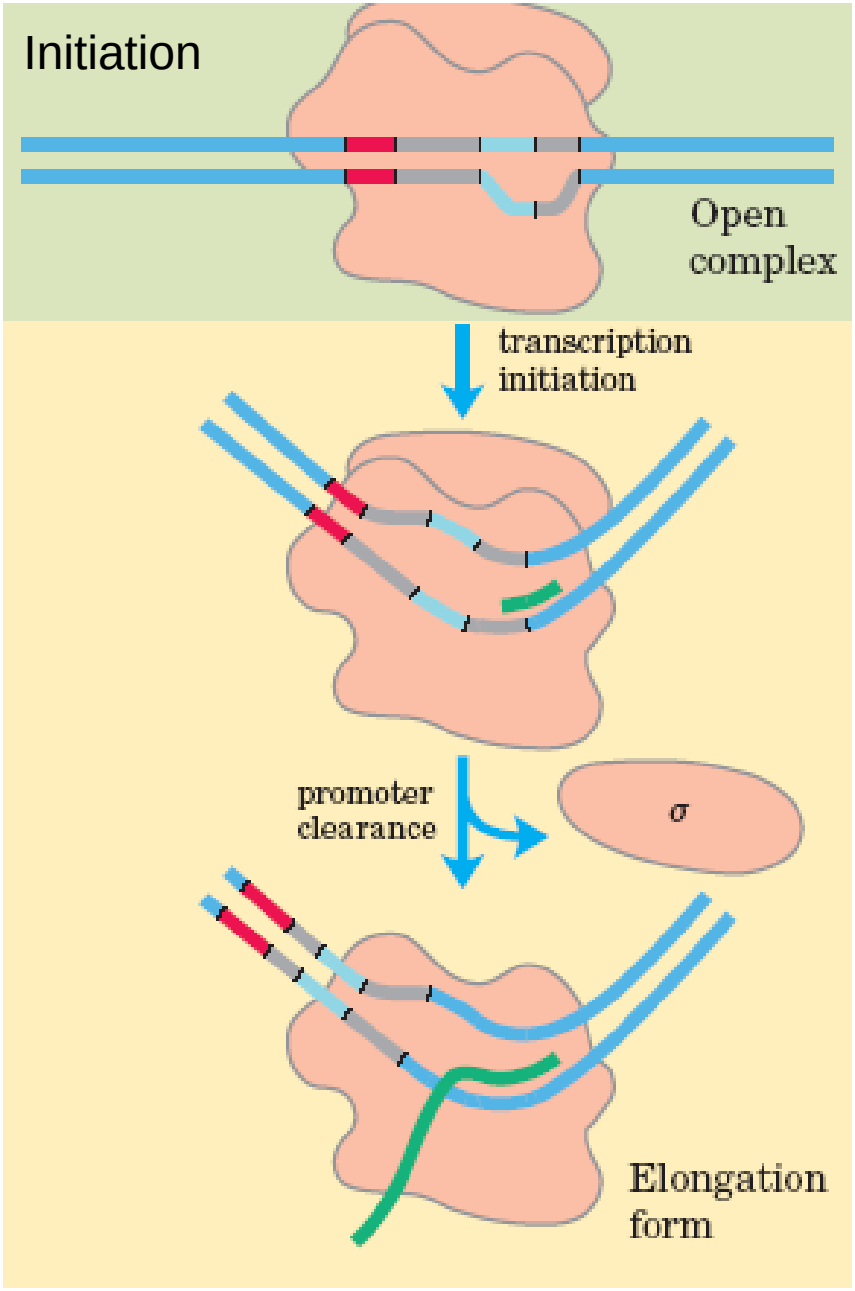
RNA polymerase enzyme



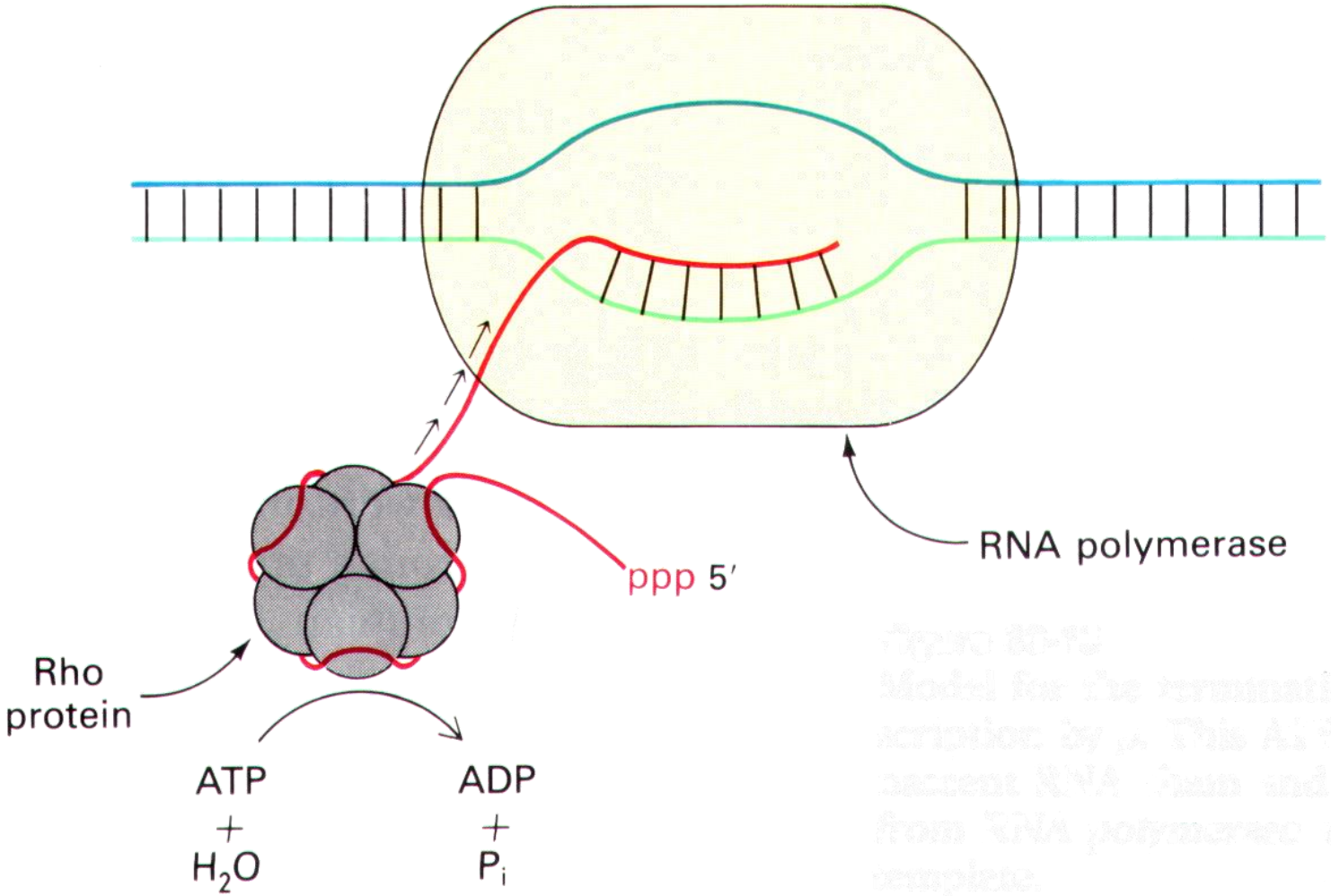
Transcription Bubble



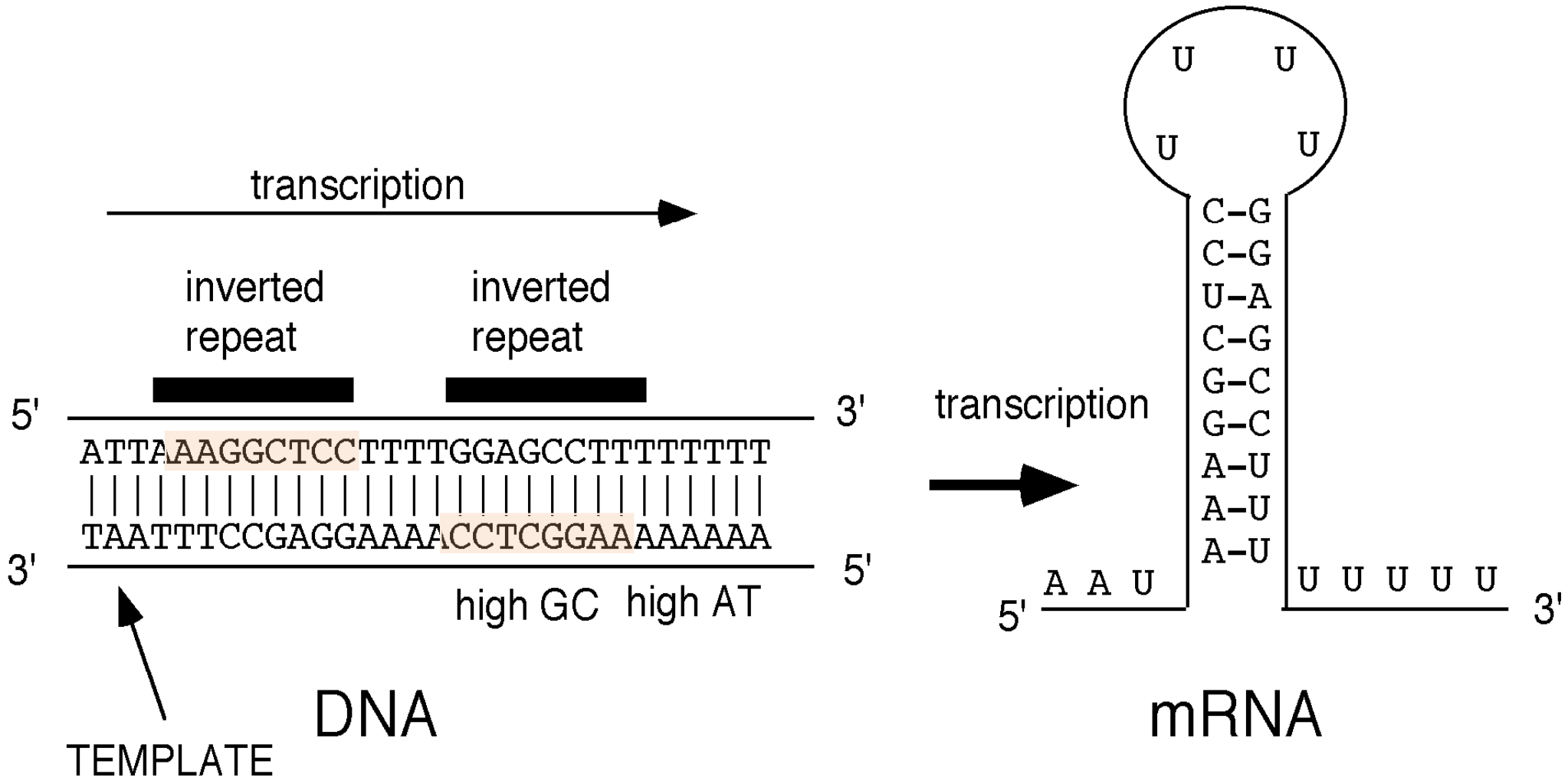

Binding
σ
5′
3′
3′
5′
−35
−10
+1
Closed complex
Open complex


Initiation
Open complex
transcription initiation
promoter clearance
σ
Elongation form

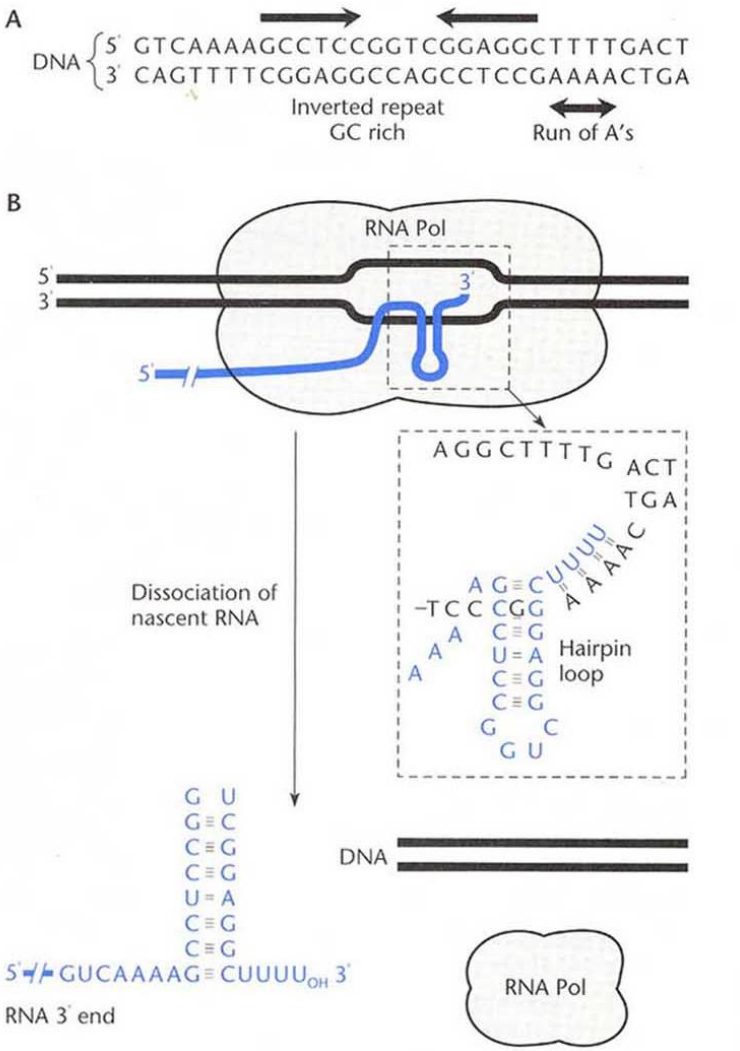
Rho (ρ) factor

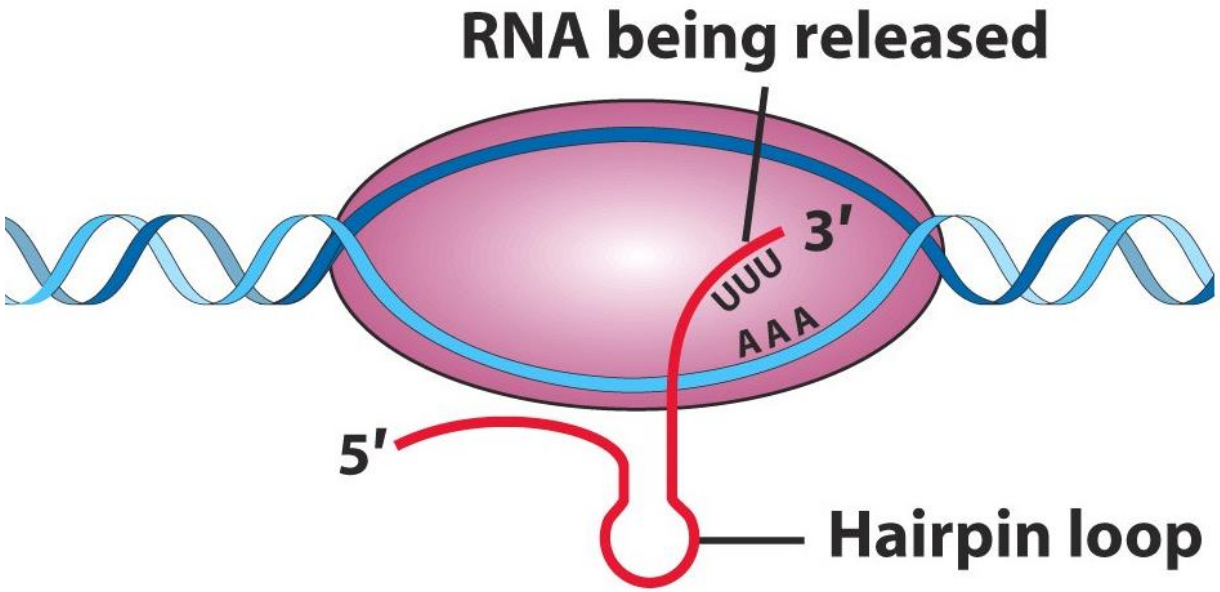


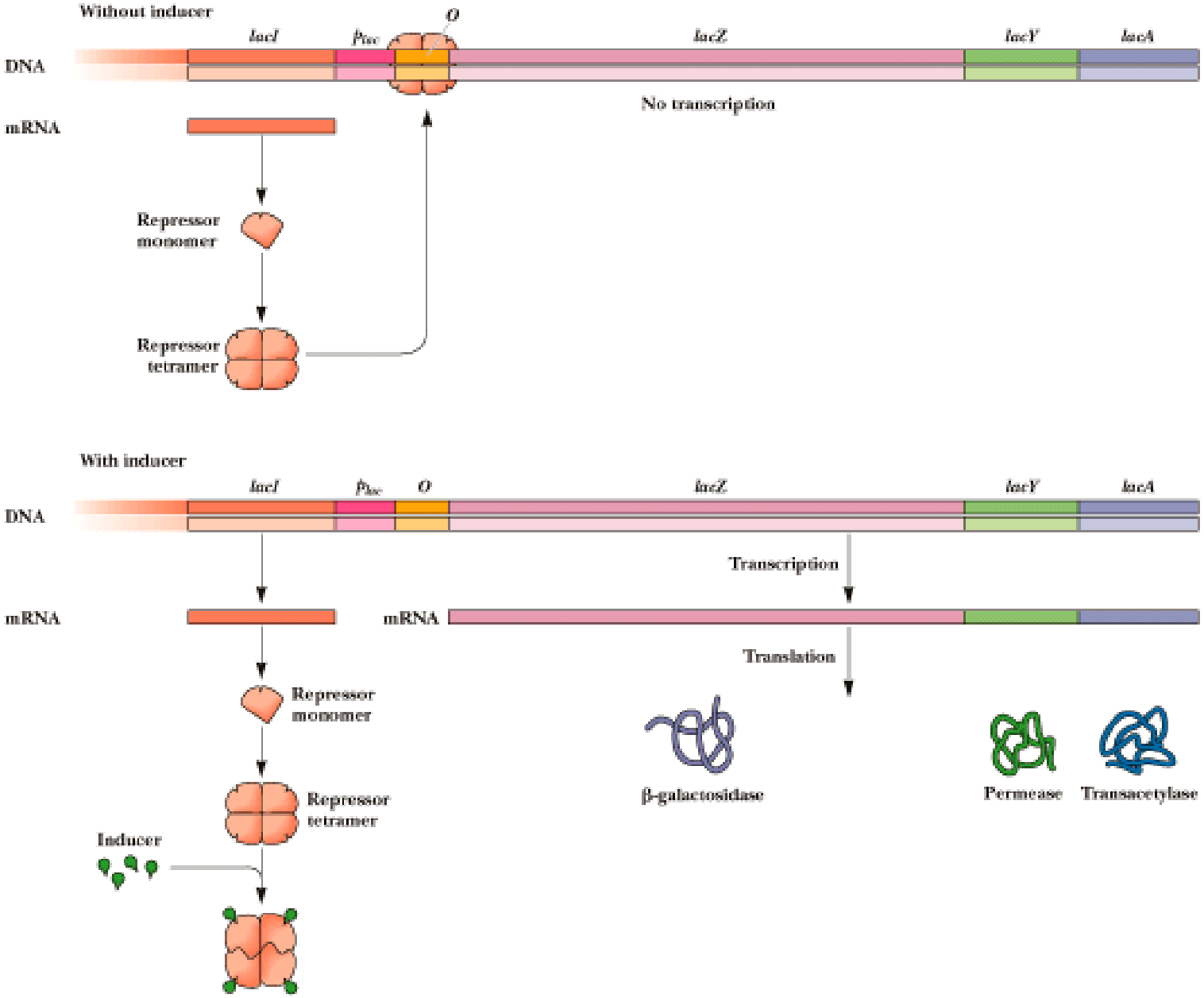
Inverted repeat



Inverted repeat






Without inducer
O
lacI
Plac
lacZ
lacY
lacA
DNA
No transcription
mRNA
Repressor monomer
Repressor tetramer
With inducer
lacI
Plac
O
lacZ
lacY
lacA
DNA
Transcription
mRNA
mRNA
Translation
Repressor monomer
Repressor tetramer
Inducer
β-galactosidase
Permease
Transacetylase