In the name of the most high

Introduction to Bioinformatics

Transcription

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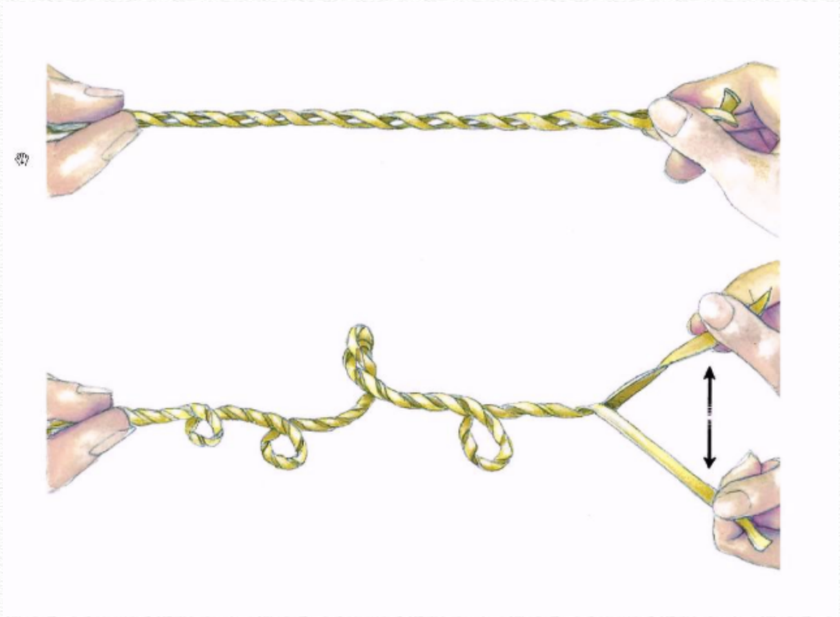
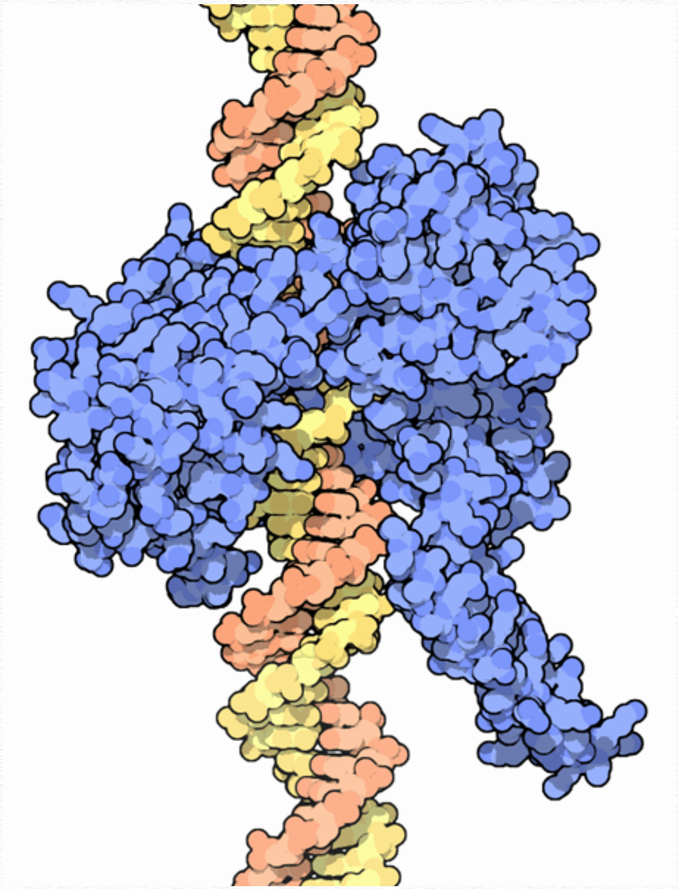
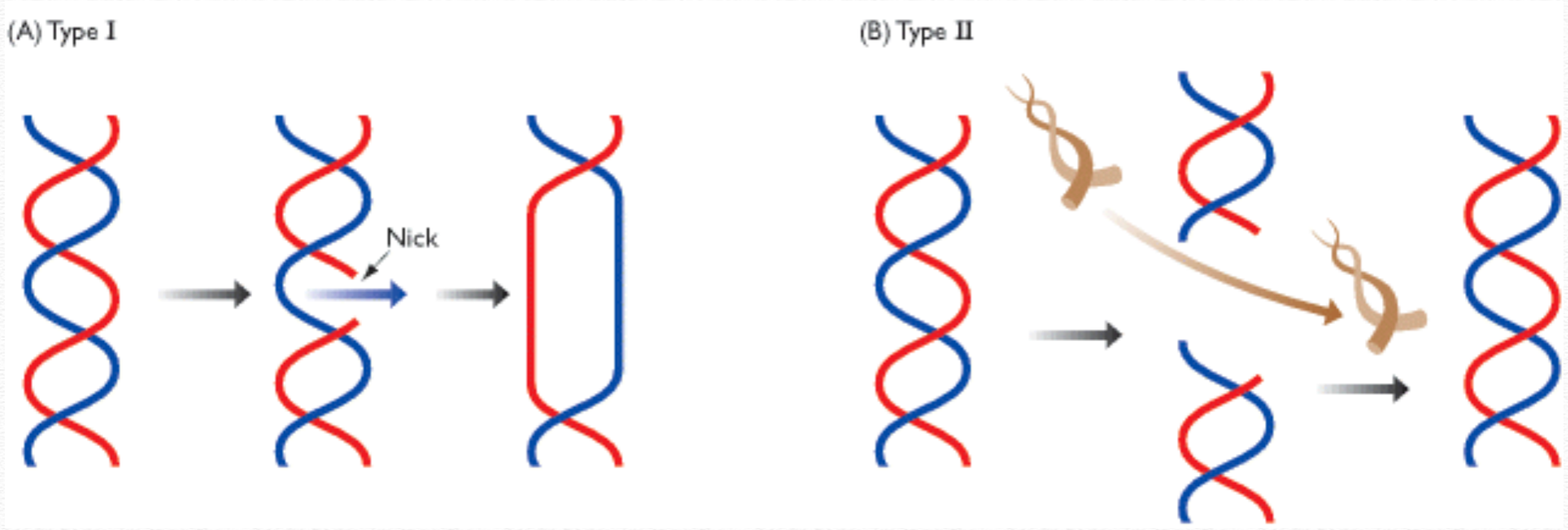
Questions from last session

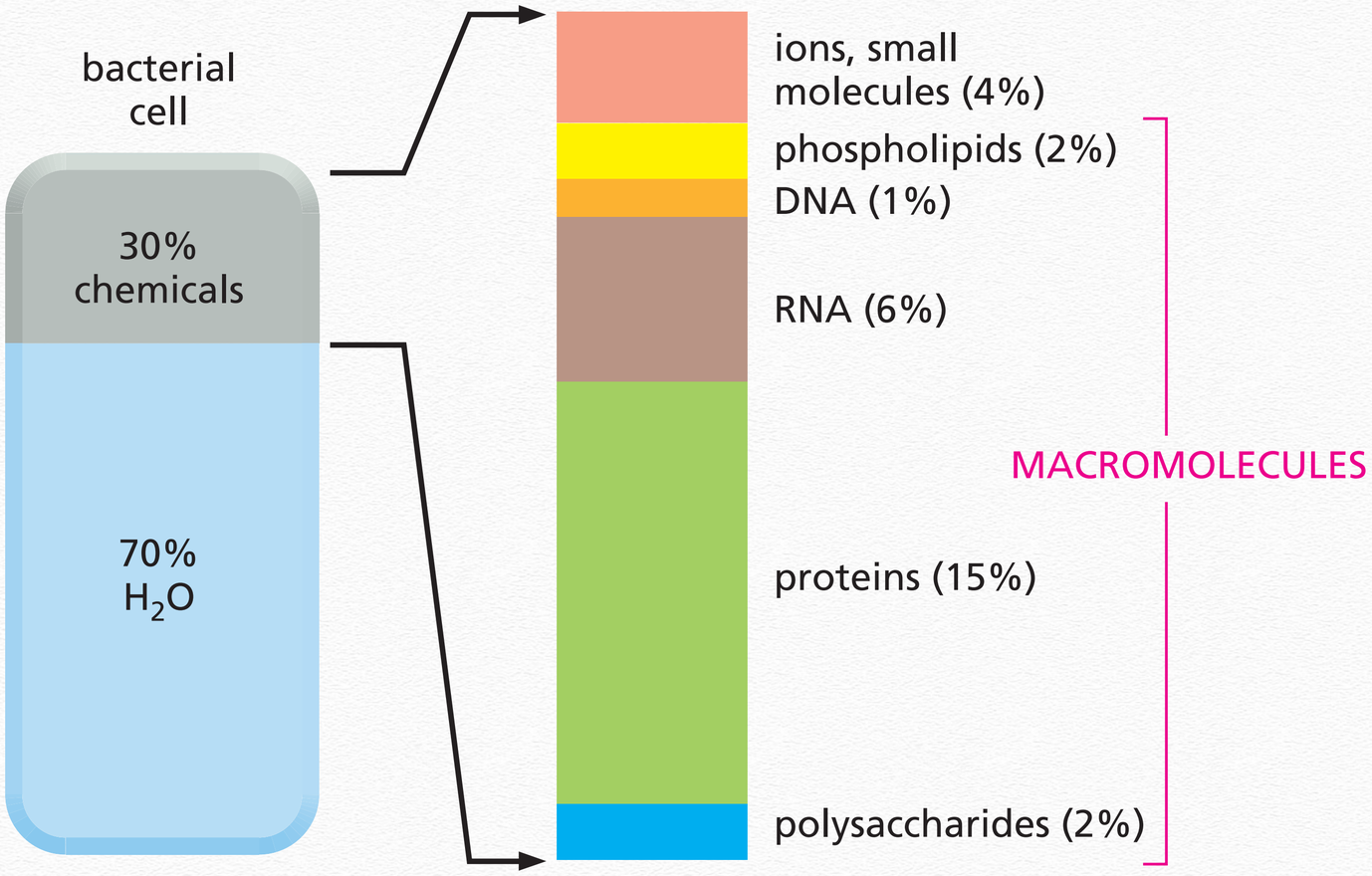




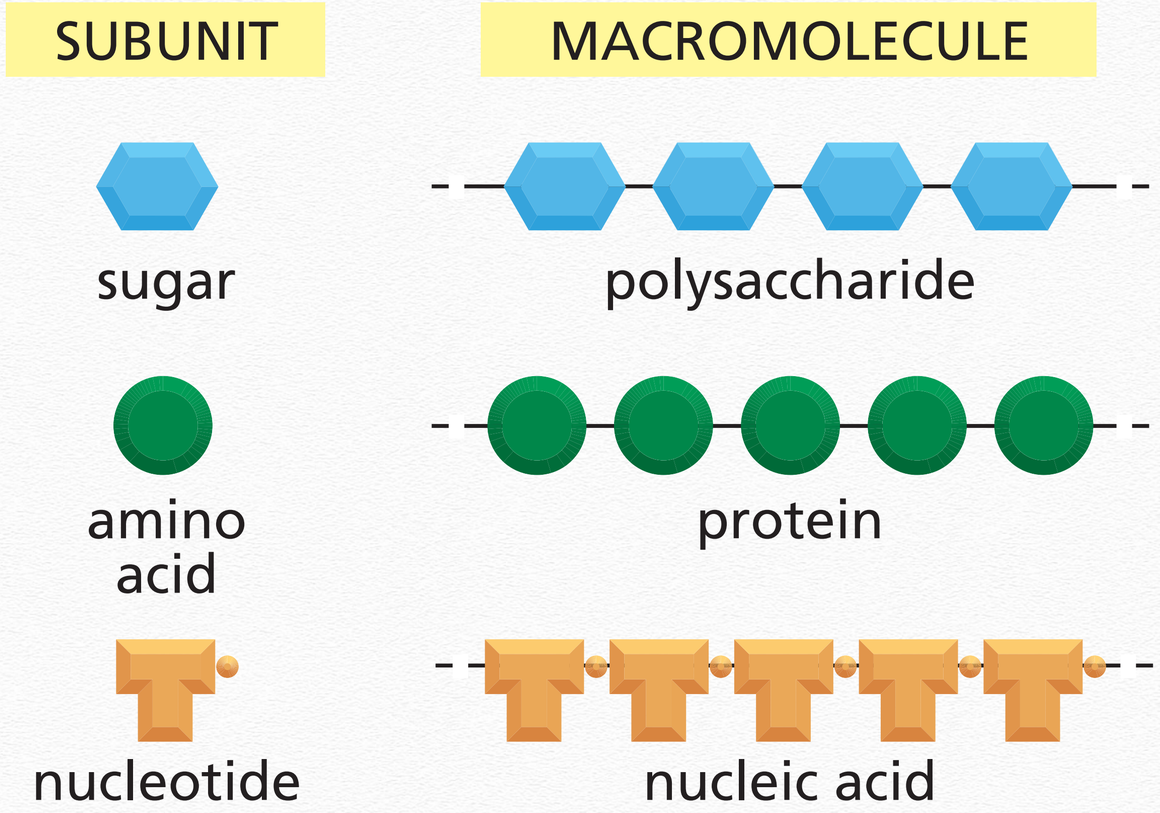
Questions from last session



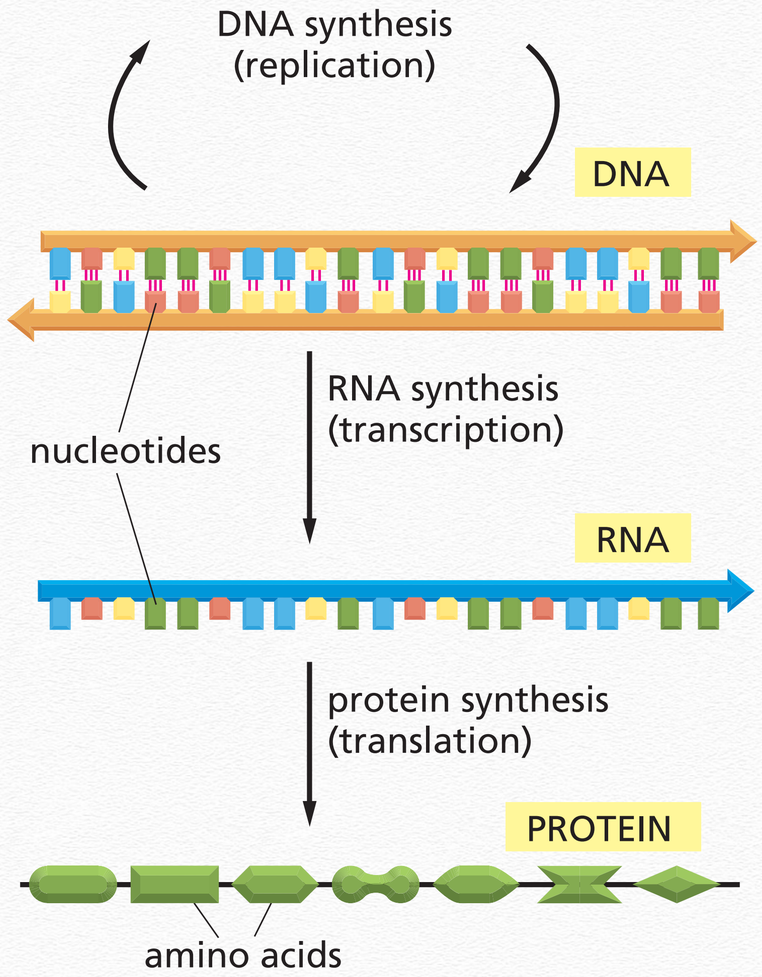
Abundant Macromolecules



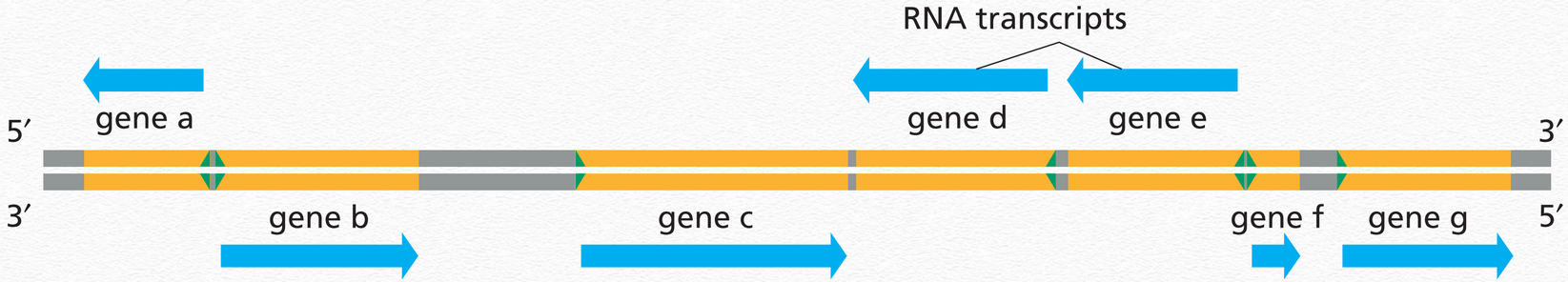
Macromolecules



Central Dogma

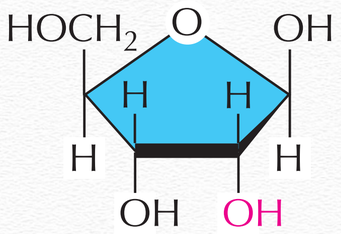


The Genes


RNA transcripts
gene a
gene d
gene e
5′
3′
3′
gene b
gene c
gene f
gene g
5′

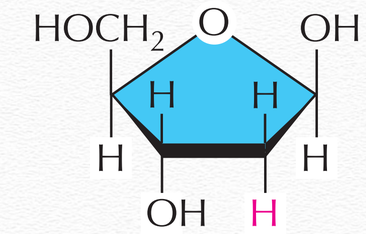
RNA: The Messenger

Chemical Structure of RNA



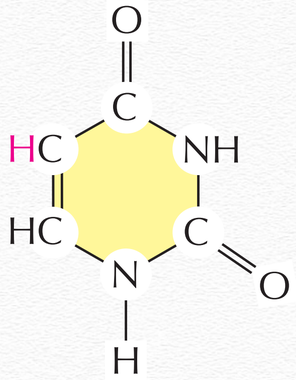
ribose

used in ribonucleic acid (RNA)



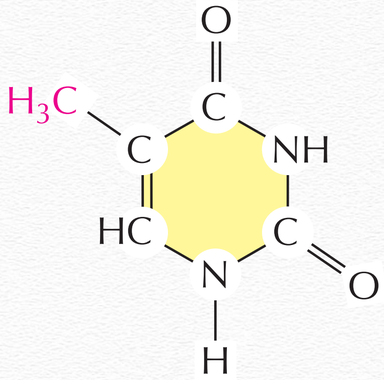
deoxyribose

used in deoxyribonucleic acid (DNA)



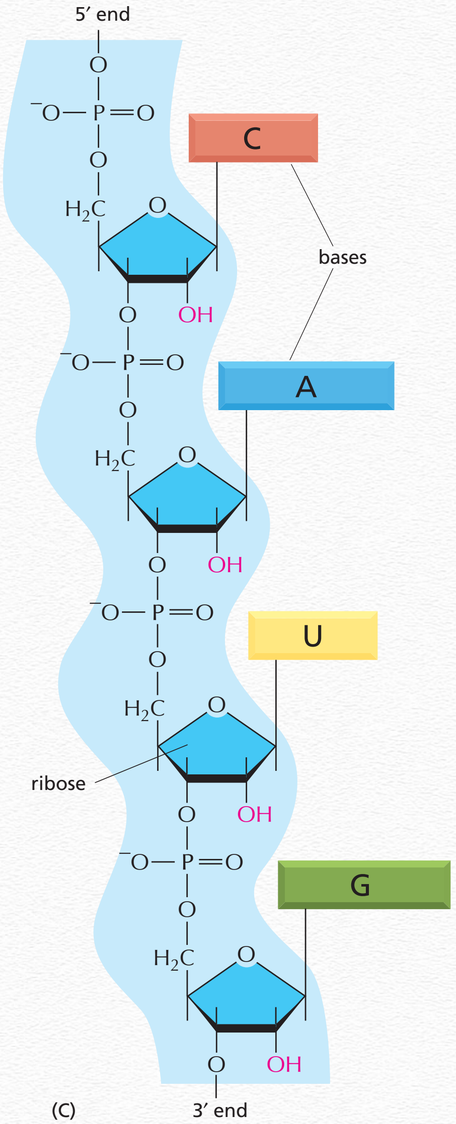
uracil

used in RNA

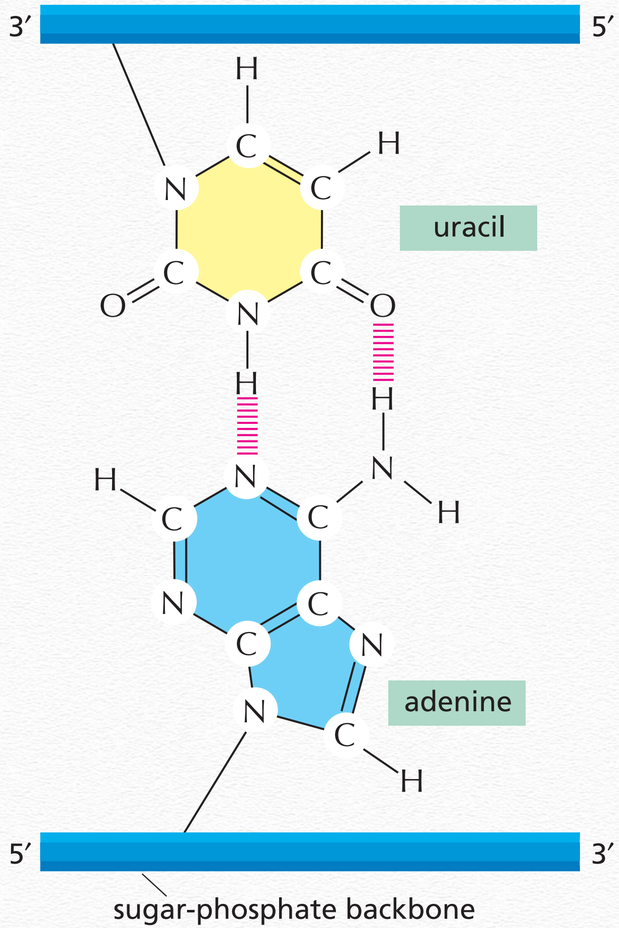


thymine

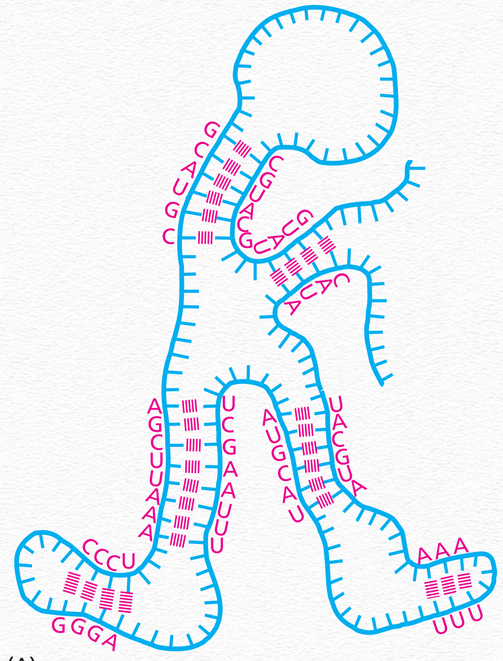
used in DNA



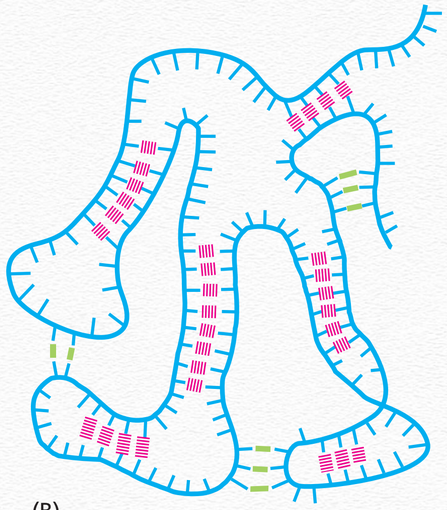
Uracil Bonding with Adenine



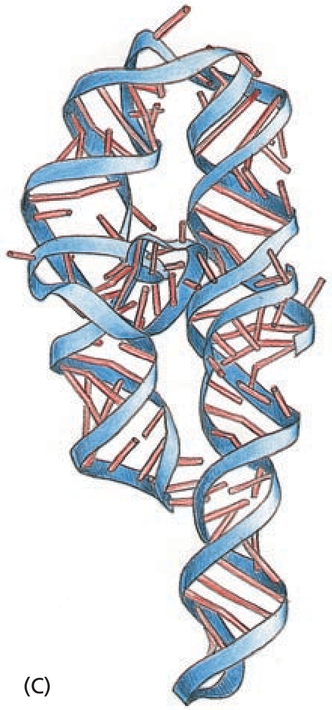
RNA Folding



(A)

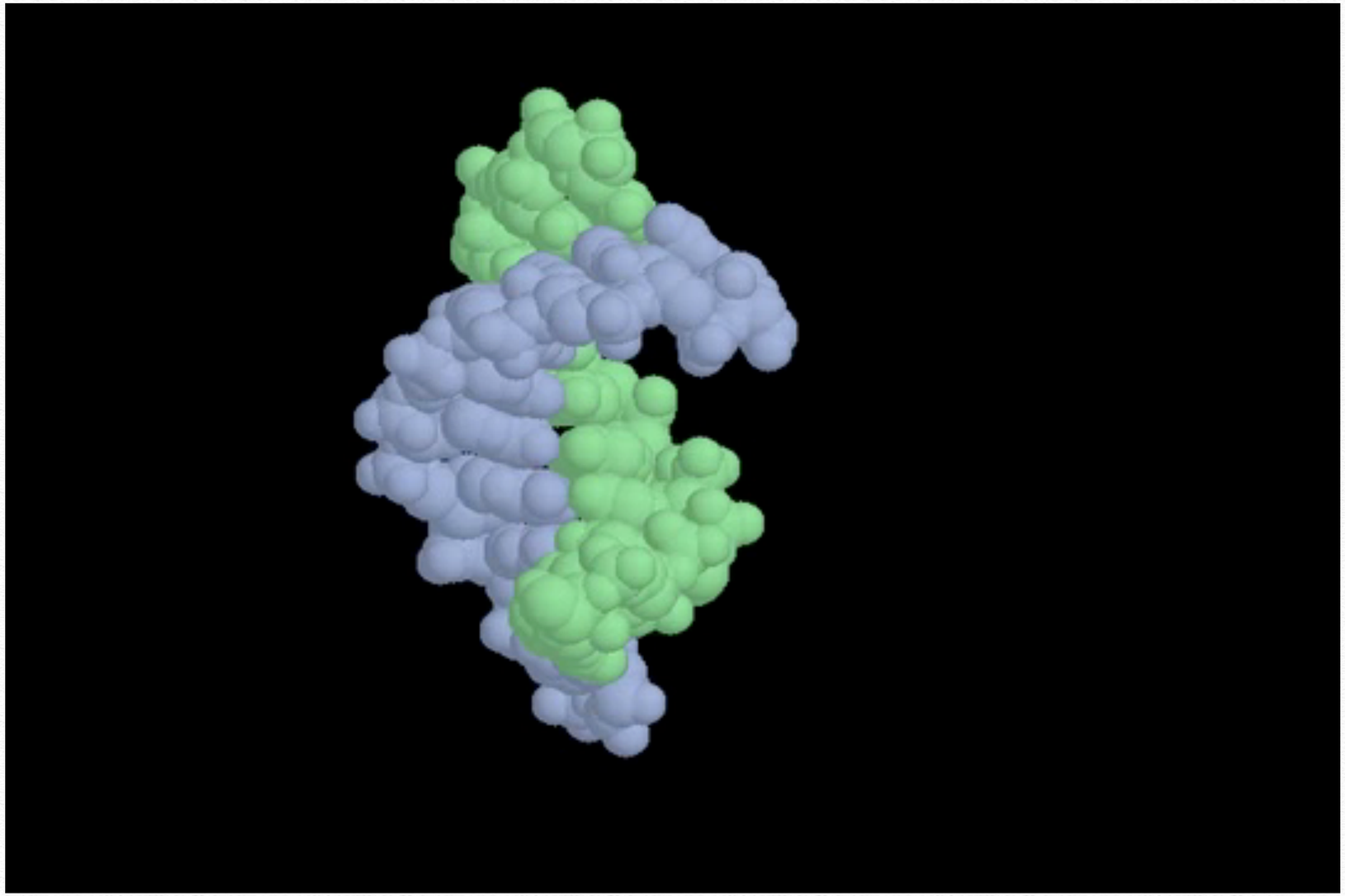


(B)



(C)

RNA Structure

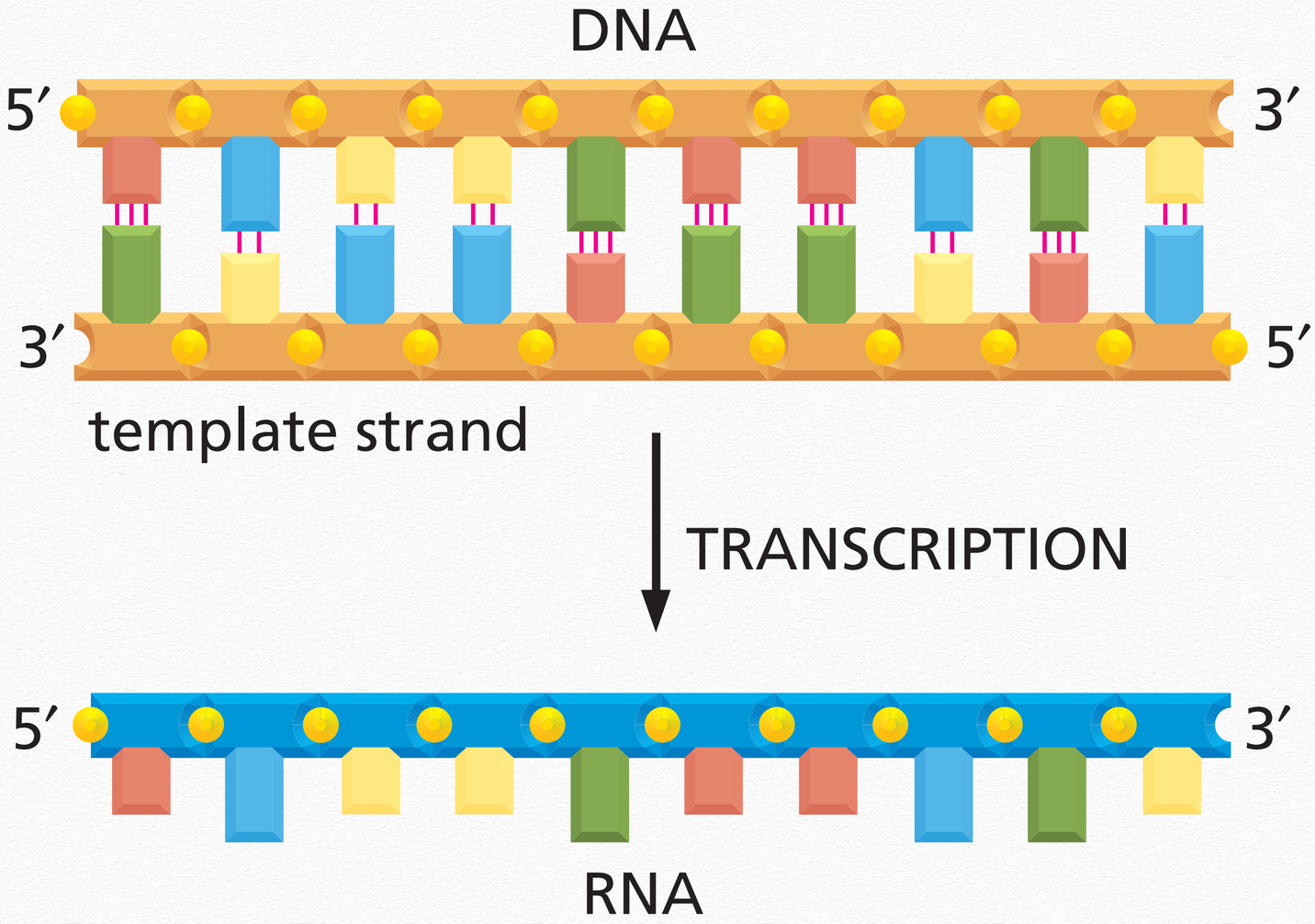


Types of RNA

TYPE OF RNA	FUNCTION
mRNAs	code for proteins
rRNAs	form the core of the ribosome and catalyze protein synthesis
miRNAs	regulate gene expression
tRNAs	serve as adaptors between mRNA and amino acids during protein synthesis
Other small RNAs	used in RNA splicing, telomere maintenance, and many other processes

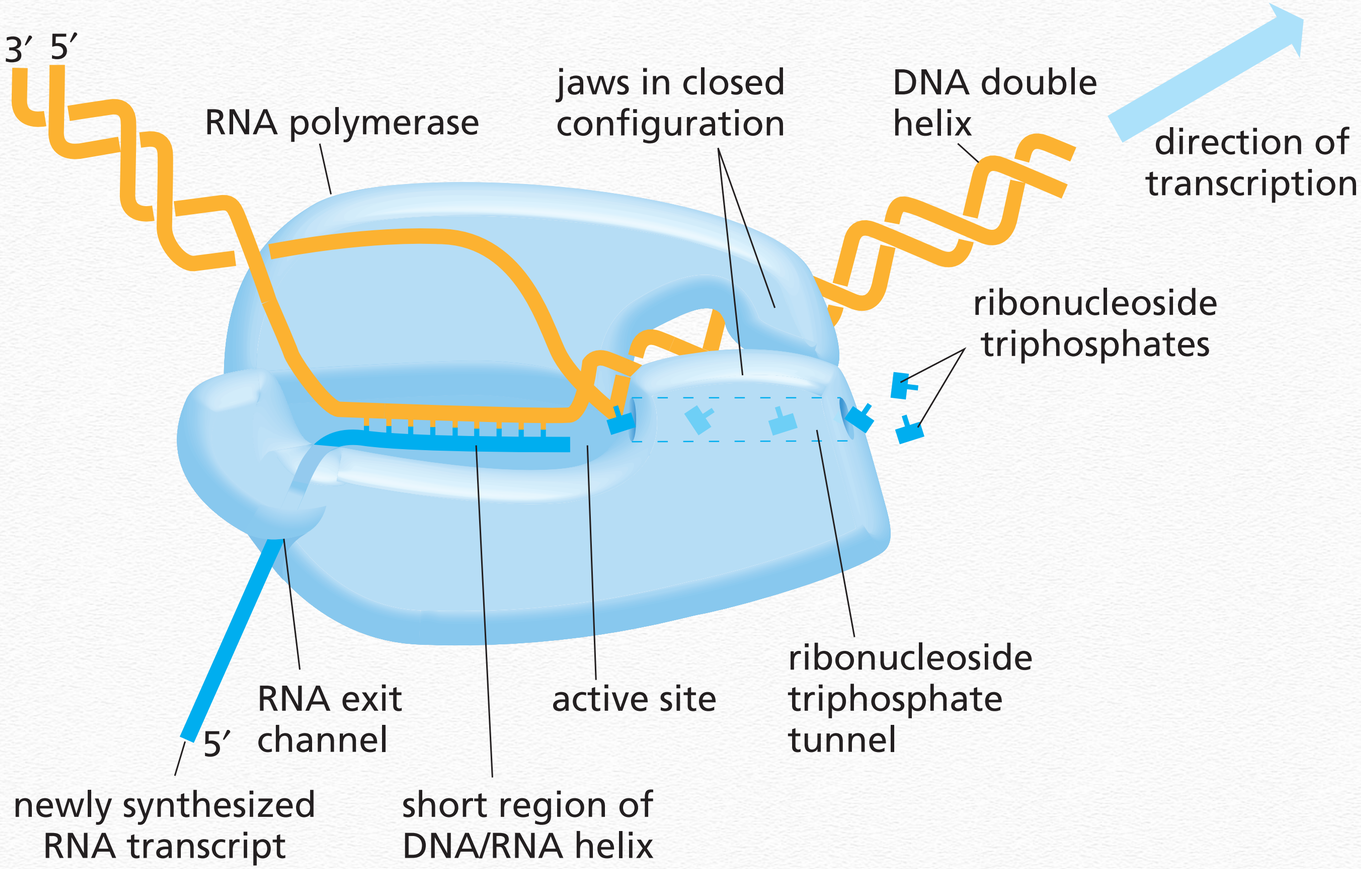
Transcription:
Making RNA from DNA

Transcription

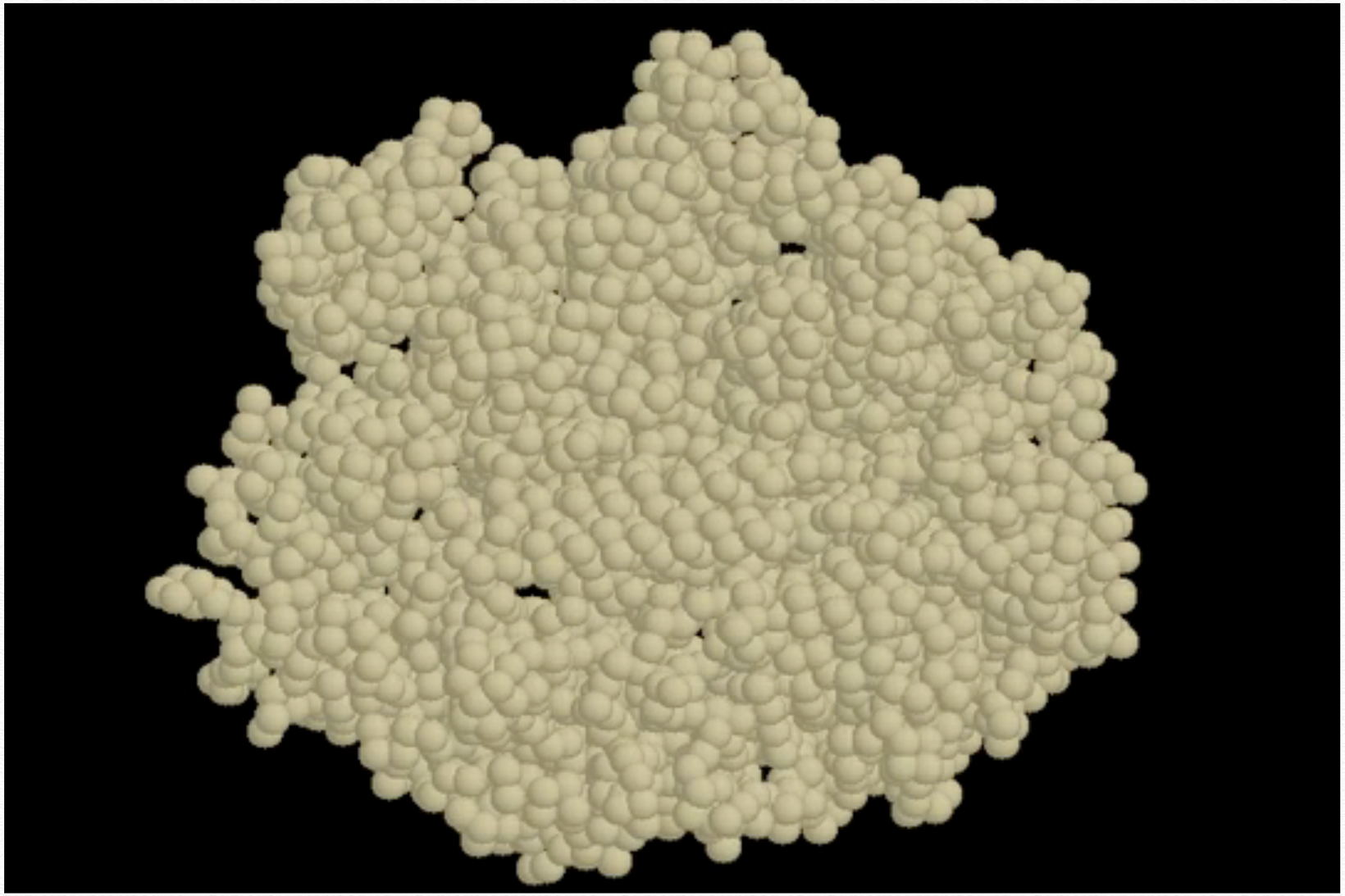


Transcription

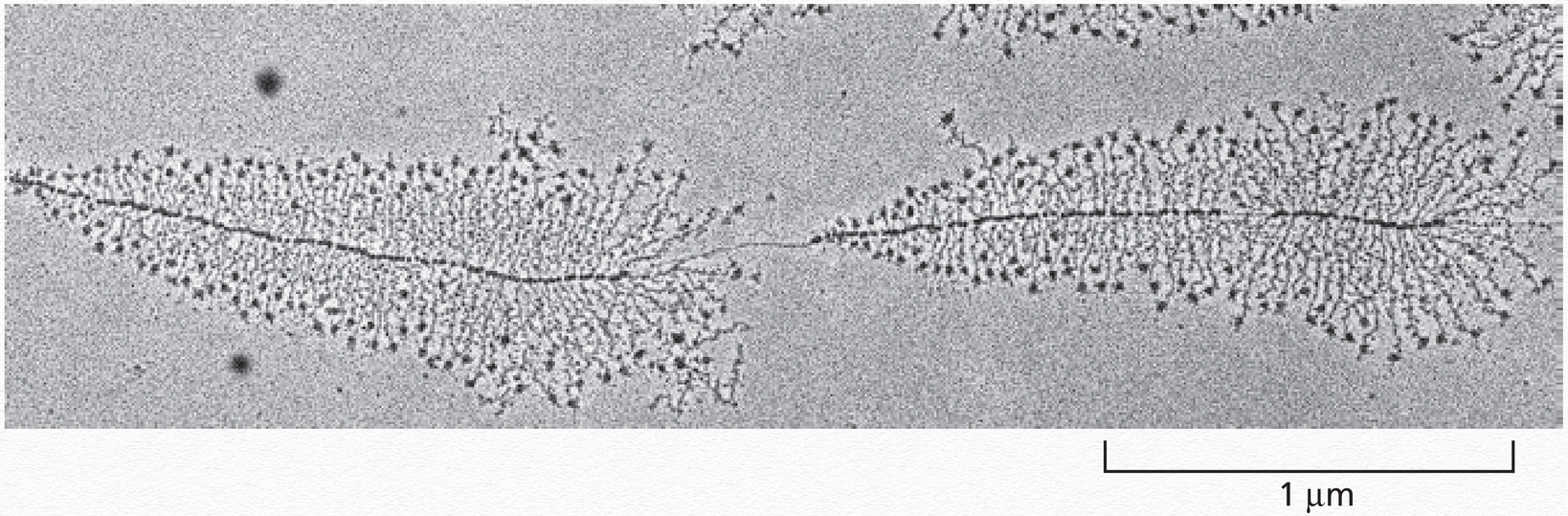
RNA-Polymerase



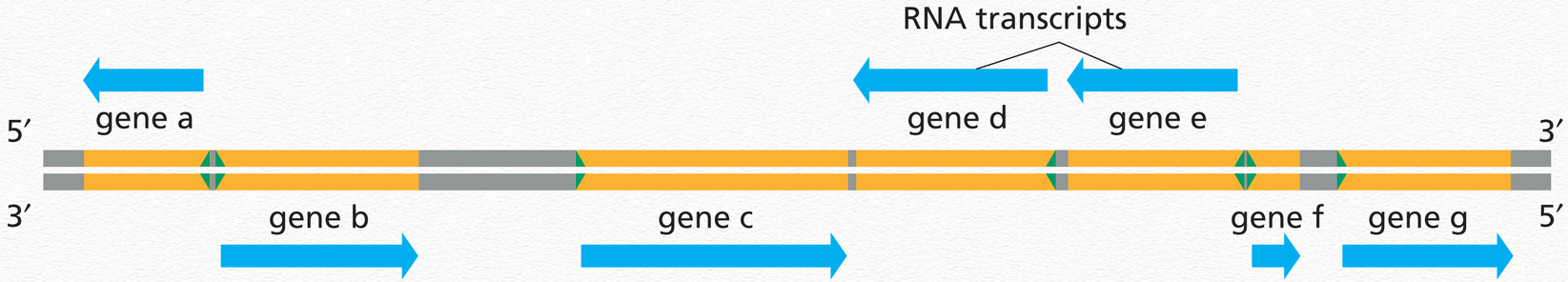
RNA-Polymerase



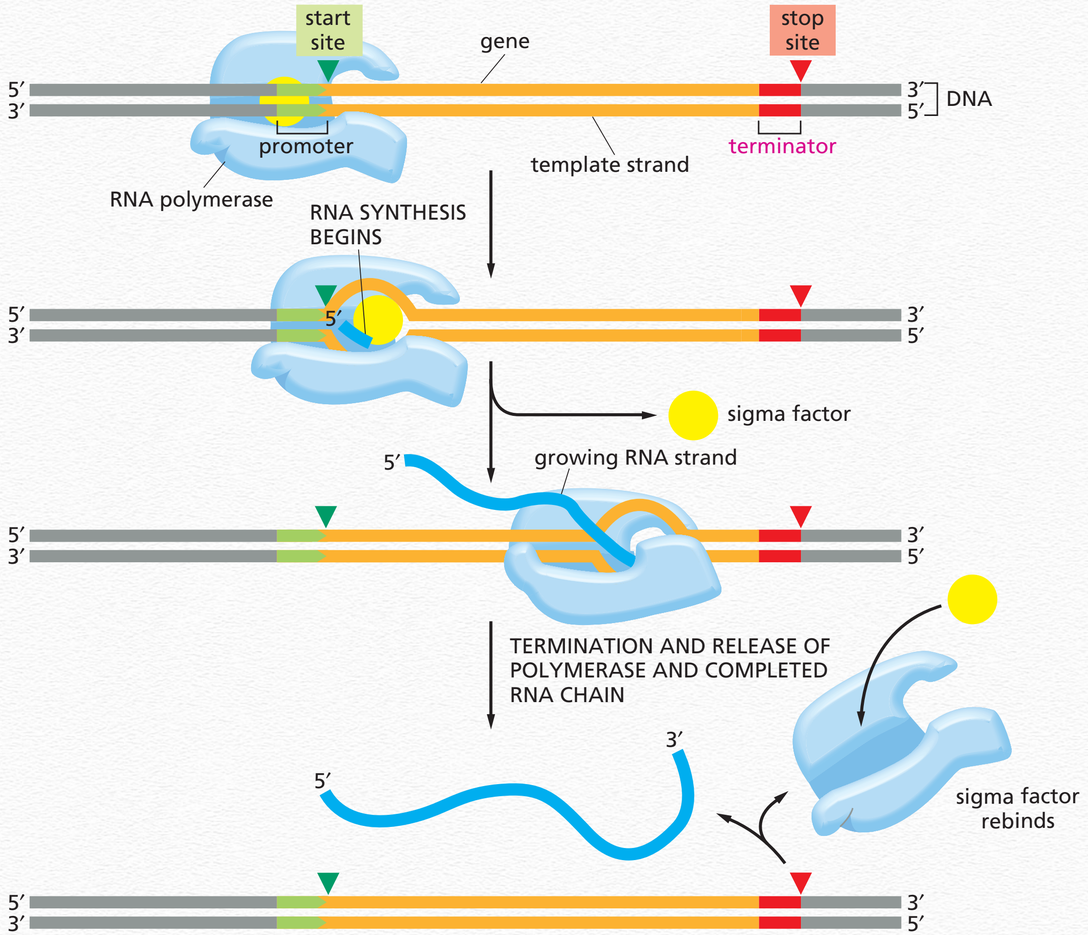
From One, Many



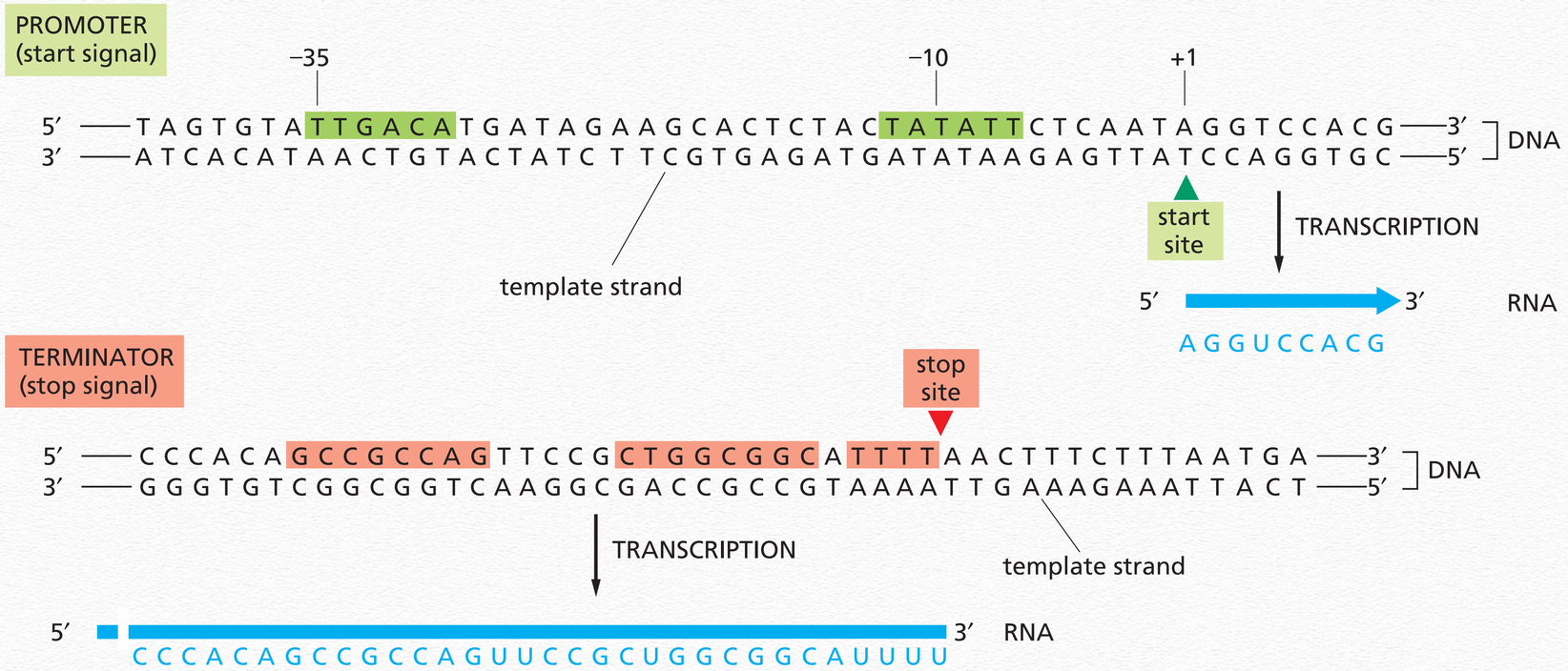
Both Directions



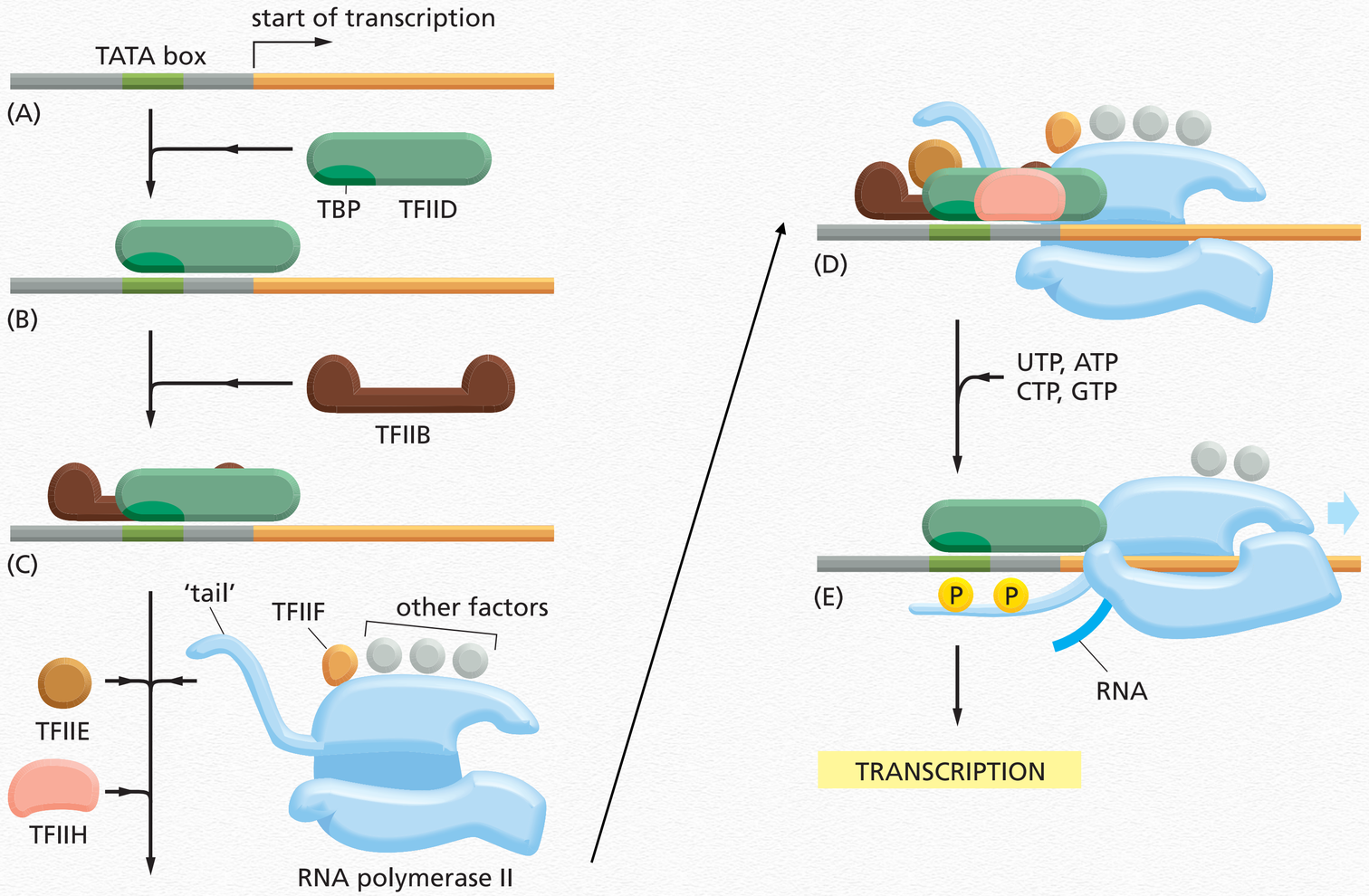
Prokaryotic Transcription



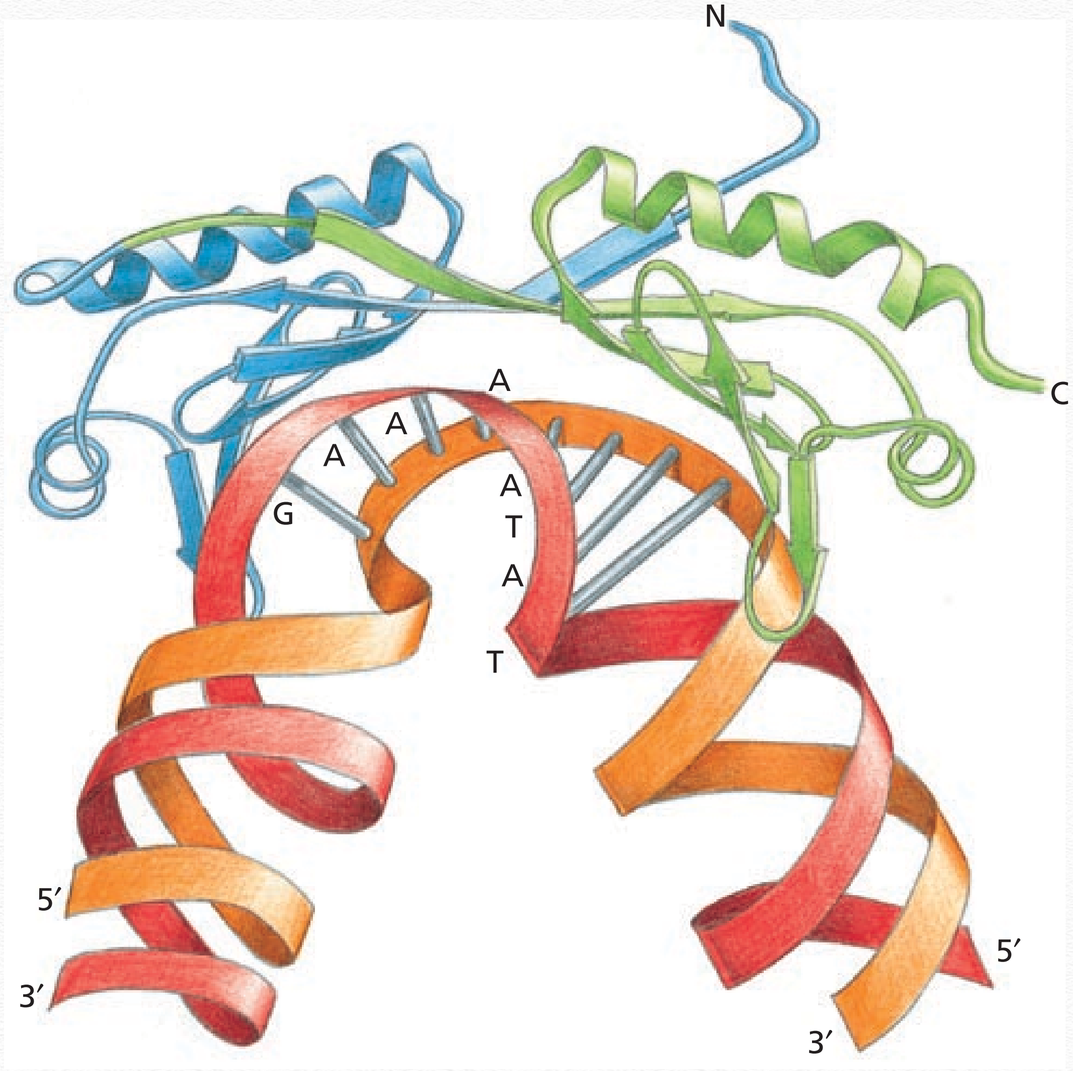
DNA Motifs


PROMOTER
(start signal)
−35
−10
+1
5′ TAGTGTATTGACATGATAGAAGCACTCTACTATATTCTCAATAGGTCCACG 3′
3′ ATCACATAACTGTACTATC T TCGTGAGATGATATAAGAGTTATCCAGGTGC 5′
DNA
start site
TRANSCRIPTION
template strand
5′ 3′ RNA
AGGUCCACG
TERMINATOR
(stop signal)
stop site
5′ CCCACAGCCGCCAGTTCCGCTGGCGGCATTTTAACTTTCTTTAATGA 3′
3′ GGGTGTCGGCGGTCAAGGCGACCGCCGTAAAATTGAAAGAAATTACT 5′
DNA
TRANSCRIPTION
template strand
5′ 3′ RNA
CCCACAGCCGCCAGUUCCGCUGGCGGCAUUUU

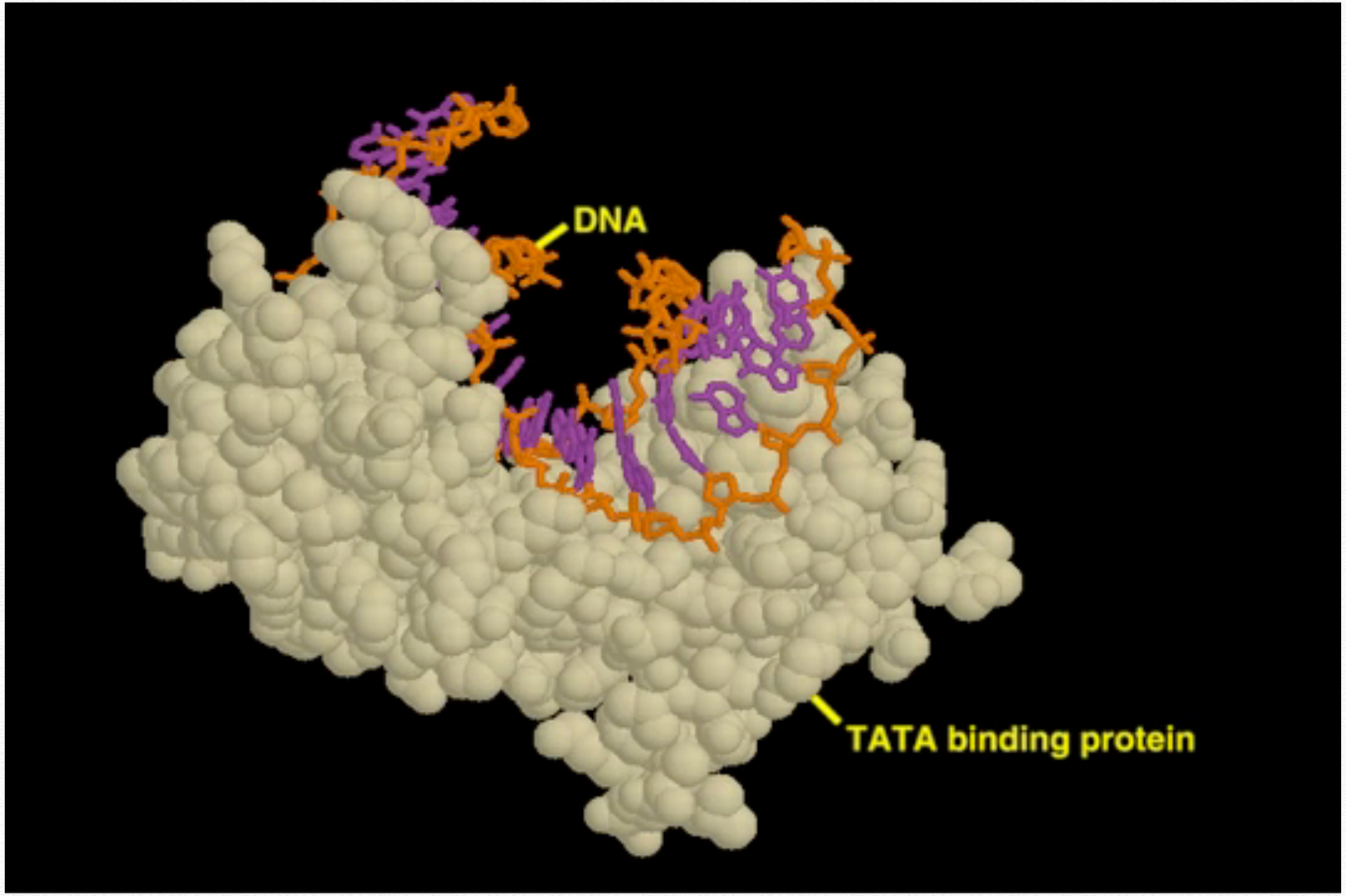
Eukaryotic Transcription



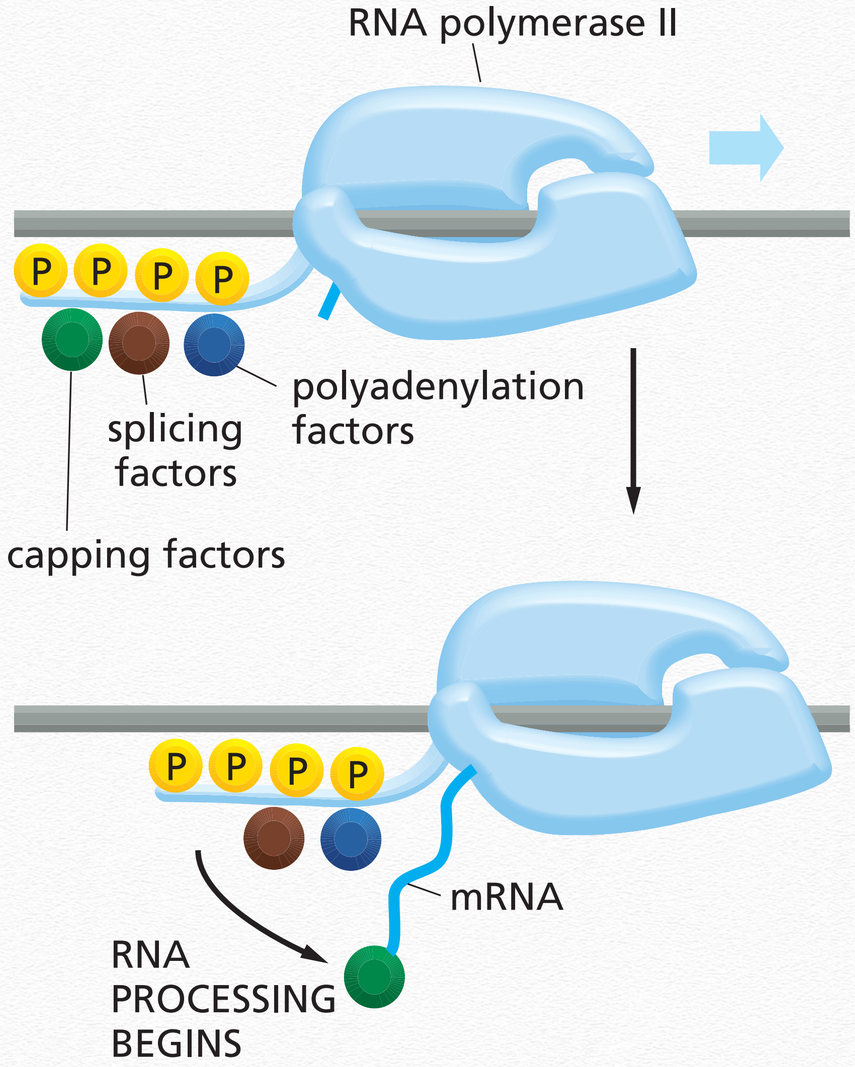
TATA-Binding Protein



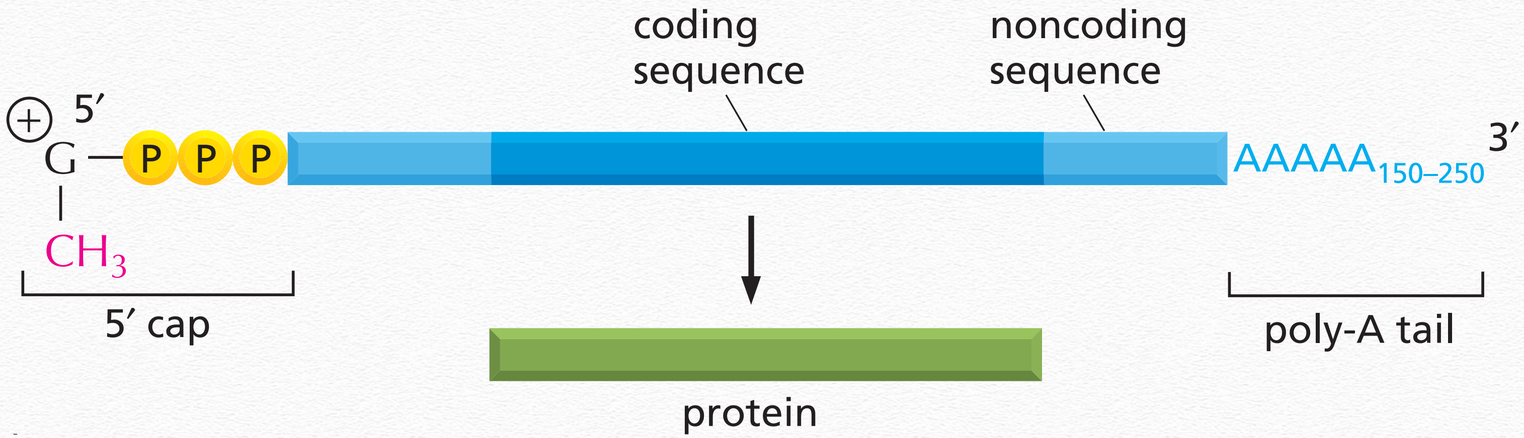
TATA-Binding Protein



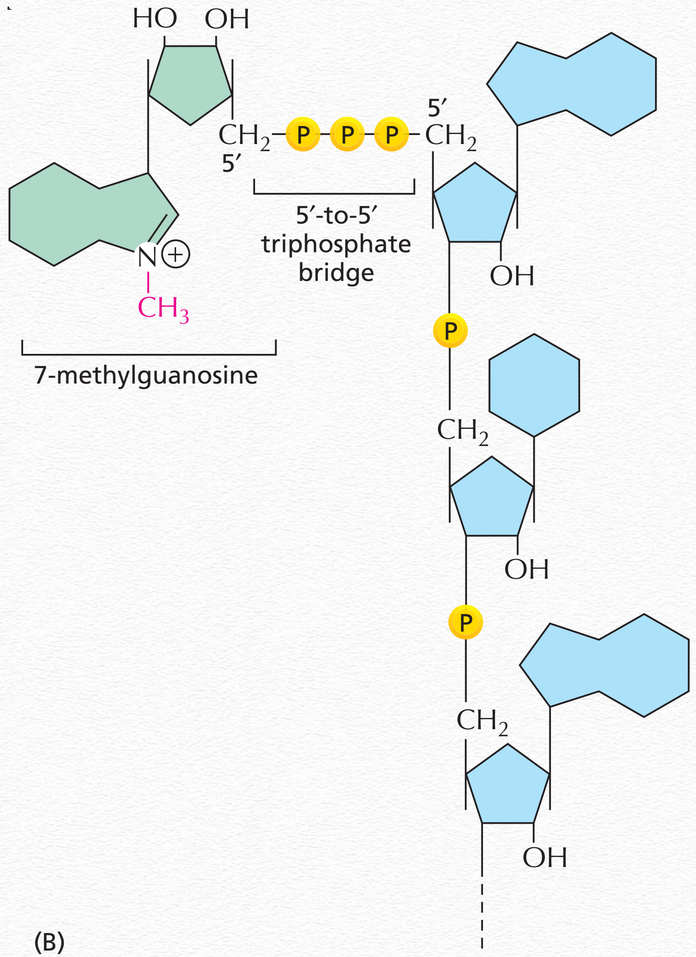
RNA Processing Proteins



5′-Cap & Poly-A tail

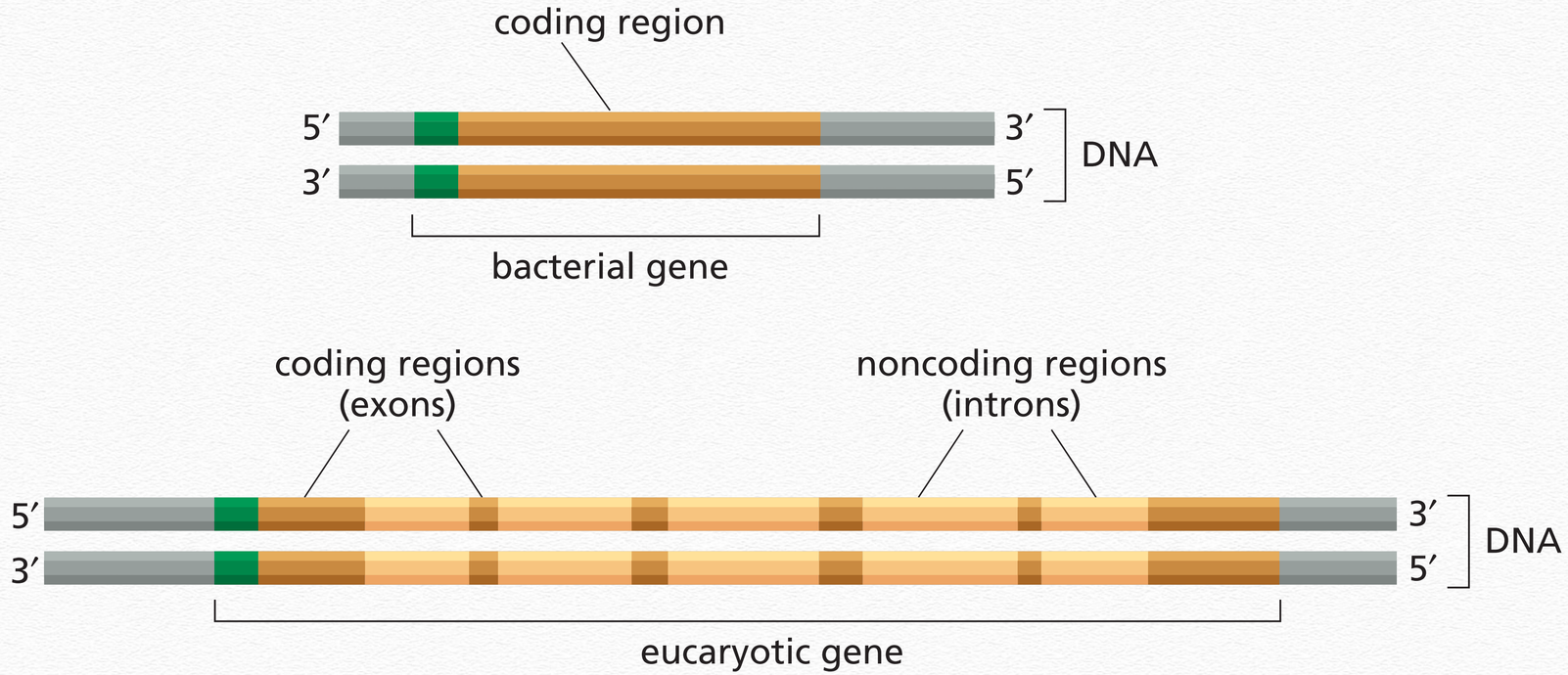


5′ Cap

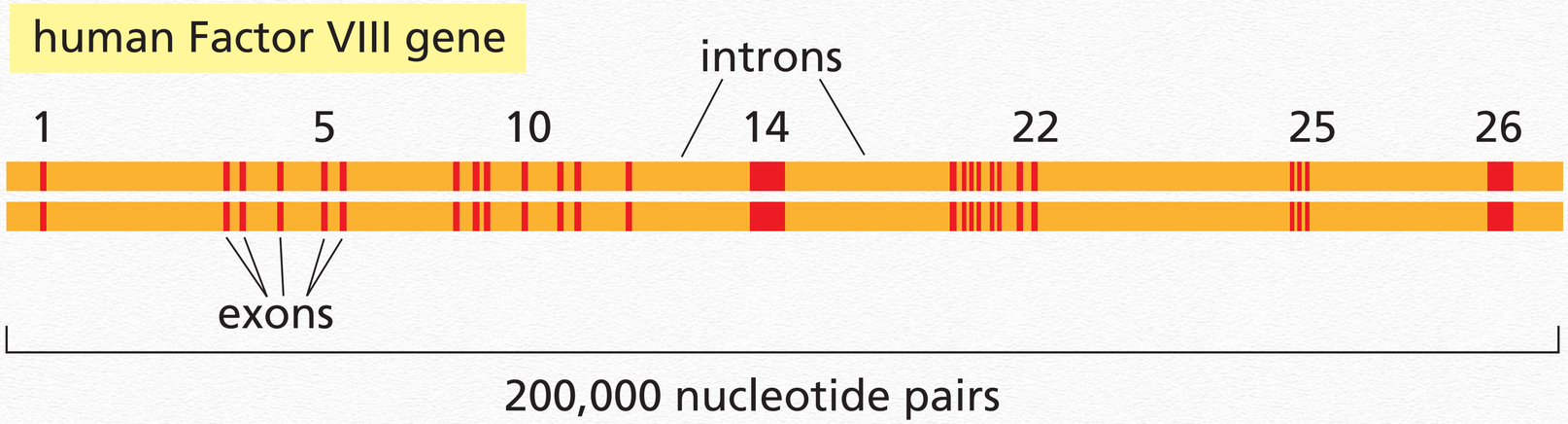

HO
OH
CH2
5′
P
P
P
5′
CH2
5′-to-5′
triphosphate
bridge
OH
N
CH3
7-methylguanosine
P
CH2
OH
P
CH2
OH

(B)

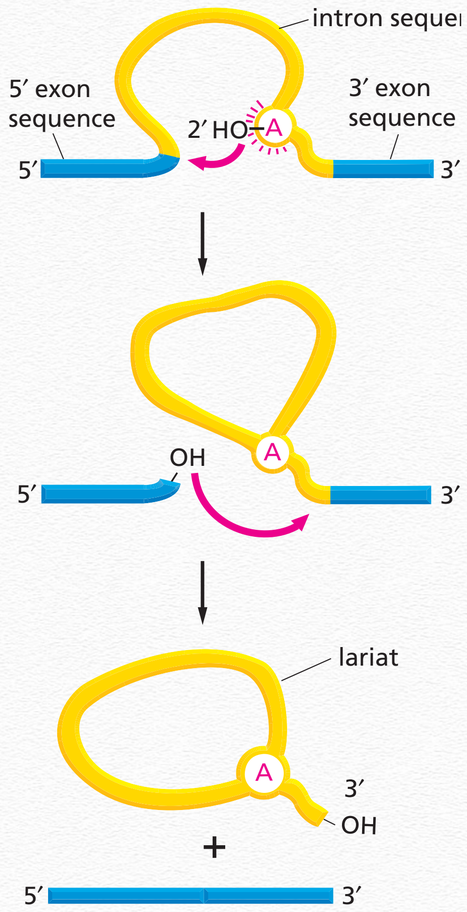
Eukaryotic & Bacterial Genes



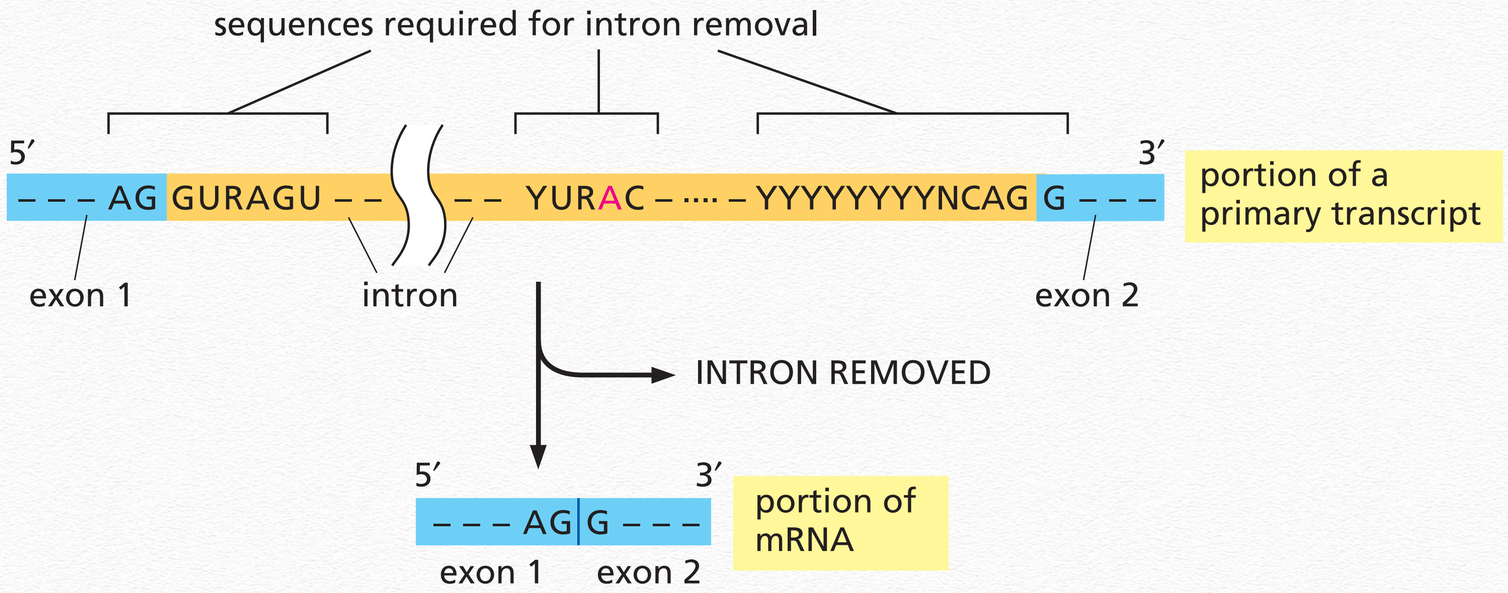
Factor VIII Gene



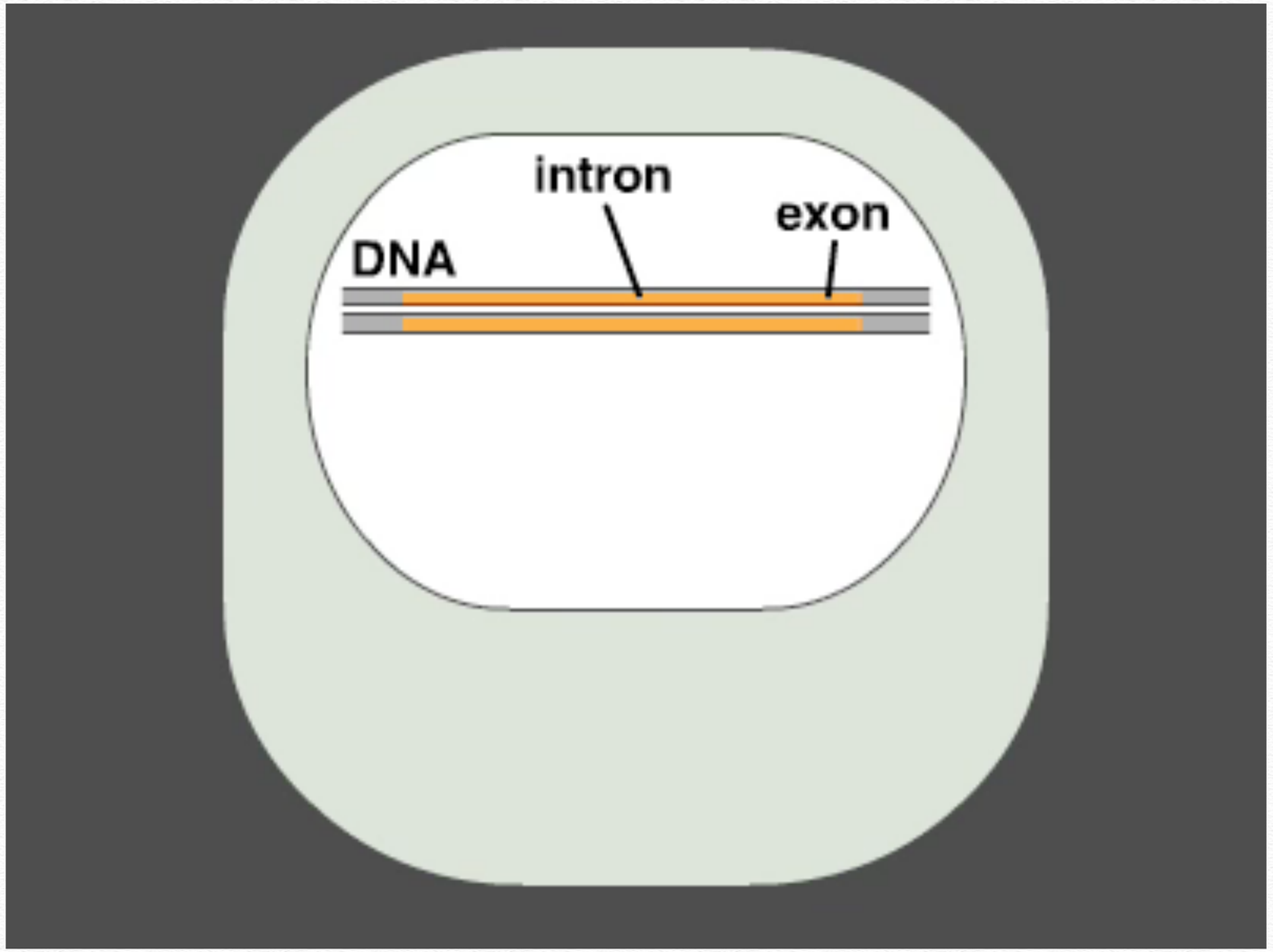
Splicing


intron sequel
5′ exon
sequence
3′ exon
sequence
2′ HO
A
5′
3′
A
OH
5′
3′
lariat
A
3′
OH
+
5′
3′

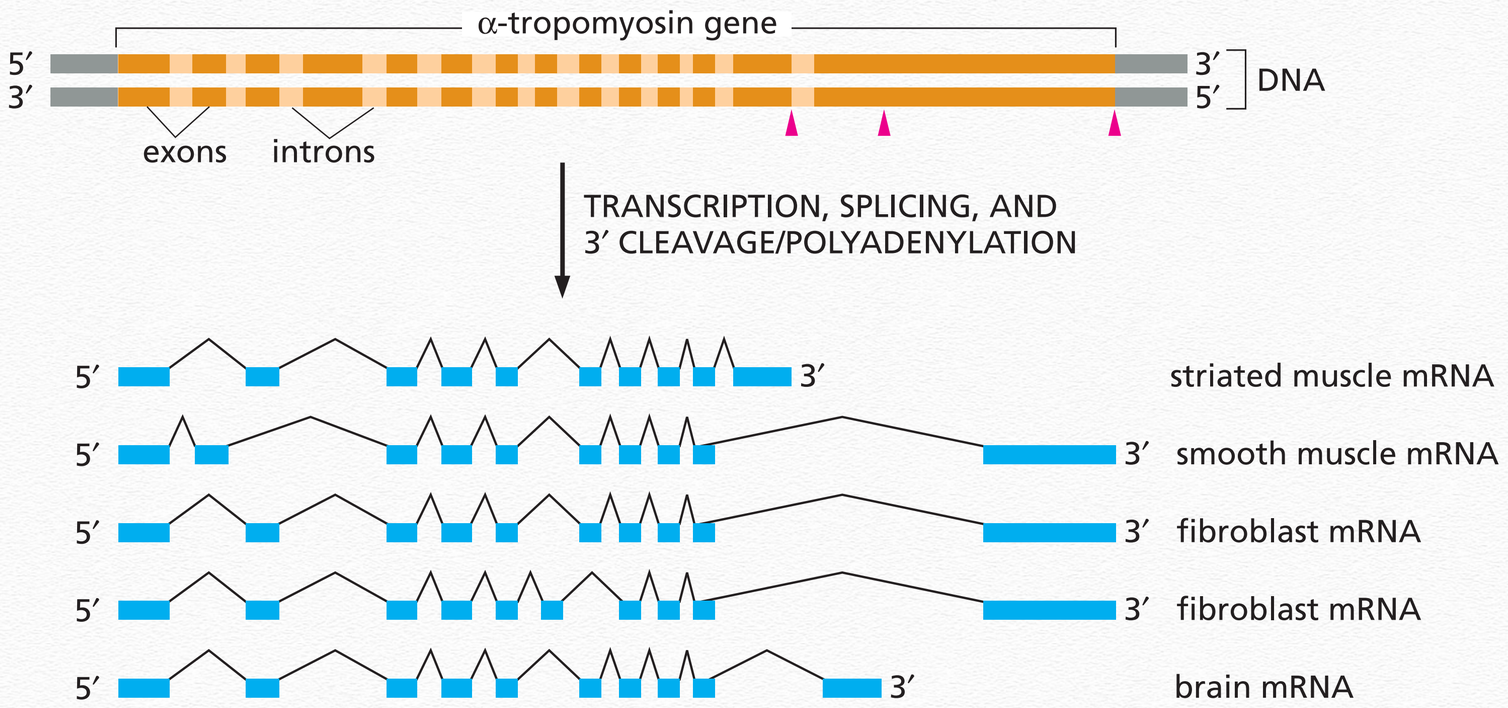
Splicing Motifs



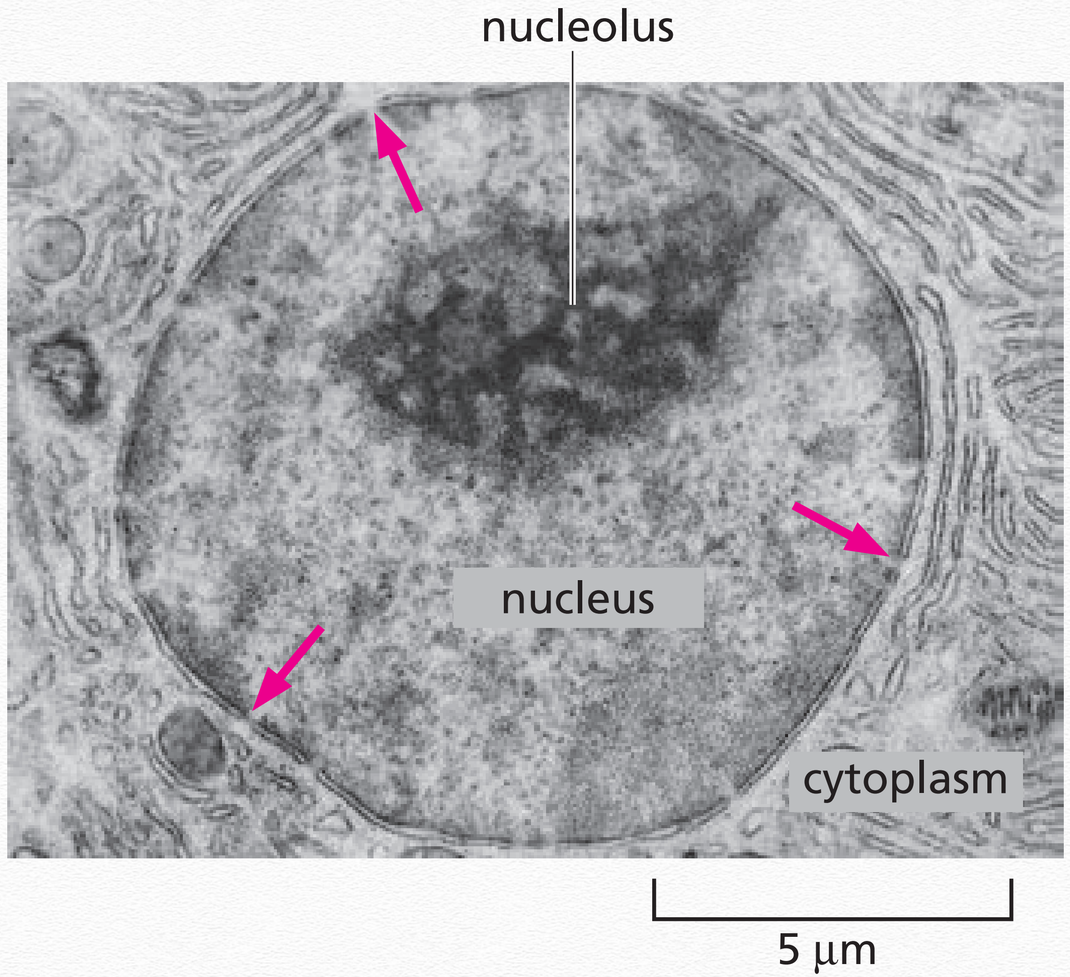
Splicing



Alternative Splicing



mRNA Export from Nucleus



Passport Control!