QBQ1354 – Biologia Molecular

Aula 8 - 2024

Transcrição em Eucariotos

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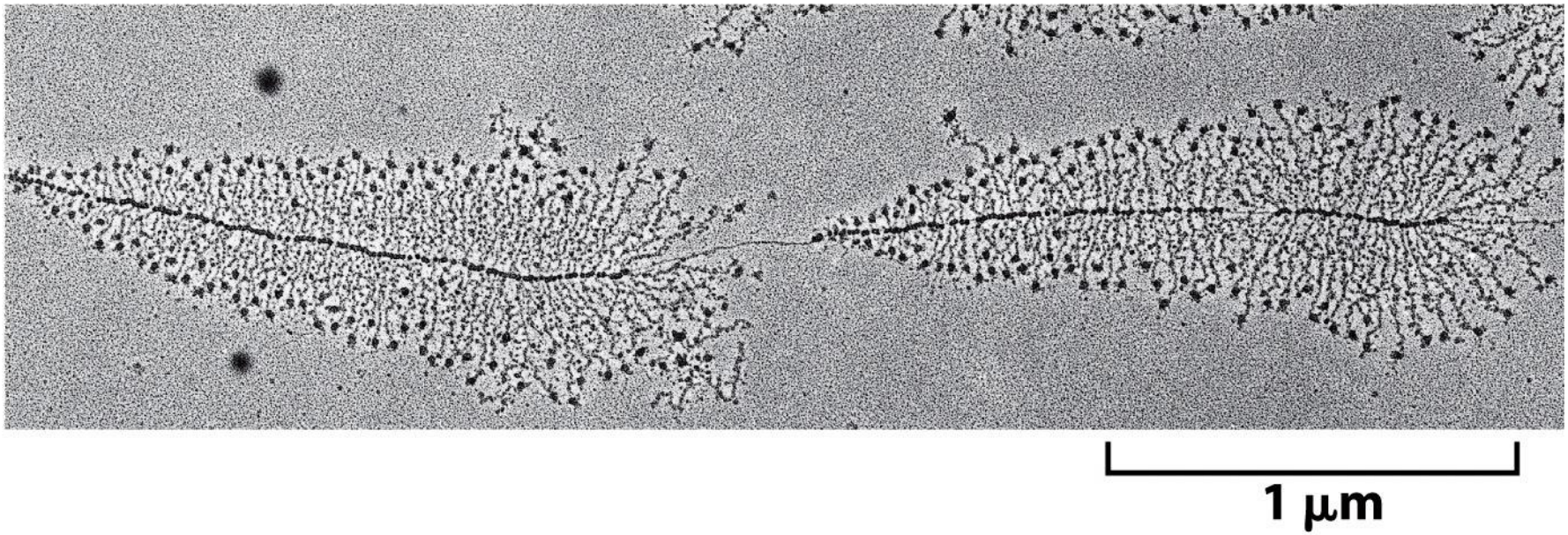
Instituto de Química
Universidade de São Paulo

Transcrição em Eucariotos



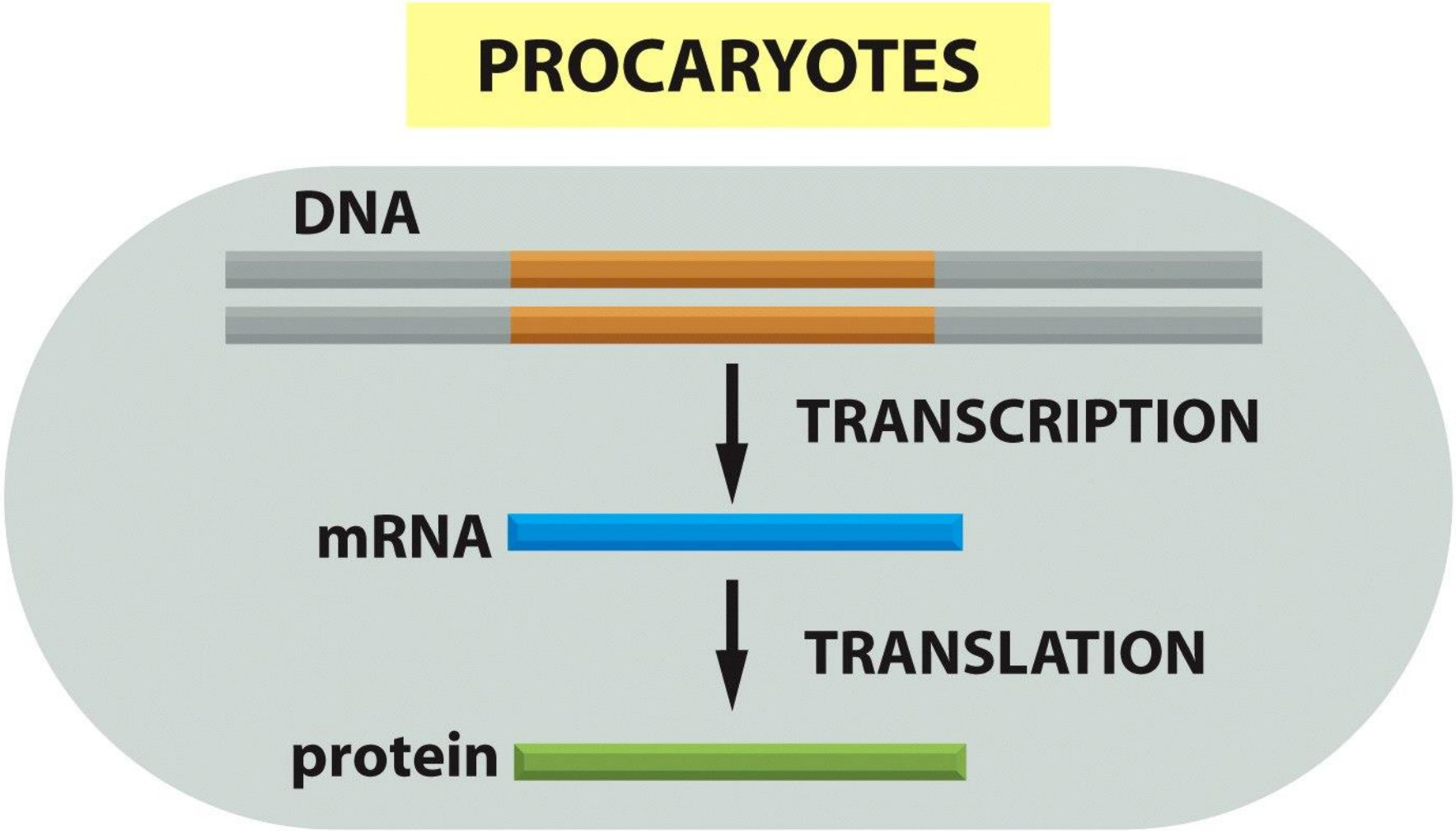
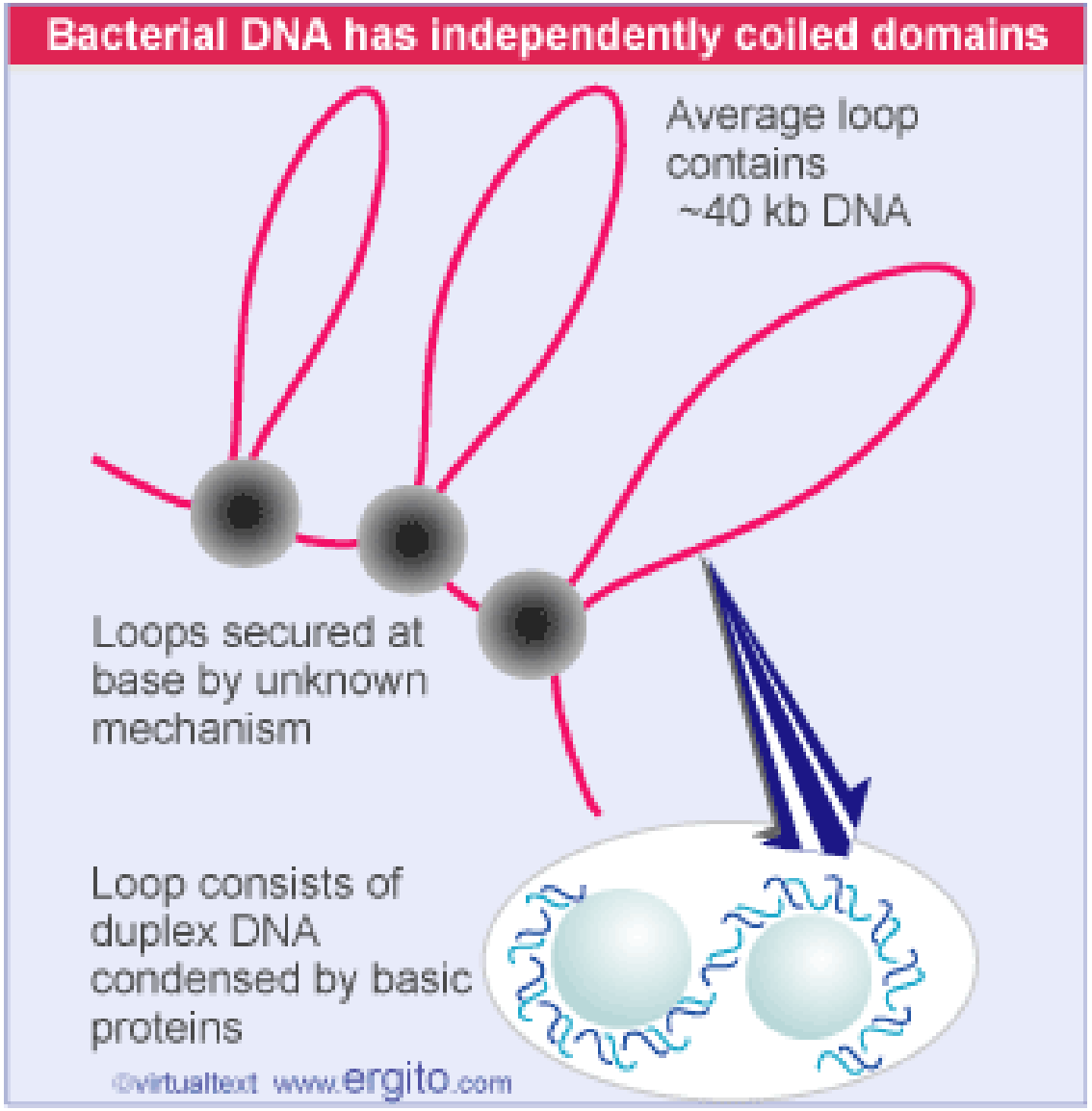


Figure 6-21b *Molecular Biology of the Cell* (© Garland Science 2008)

Bactérias


Bacterial DNA has independently coiled domains
Average loop contains ~40 kb DNA
Loops secured at base by unknown mechanism
Loop consists of duplex DNA condensed by basic proteins
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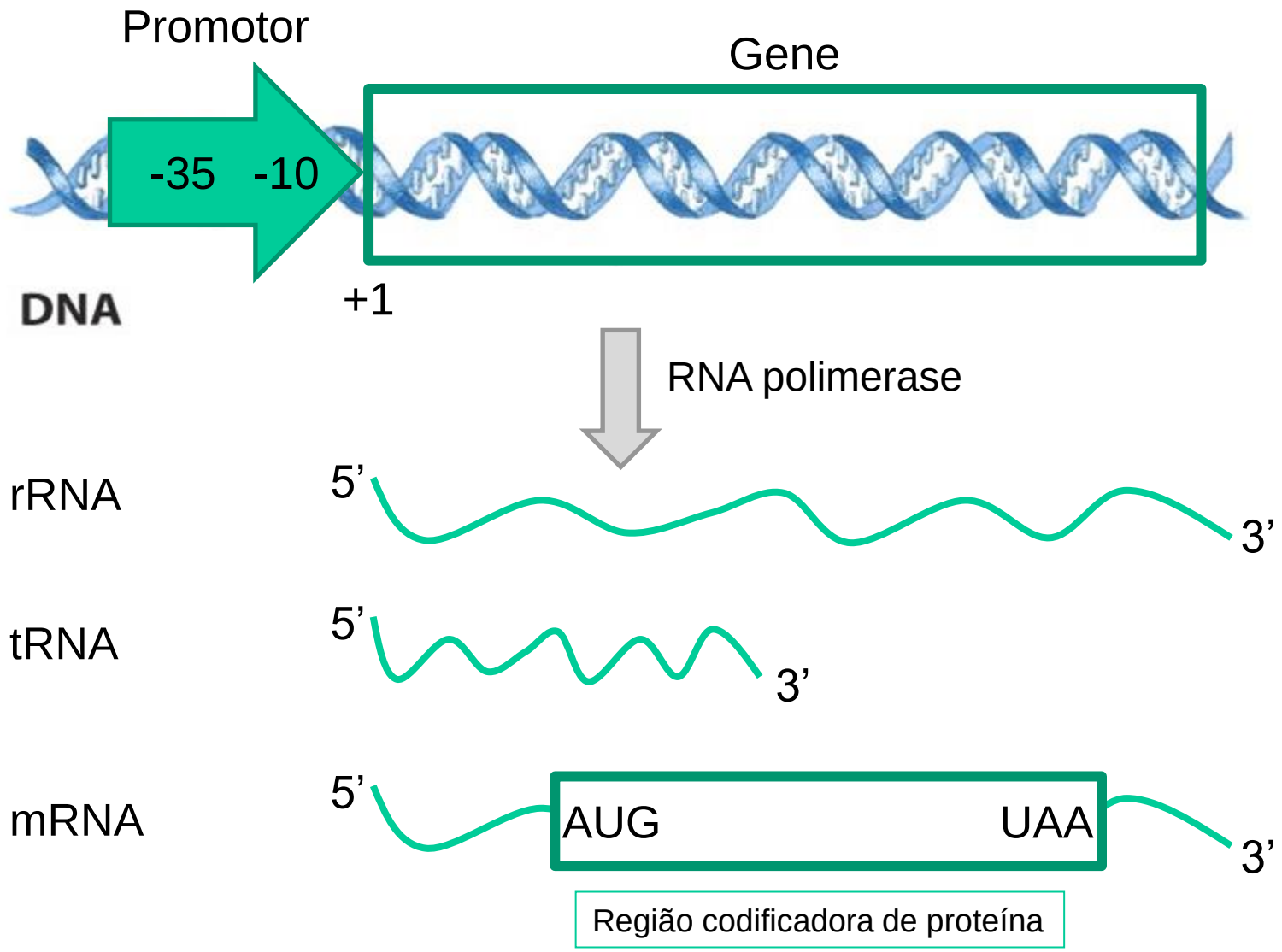
Procariotos



Transcrição em Eucariotos

Existem 3 RNA polimerases em eucariotos:

RNA pol I	⟶	rRNAs	rRNAs 18S, 25S/28S e 5.8S
RNA pol II	⟶	mRNAs	Alguns snRNAs e snoRNAs
RNA pol III	⟶	tRNAs	rRNAs 5S, snRNAs, snoRNAs

Table 6–2 The Three RNA Polymerases in Eucaryotic Cells

TYPE OF POLYMERASE	GENES TRANSCRIBED
RNA polymerase I	5.8S, 18S, and 28S rRNA genes
RNA polymerase II	all protein-coding genes, plus snoRNA genes, miRNA genes, siRNA genes, and most snRNA genes
RNA polymerase III	tRNA genes, 5S rRNA genes, some snRNA genes and genes for other small RNAs

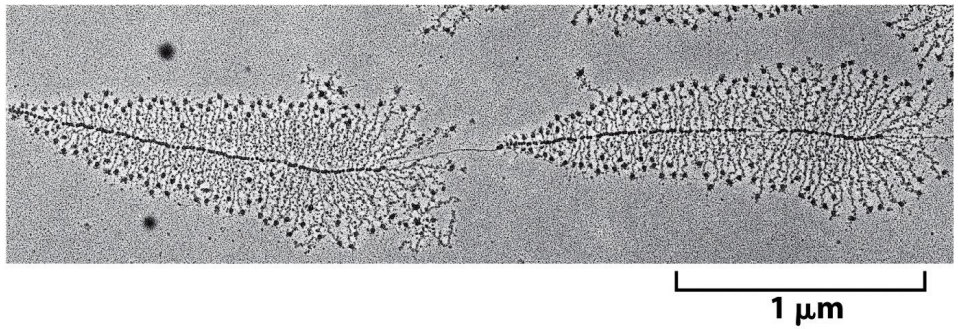
The rRNAs are named according to their "S" values, which refer to their rate of sedimentation in an ultracentrifuge. The larger the S value, the larger the rRNA.

Transcrição em Eucariotos

Existem 3 RNA polimerases em eucariotos:

RNA pol I	→	rRNAs
RNA pol II	→	mRNAs
RNA pol III	→	tRNAs

RNA polimerase I



RNA polimerase II

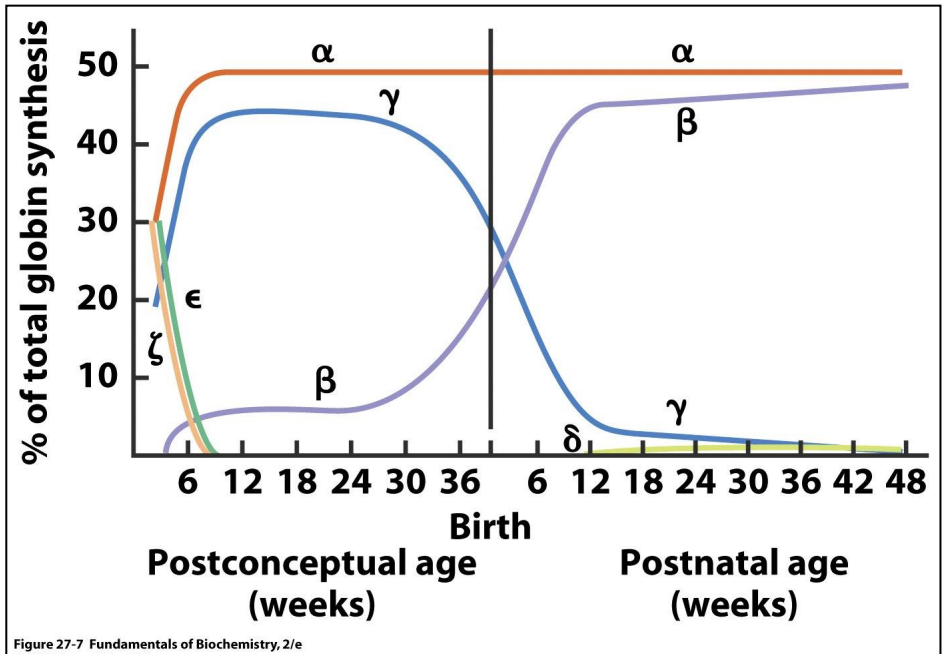


Figure 27-7 Fundamentals of Biochemistry, 2/e

Expressão de diferentes globinas ao longo do desenvolvimento humano

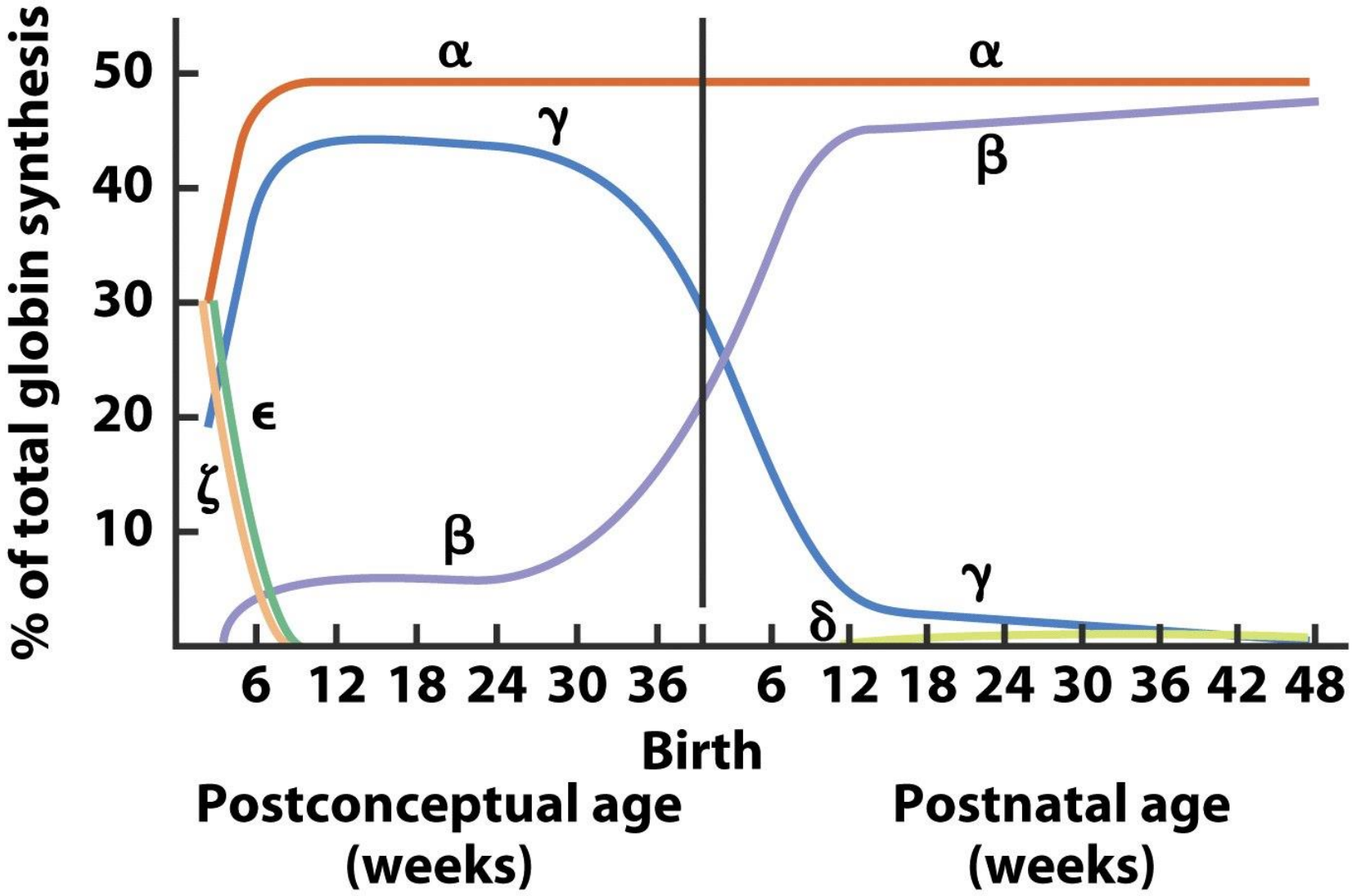


Figure 27-7 Fundamentals of Biochemistry, 2/e

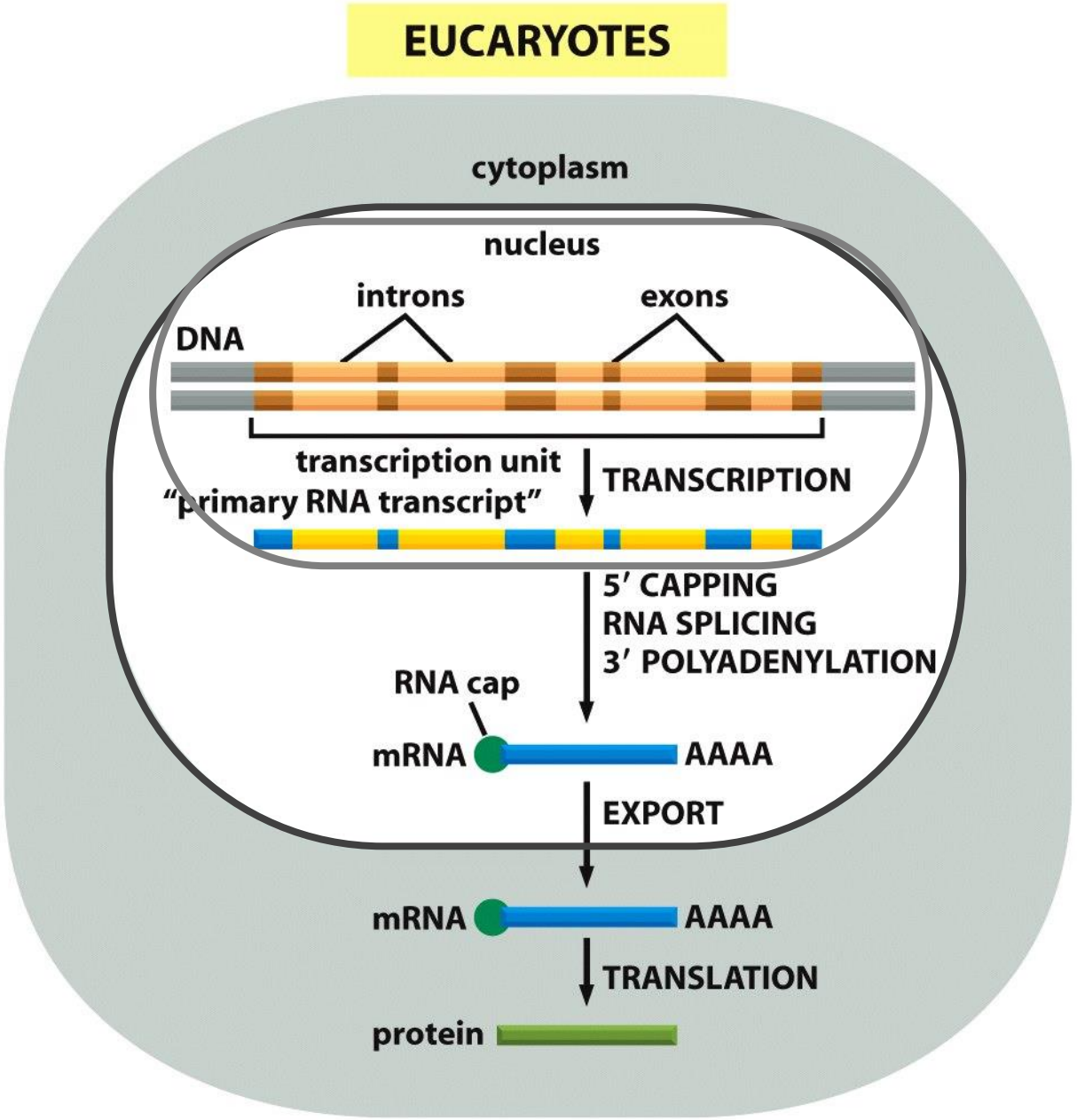


Figure 6-21a *Molecular Biology of the Cell* (© Garland Science 2008)

Eucariotos

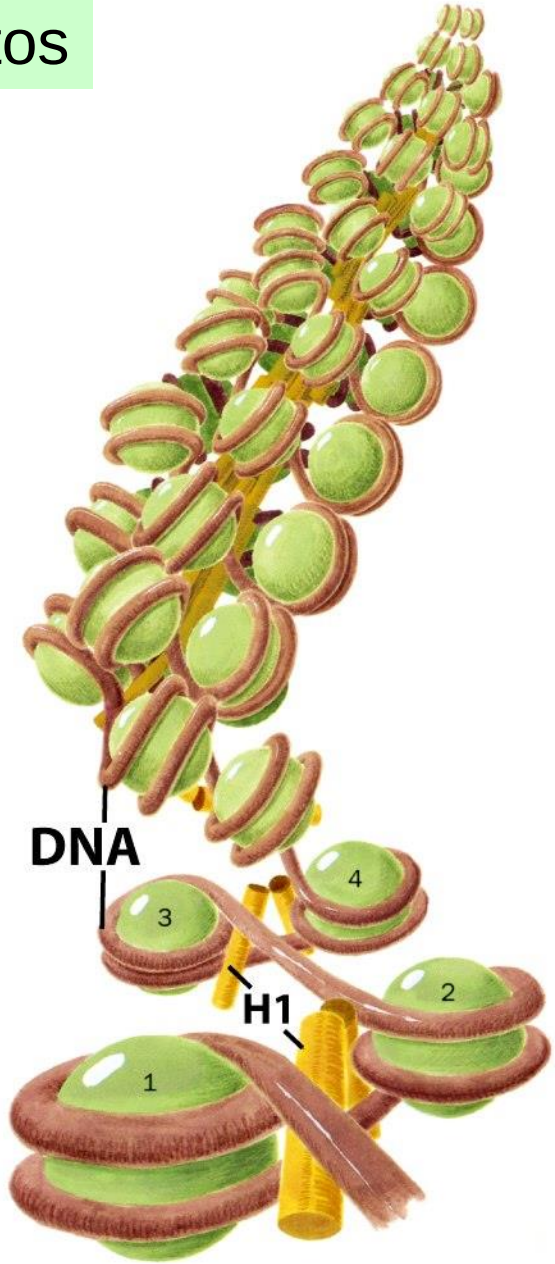
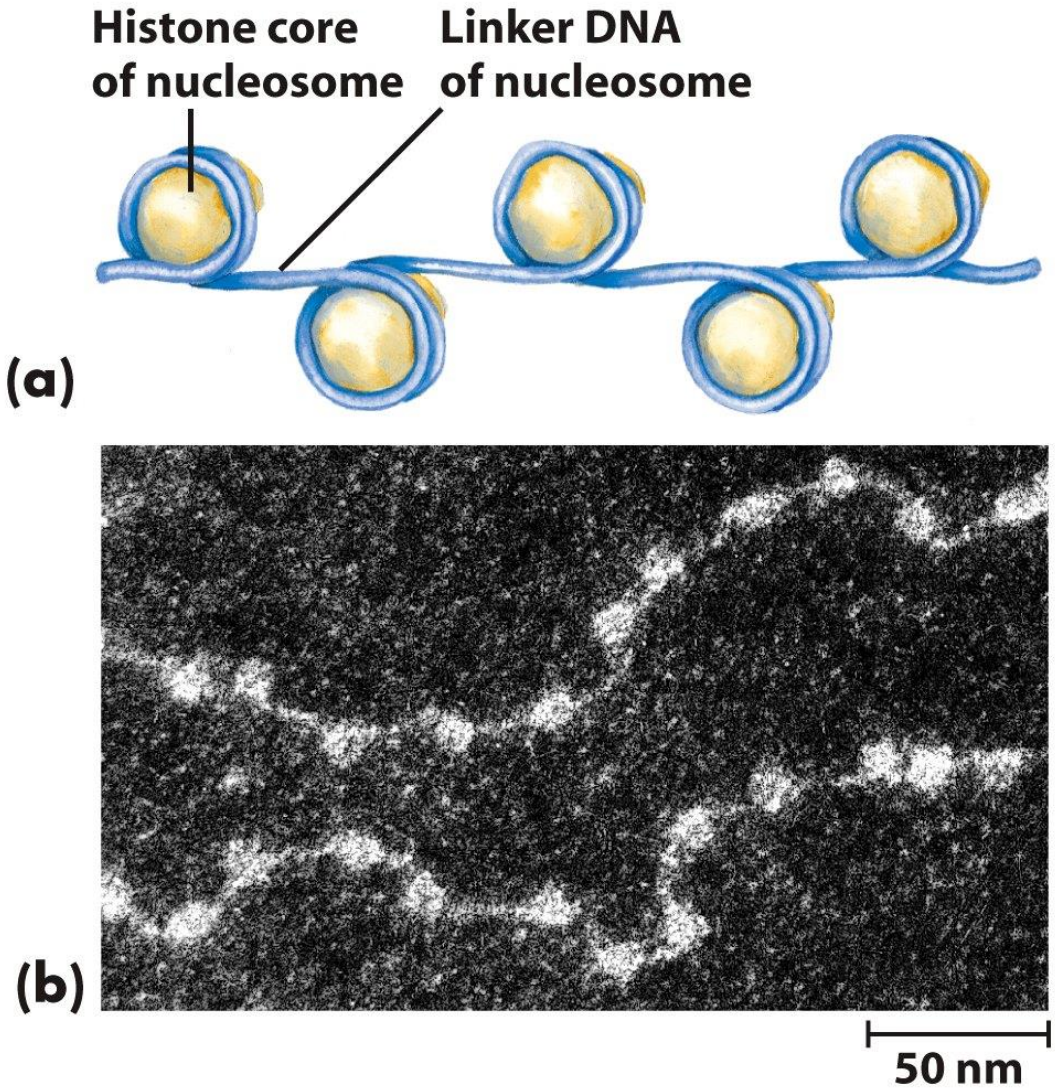
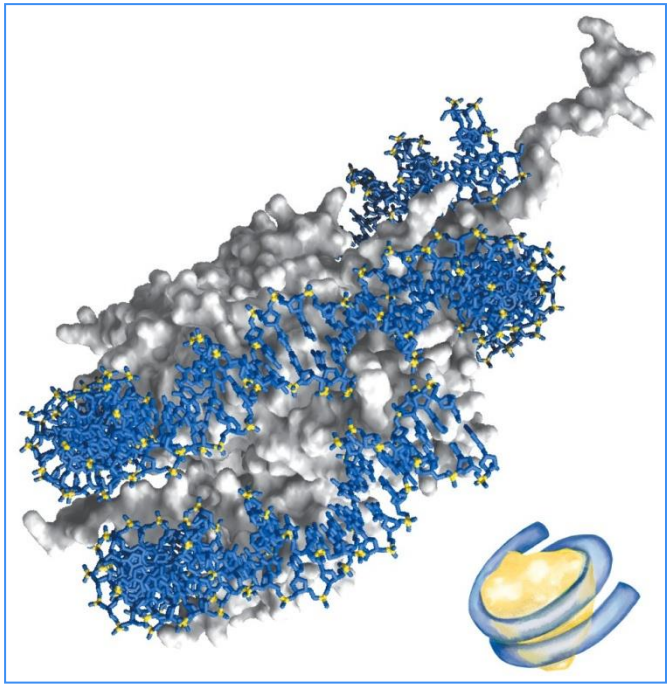


Figure 23-50 Fundamentals of Biochemistry, 2/e

Nucleossomos





Histonas

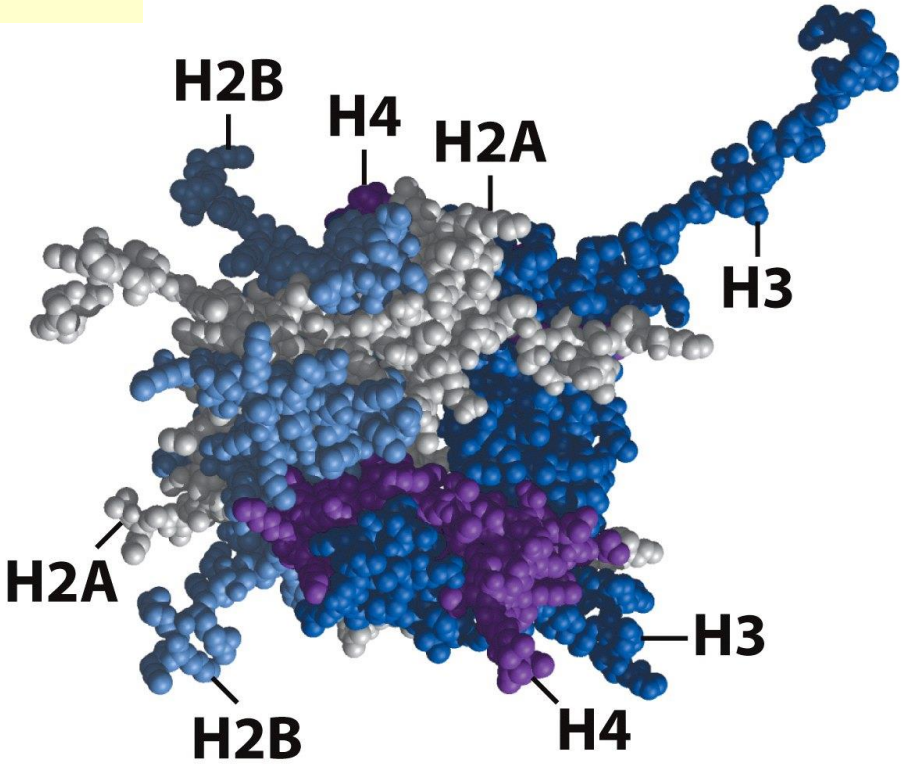


table 24–3

Types and Properties of Histones

Histone	Molecular weight	Number of amino acid residues	Content of basic amino acids (% of total)	
			Lys	Arg
H1*	21,130	223	29.5	1.3
H2A*	13,960	129	10.9	9.3
H2B*	13,774	125	16.0	6.4
H3	15,273	135	9.6	13.3
H4	11,236	102	10.8	13.7

*The sizes of these histones vary somewhat from species to species. The numbers given here are for bovine histones.

Eucariotos

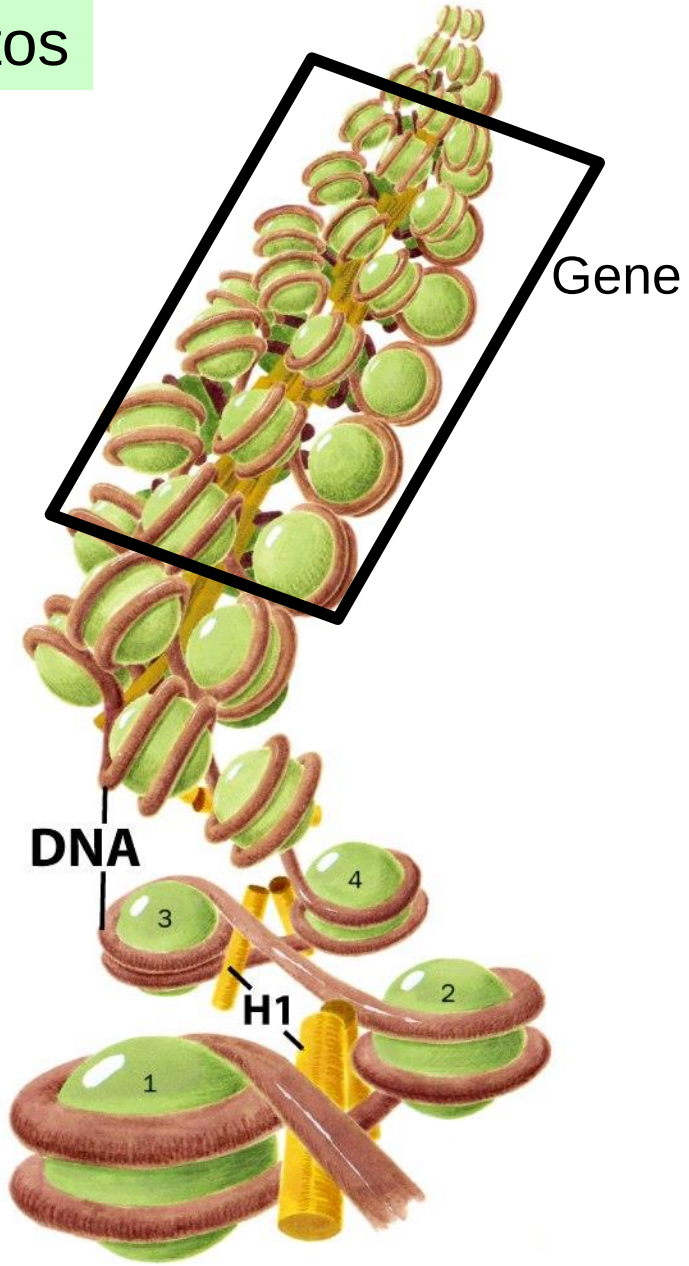


Figure 23-50 Fundamentals of Biochemistry, 2/e

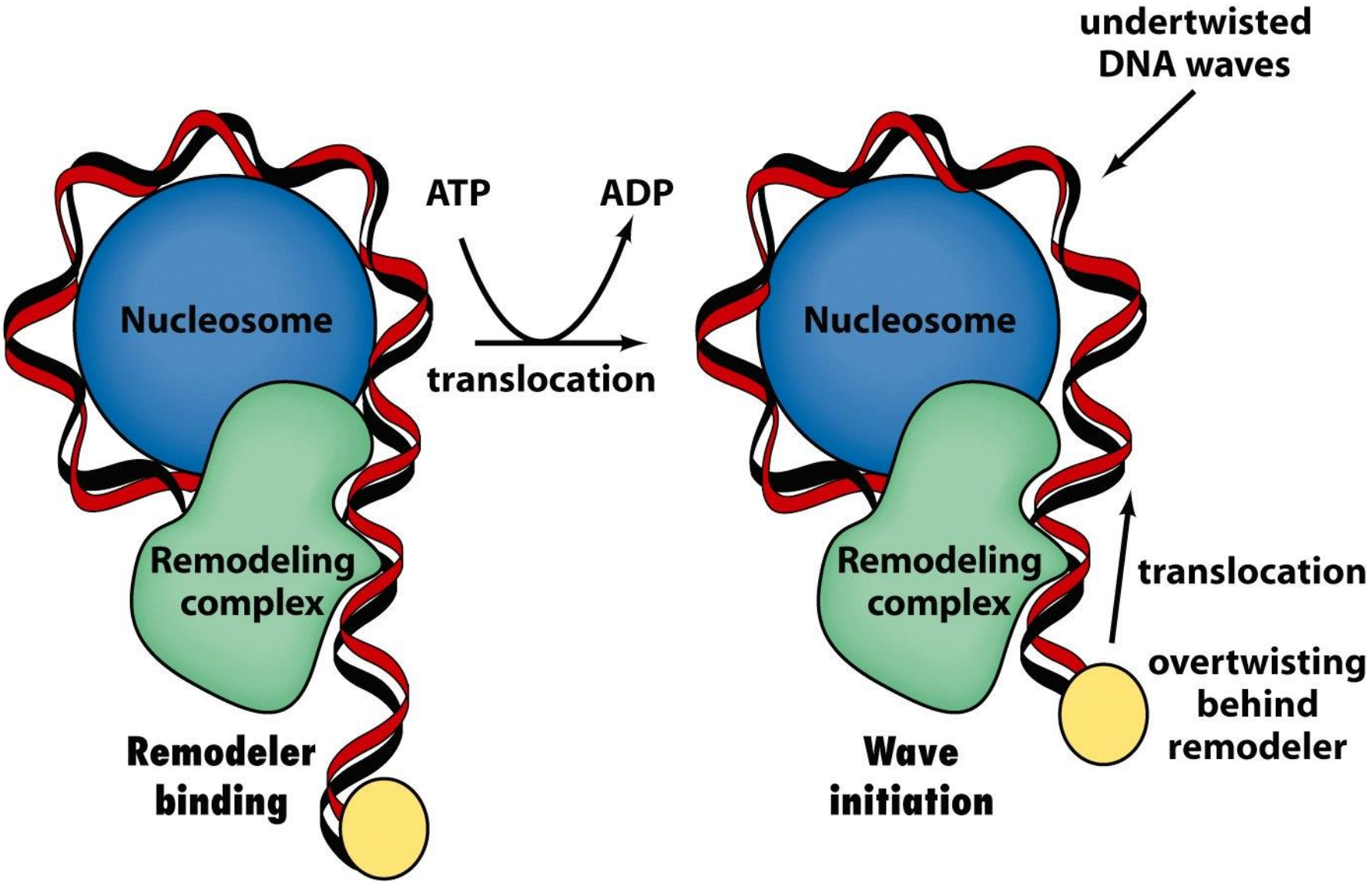


Figure 27-22 part 1 Fundamentals of Biochemistry, 2/e

Aminoácidos nas extremidades amino-terminais das histonas podem ser modificados, levando à alteração da estrutura dos nucleossomos

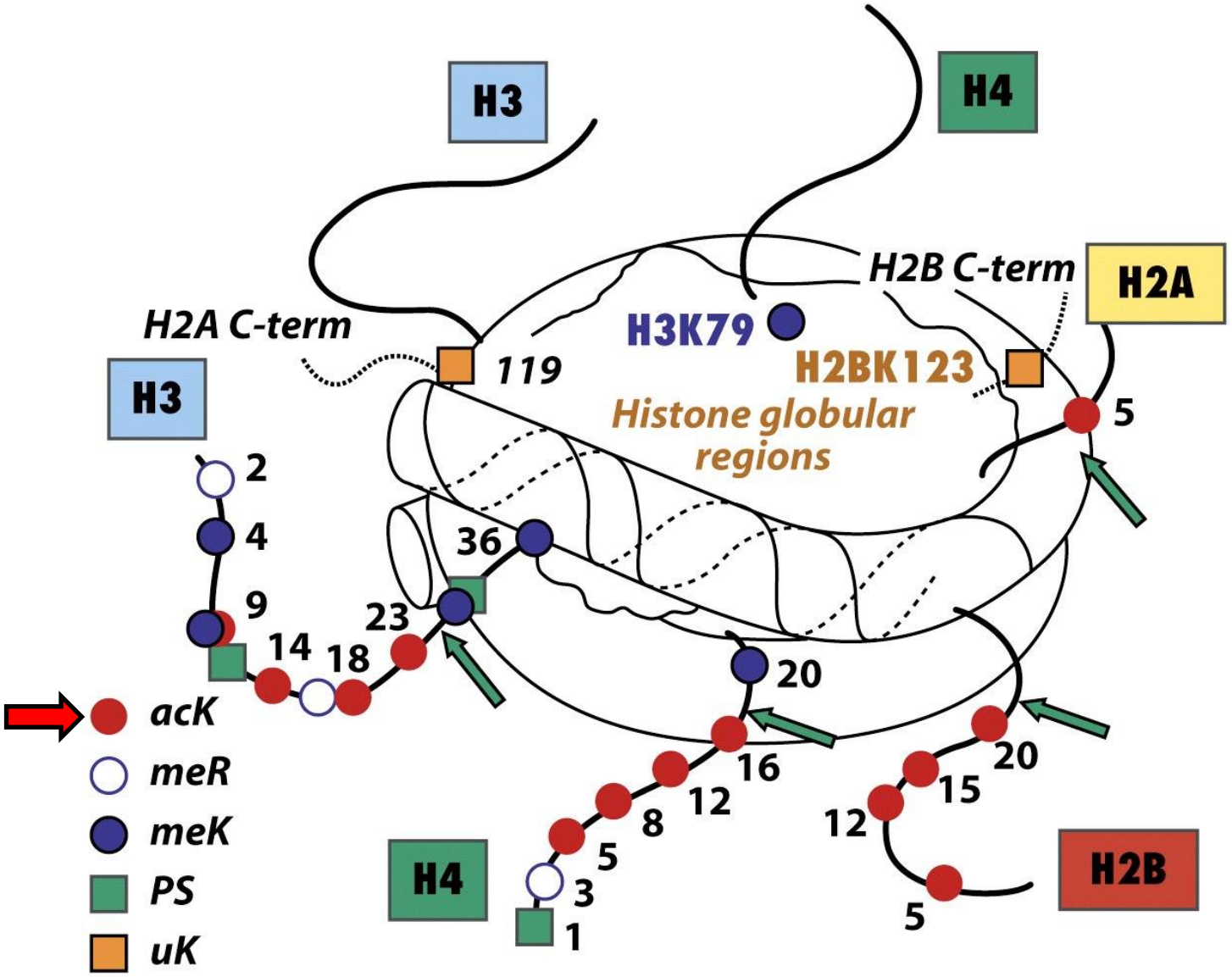
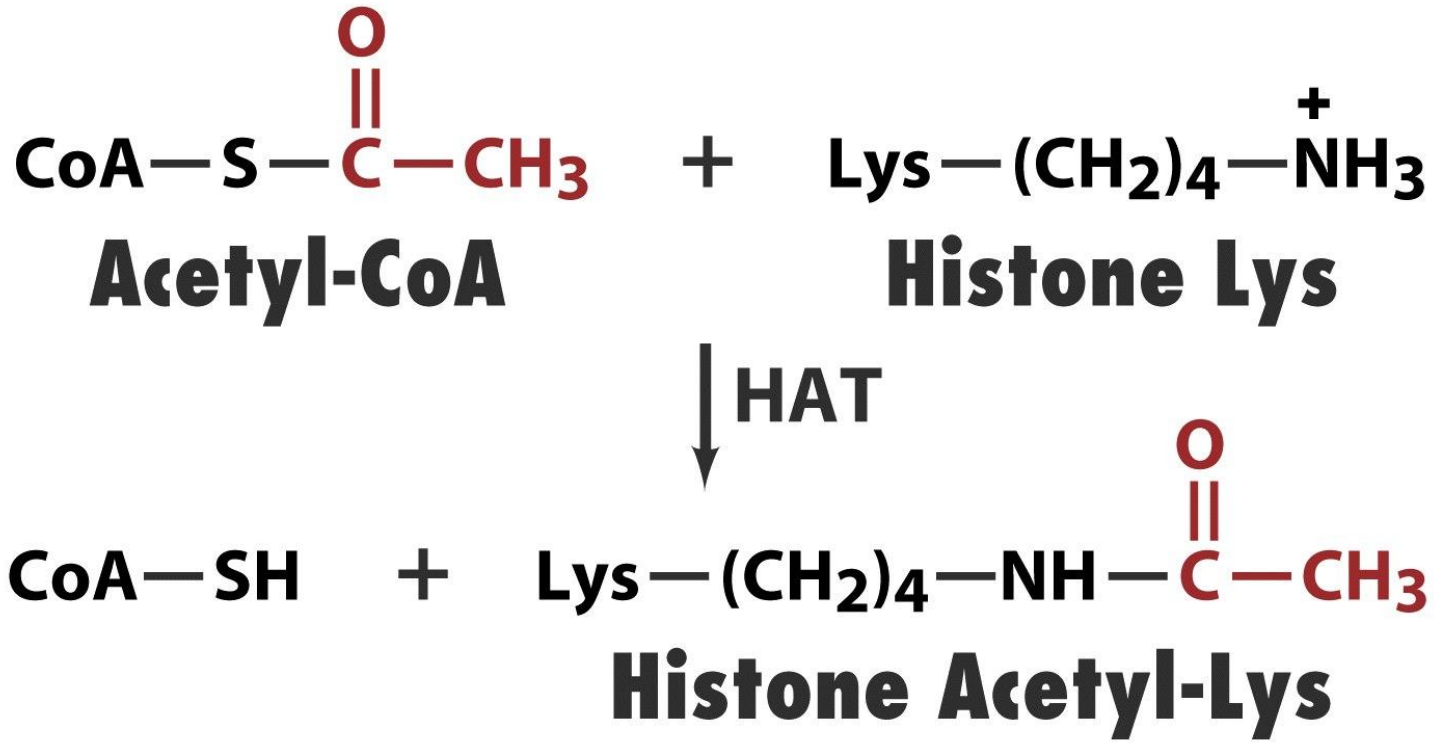


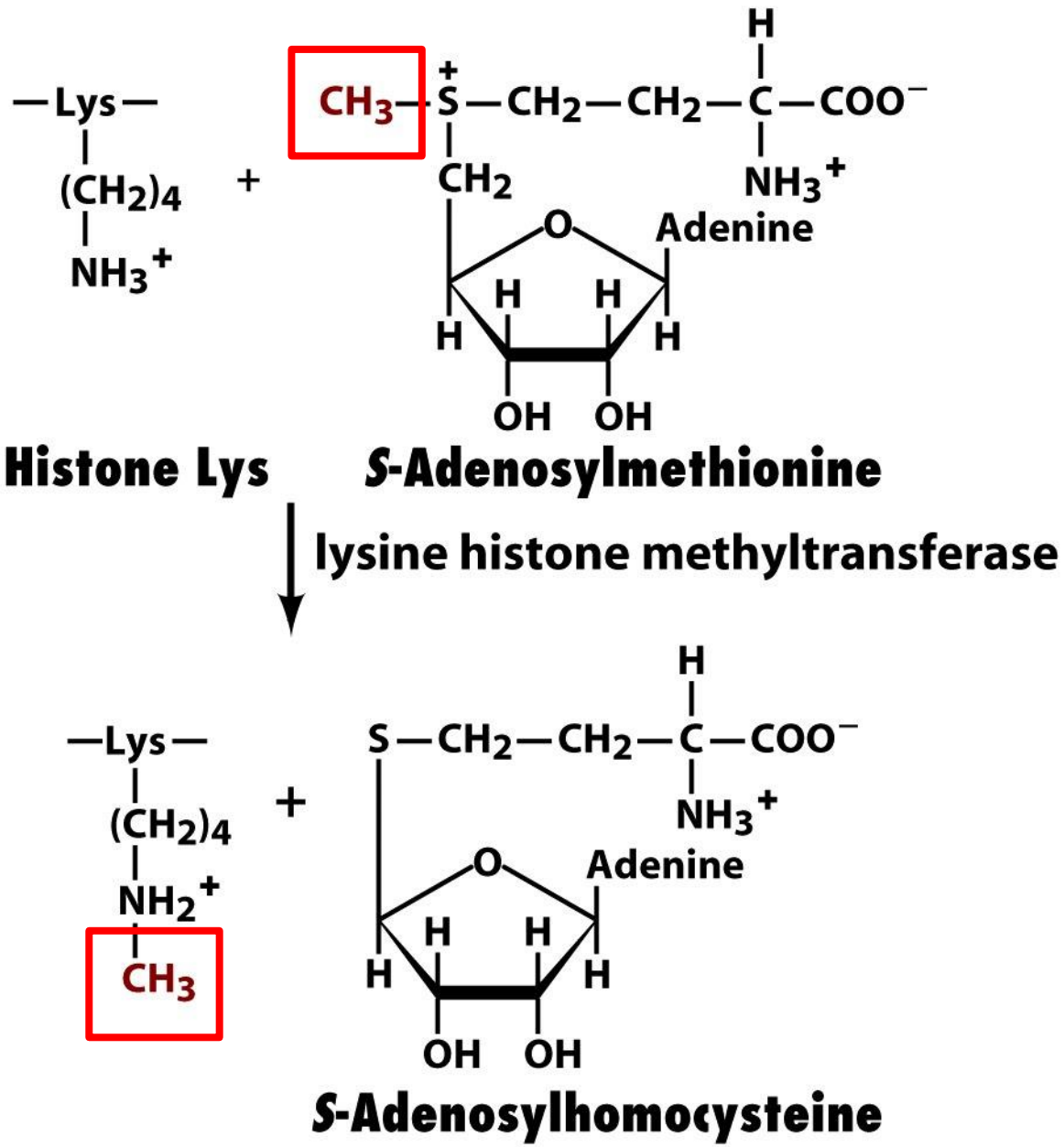
Figure 27-24 Fundamentals of Biochemistry, 2/e

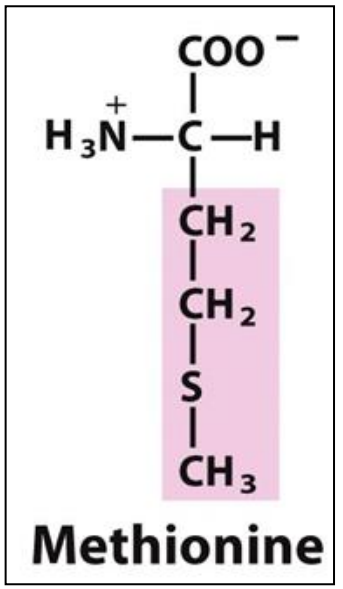
Acetilação de histonas

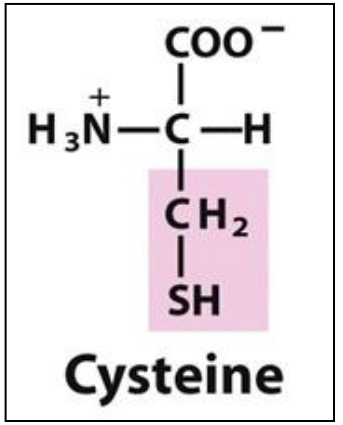


Unnumbered figure pg 1036 Fundamentals of Biochemistry, 2/e

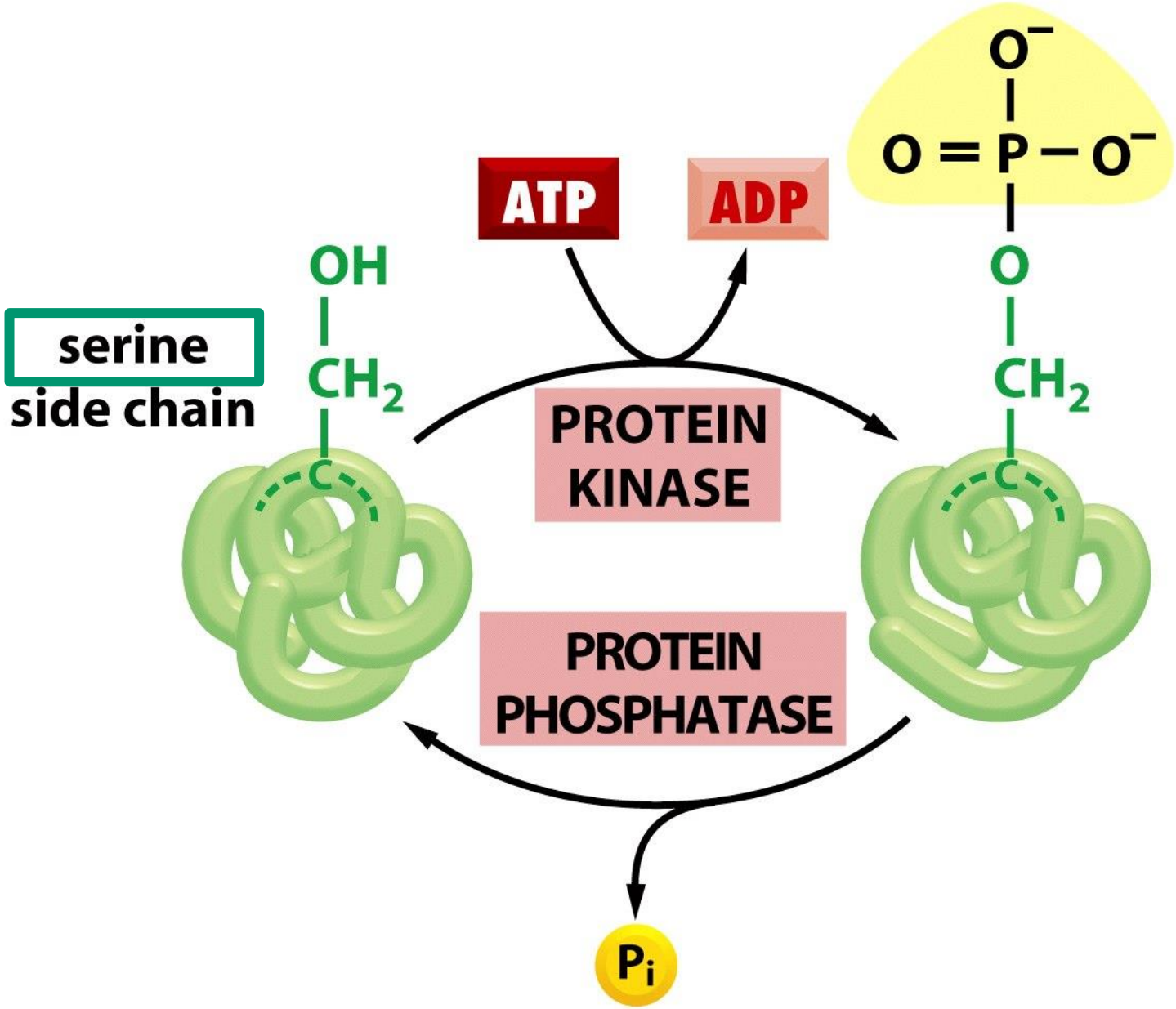
Metilação de histonas



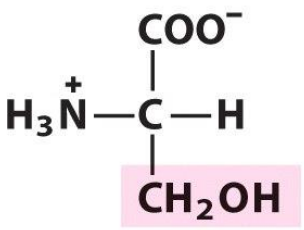




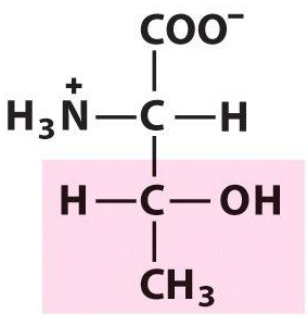
Fosforilação de Serina



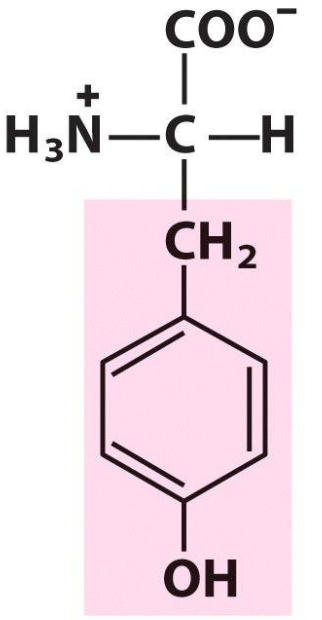
Amino ácidos fosforilados



Serine

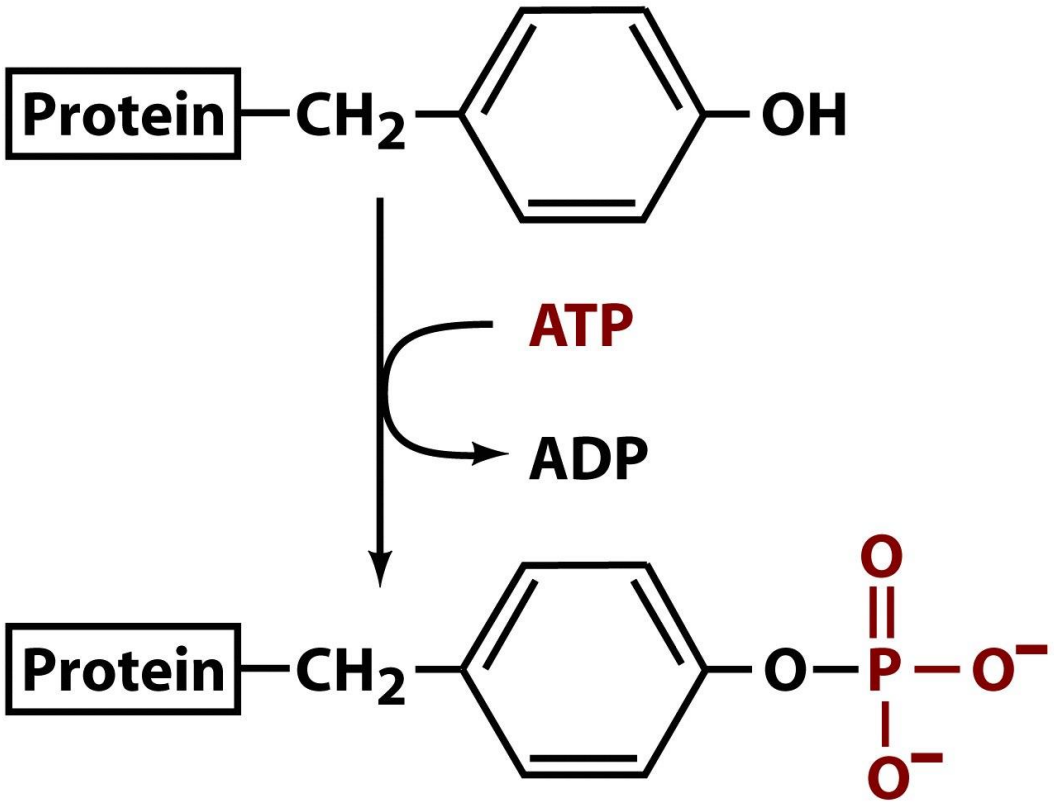


Threonine



Tyrosine

Fosforilação de Tirosina



Unnumbered figure pg 764 Fundamentals of Biochemistry, 2/e

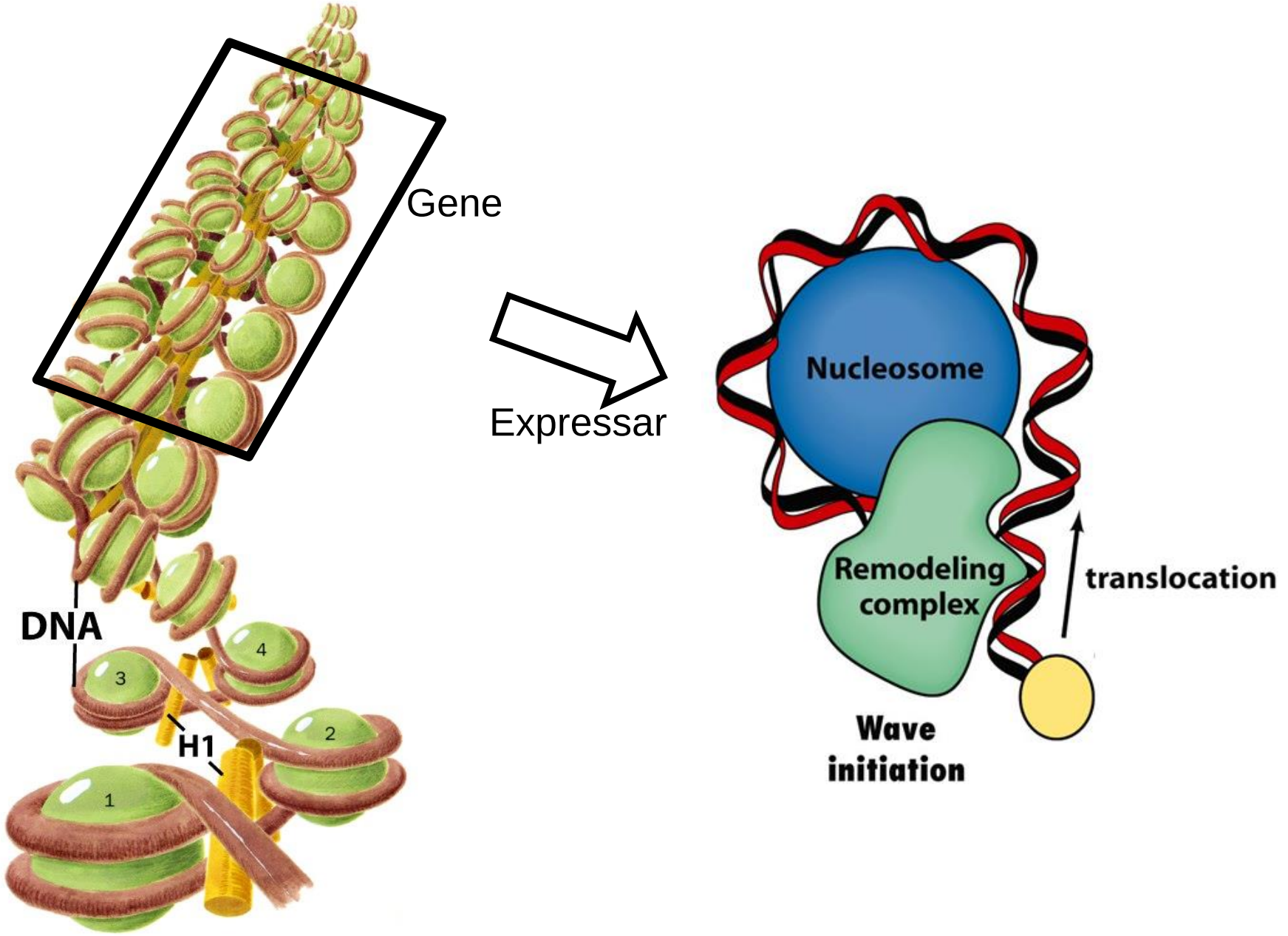
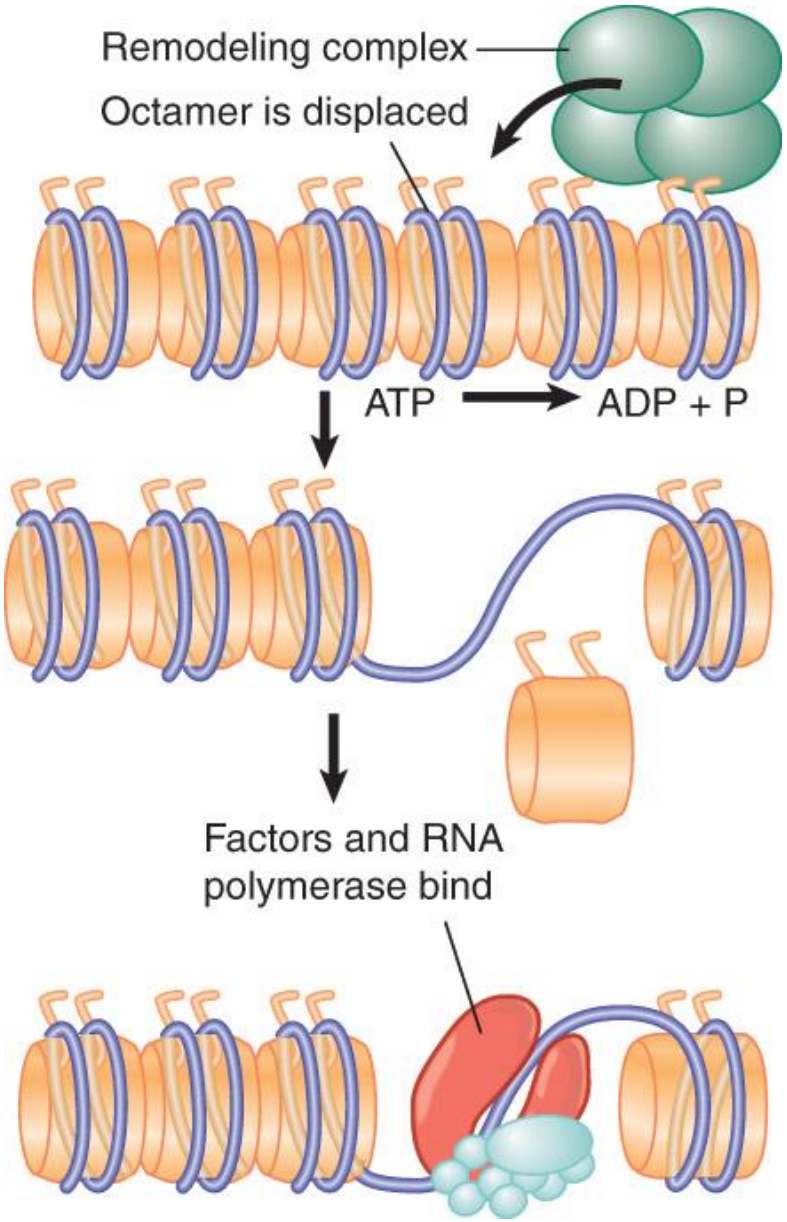


Figure 23-50 Fundamentals of Biochemistry, 2/e

Ativação da Transcrição



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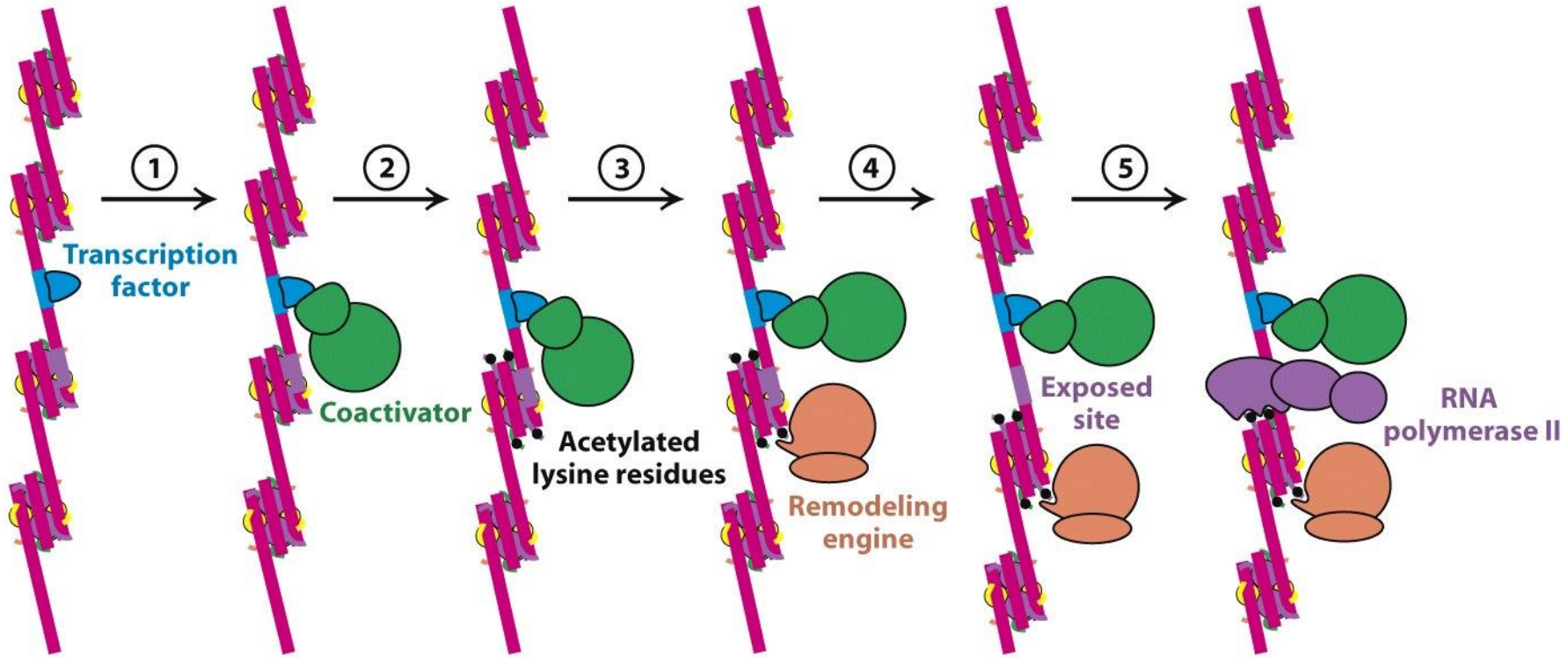

Figure 31-32
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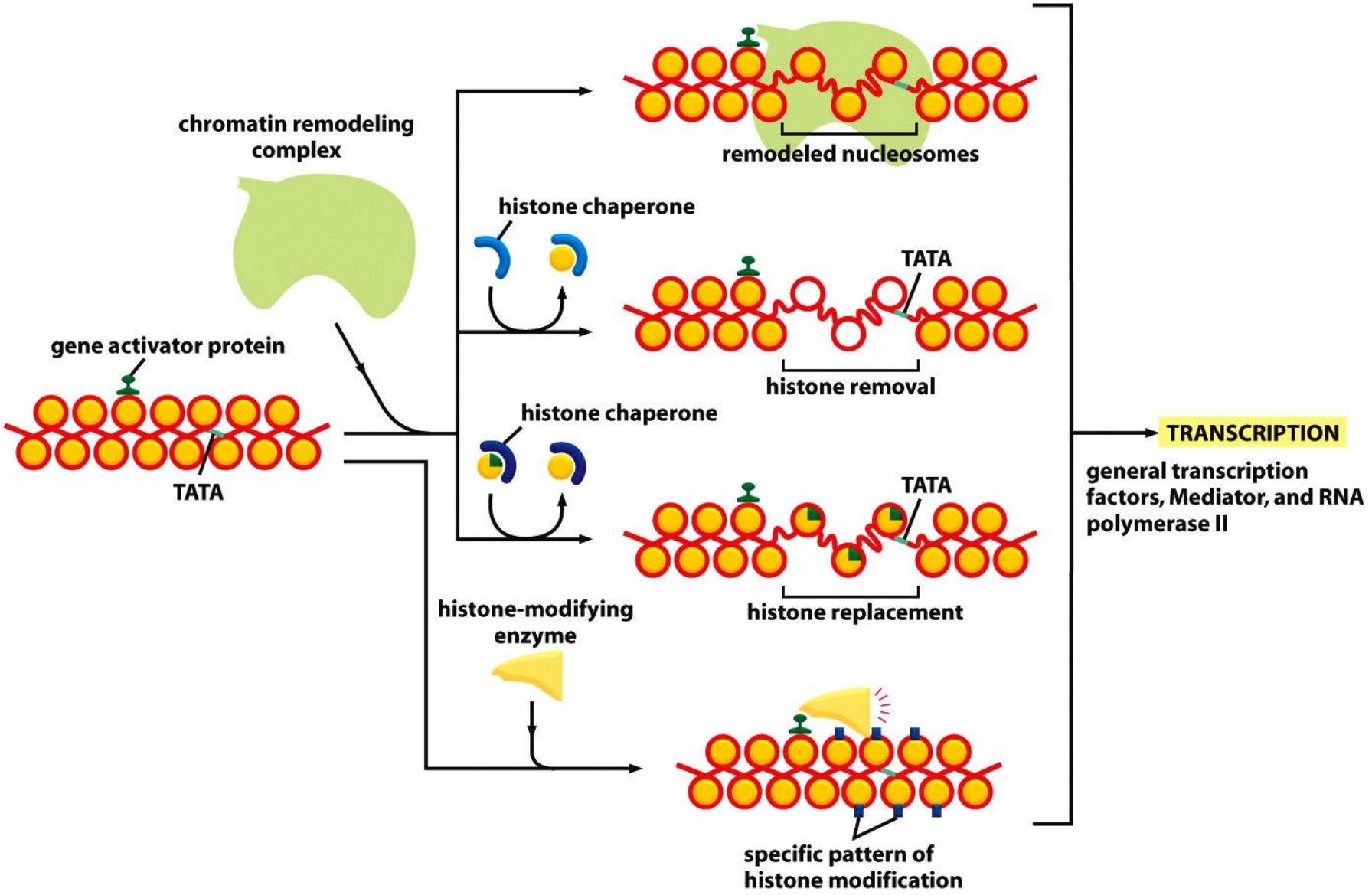
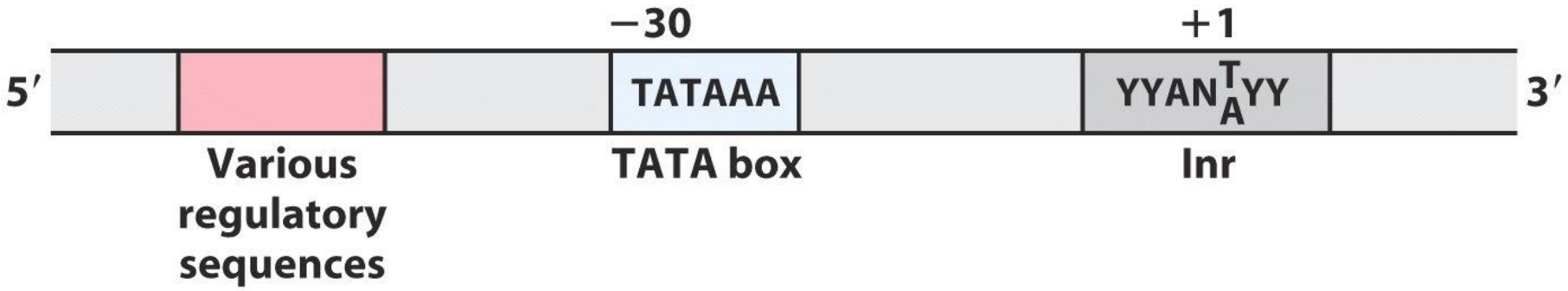
Ativação da Transcrição

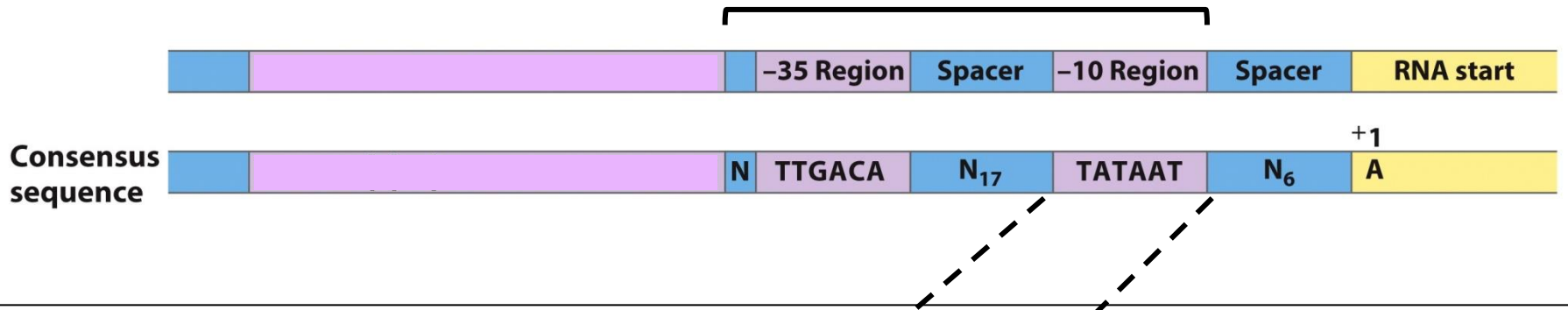


Eucariotos

Seqüências consenso reconhecidas pela RNA polimerase II + Fatores de transcrição



Promotor em procariotos



Promotor em eucariotos

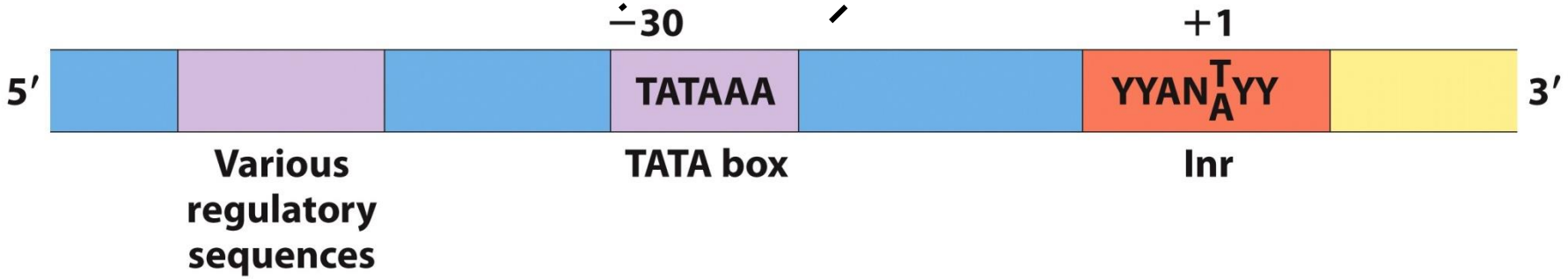


Figure 26-8
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Eucariotos

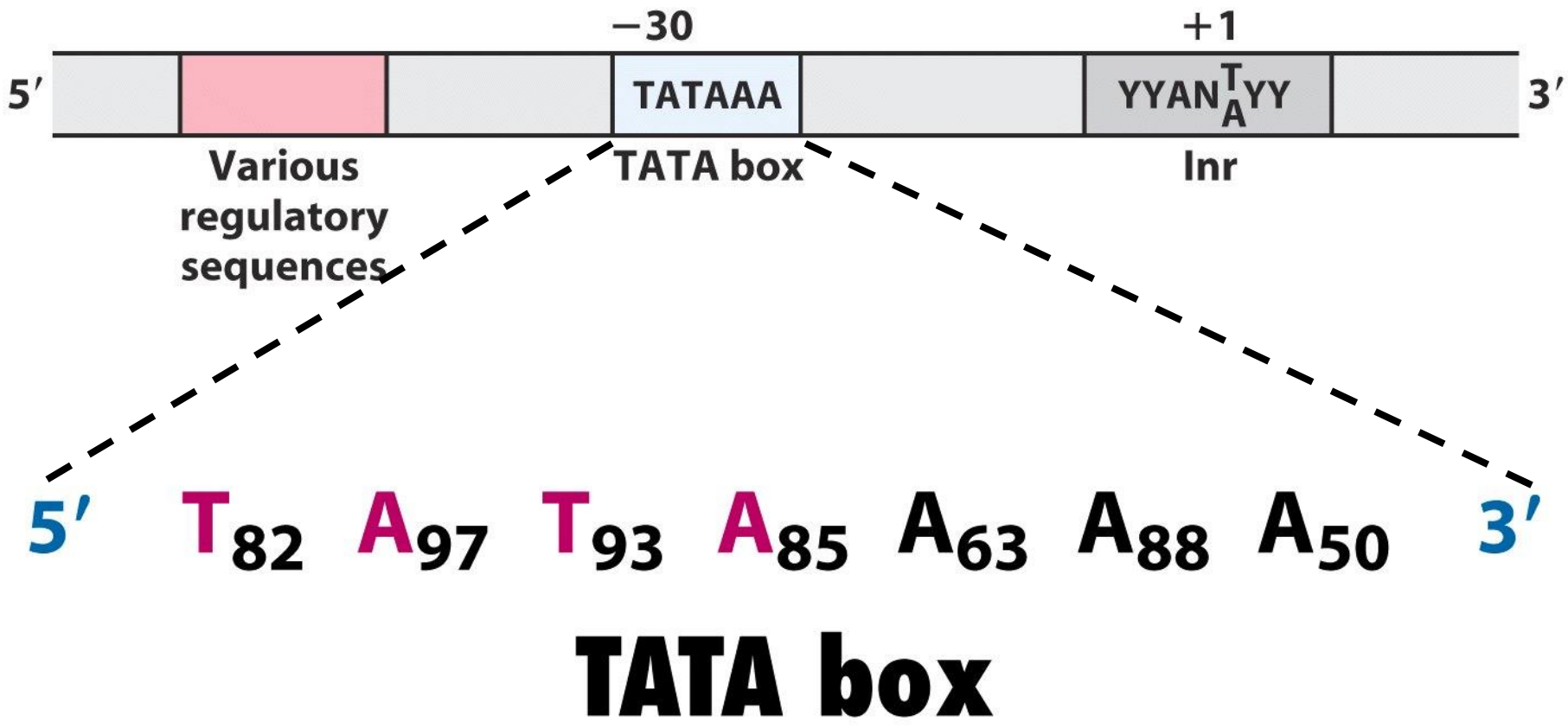

Figure 29-18
Biochemistry, Sixth Edition

Proteins Required for Initiation of Transcription at the RNA Polymerase II (Pol II) Promoters of Eukaryotes

Transcription protein	*Number of subunits*	*Subunit(s) M_r*	*Function(s)*
Initiation			
Pol II	12	10,000–220,000	Catalyzes RNA synthesis
TBP (TATA-binding protein)	1	38,000	Specifically recognizes the TATA box
TFIIA	3	12,000, 19,000, 35,000	Stabilizes binding of TFIIB and TBP to the promoter
TFIIB	1	35,000	Binds to TBP; recruits Pol II–TFIIF complex
TFIIE	2	34,000, 57,000	Recruits TFIIH; has ATPase and helicase activities
TFIIF	2	30,000, 74,000	Binds tightly to Pol II; binds to TFIIB and prevents binding of Pol II to nonspecific DNA sequences
TFIIH	12	35,000–89,000	Unwinds DNA at promoter (helicase activity); phosphorylates Pol II (within the CTD); recruits nucleotide-excision repair proteins

Subunits of RNA polymerase from *E. coli*

Subunit	Gene	Number	Mass (kd)
α	*rpoA*	2	37
β	*rpoB*	1	151
β'	*rpoC*	1	155
σ^{70}	*rpoD*	1	70
ω		1	

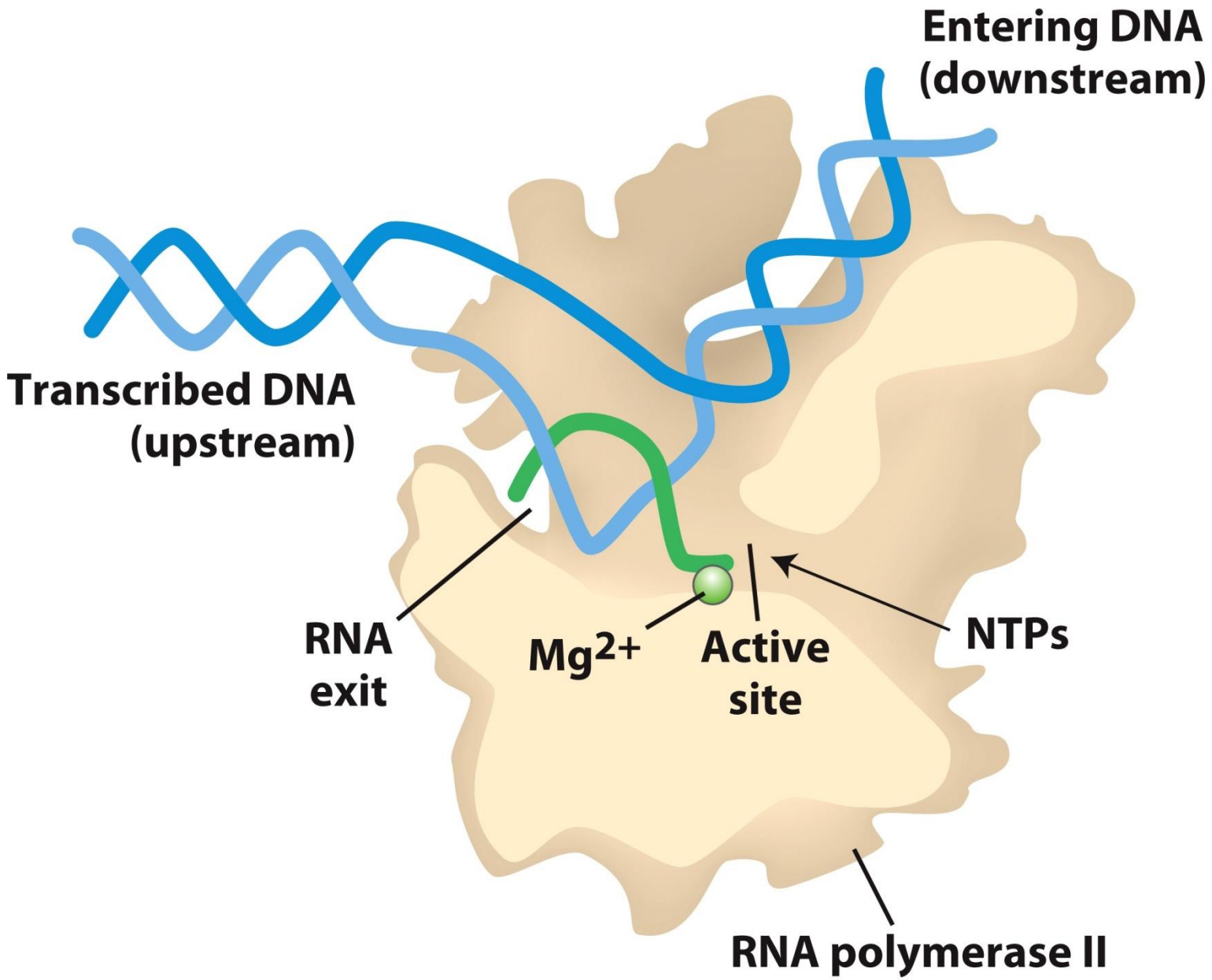

Figure 26-9c
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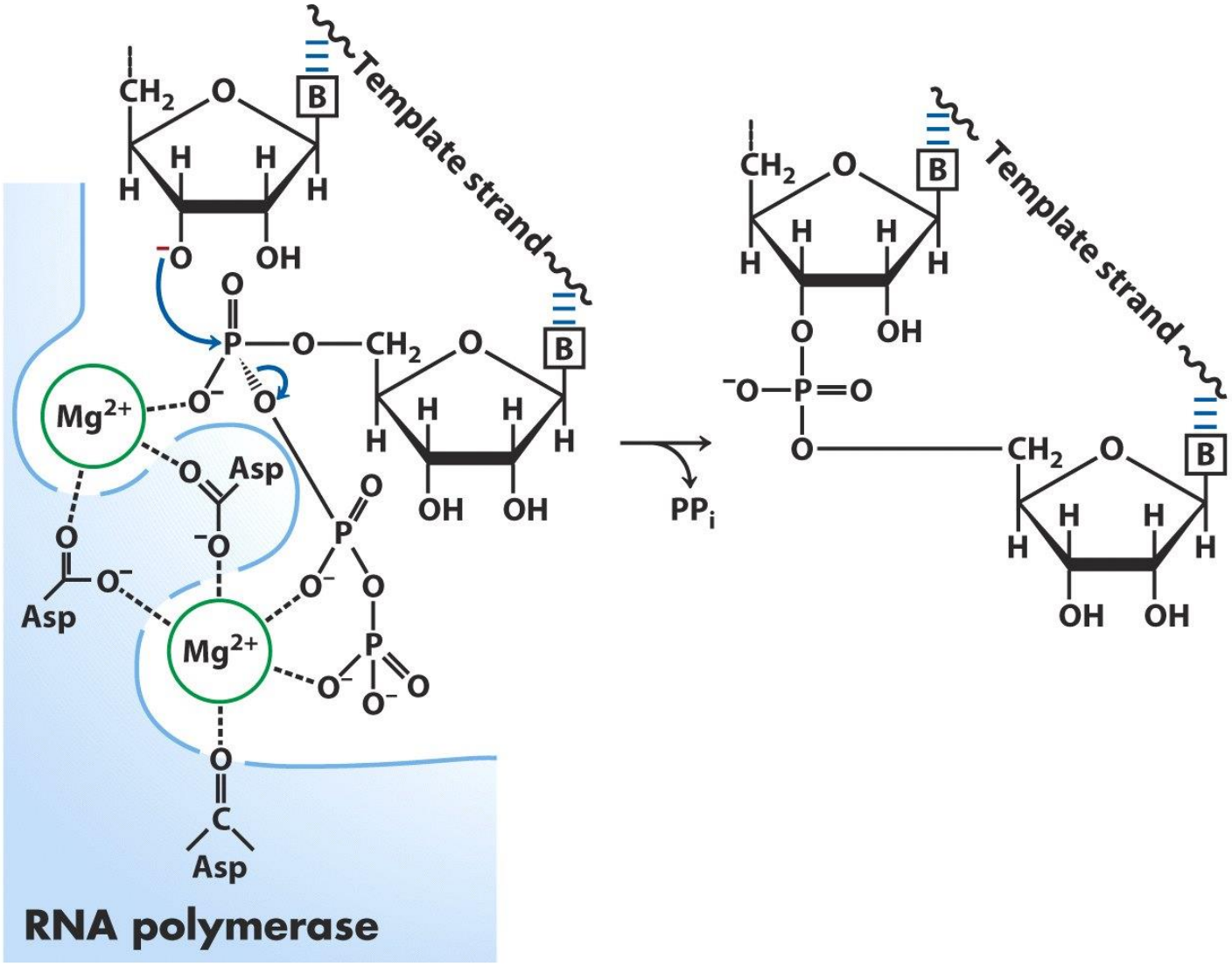
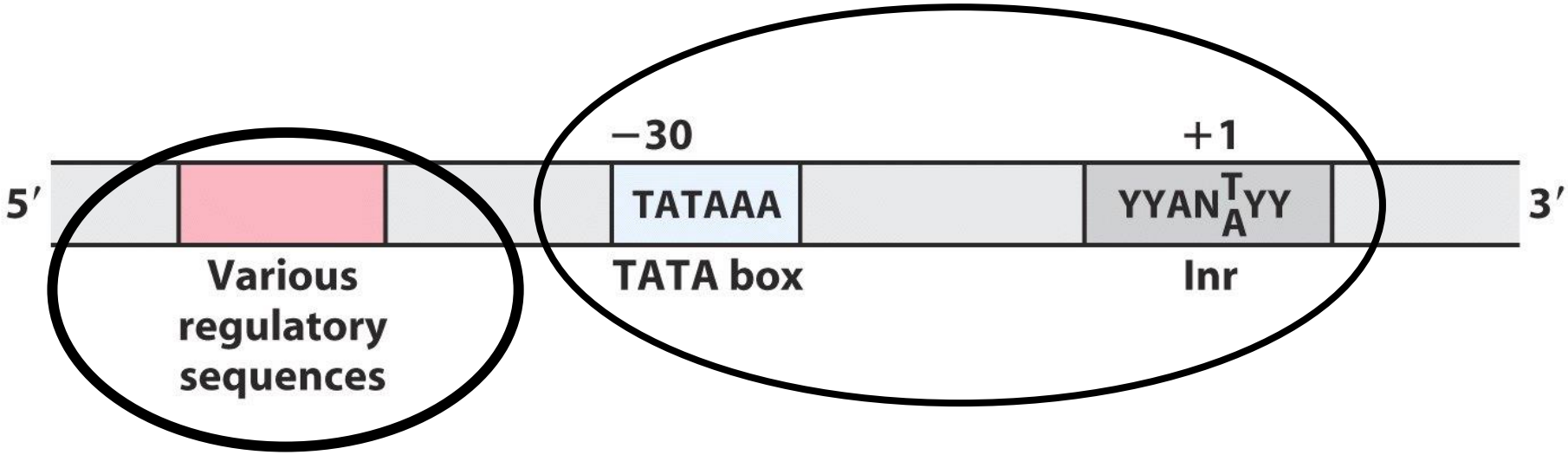
Transcrição



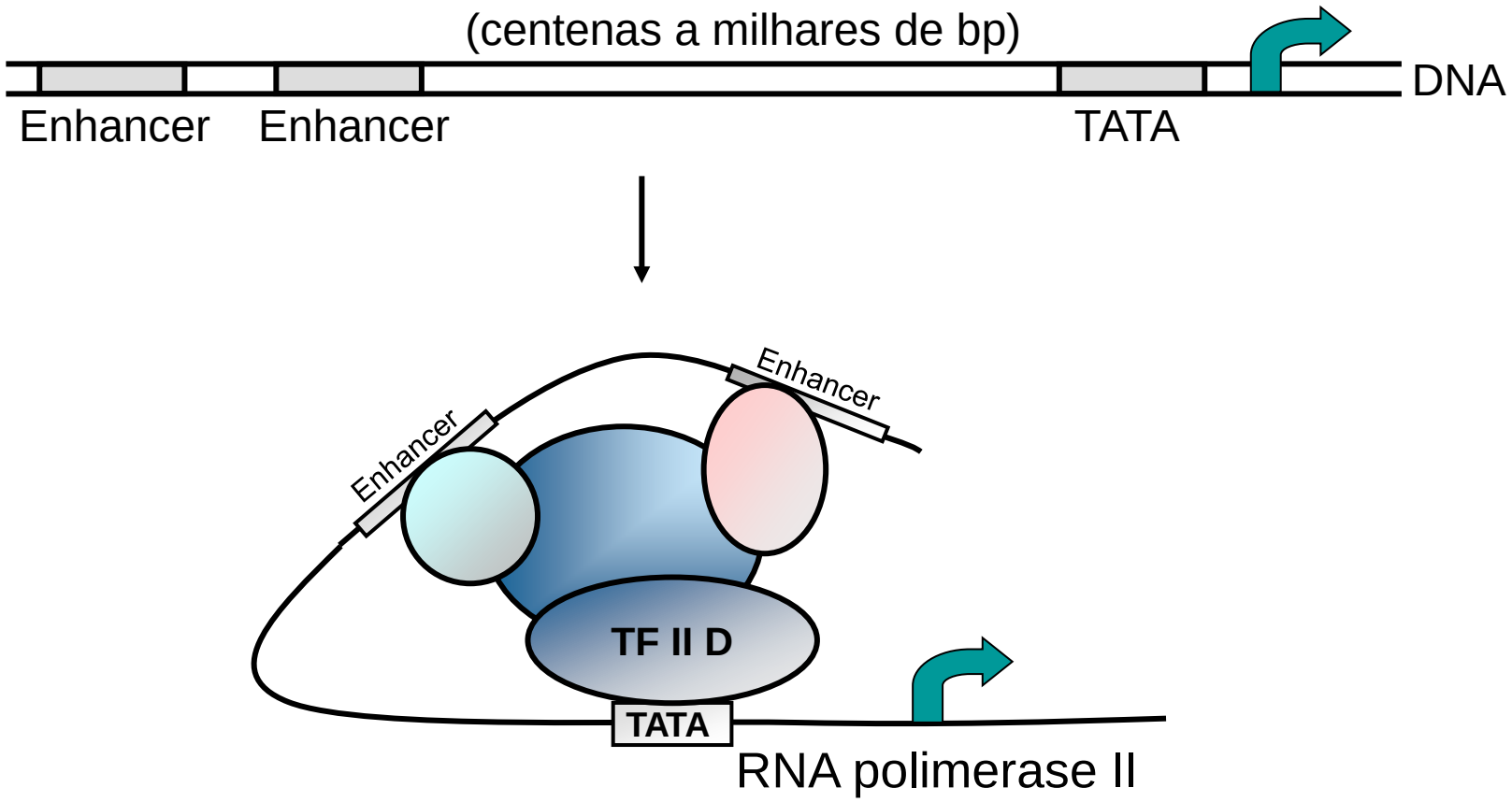
Promotor de Eucariotos



Para que servem os Enhancers/ Upstream activator sequences (UAS)?

Para ativar a transcrição;
Para controlar a transcrição.

Como os enhancers ativam a transcrição?



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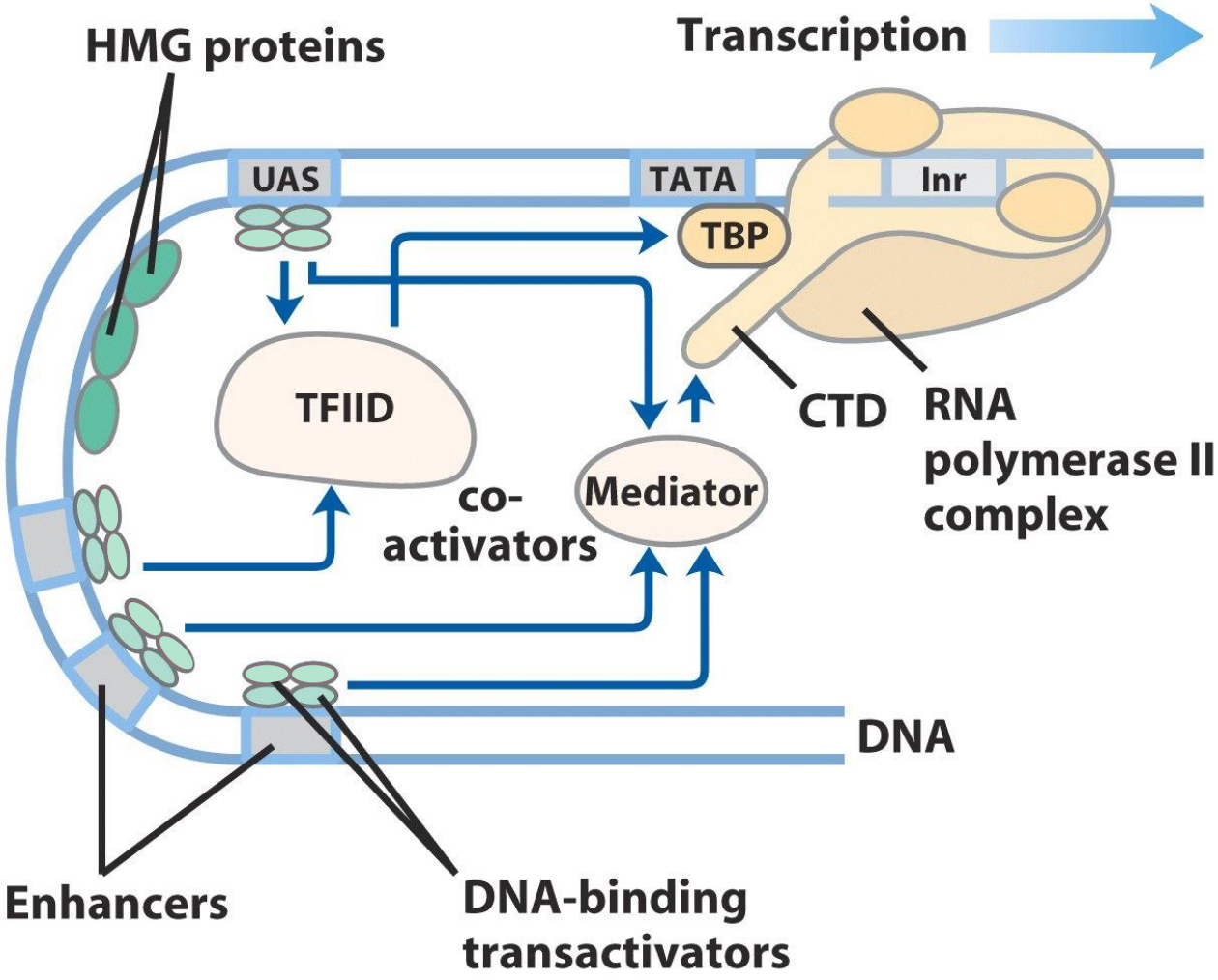

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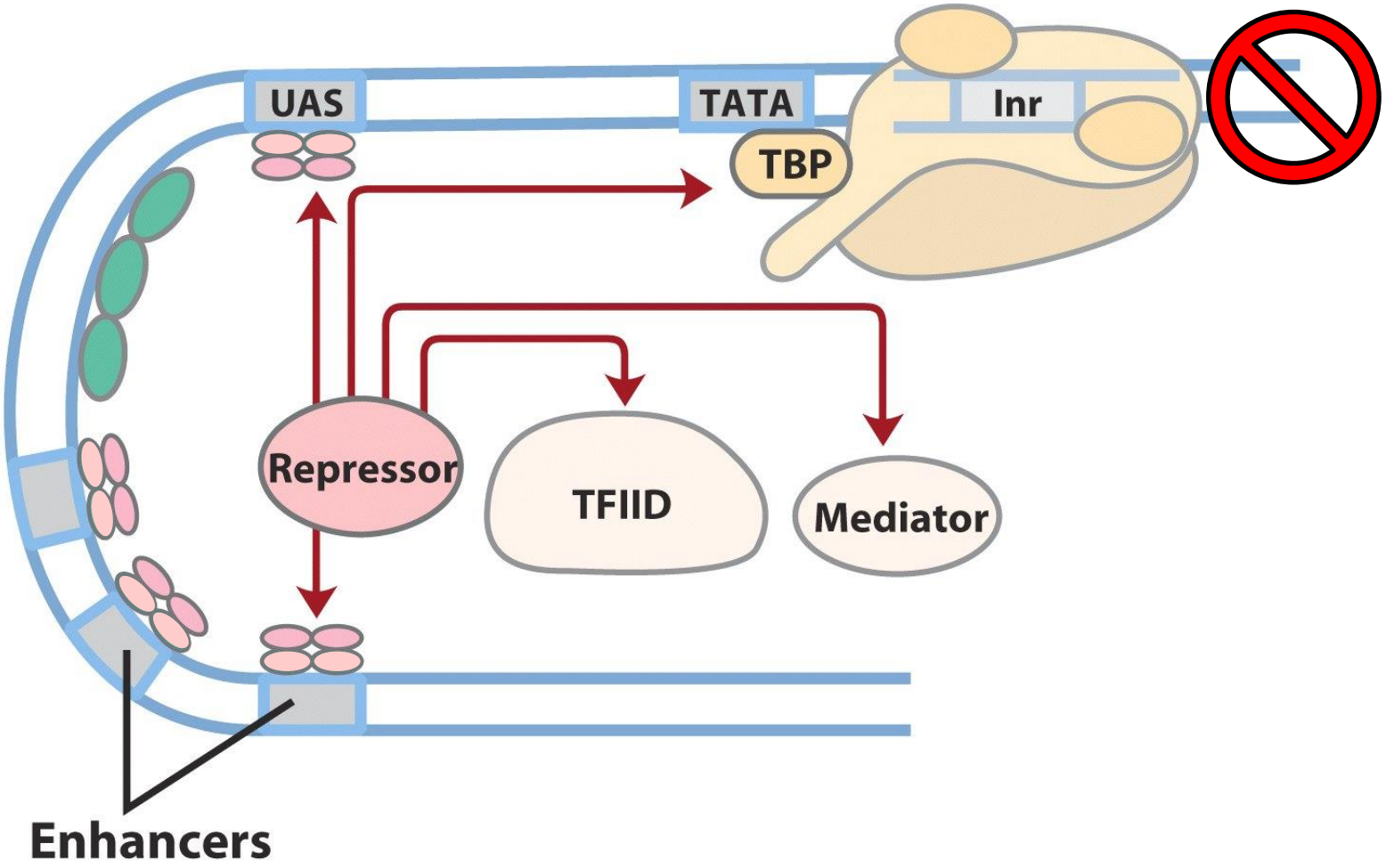

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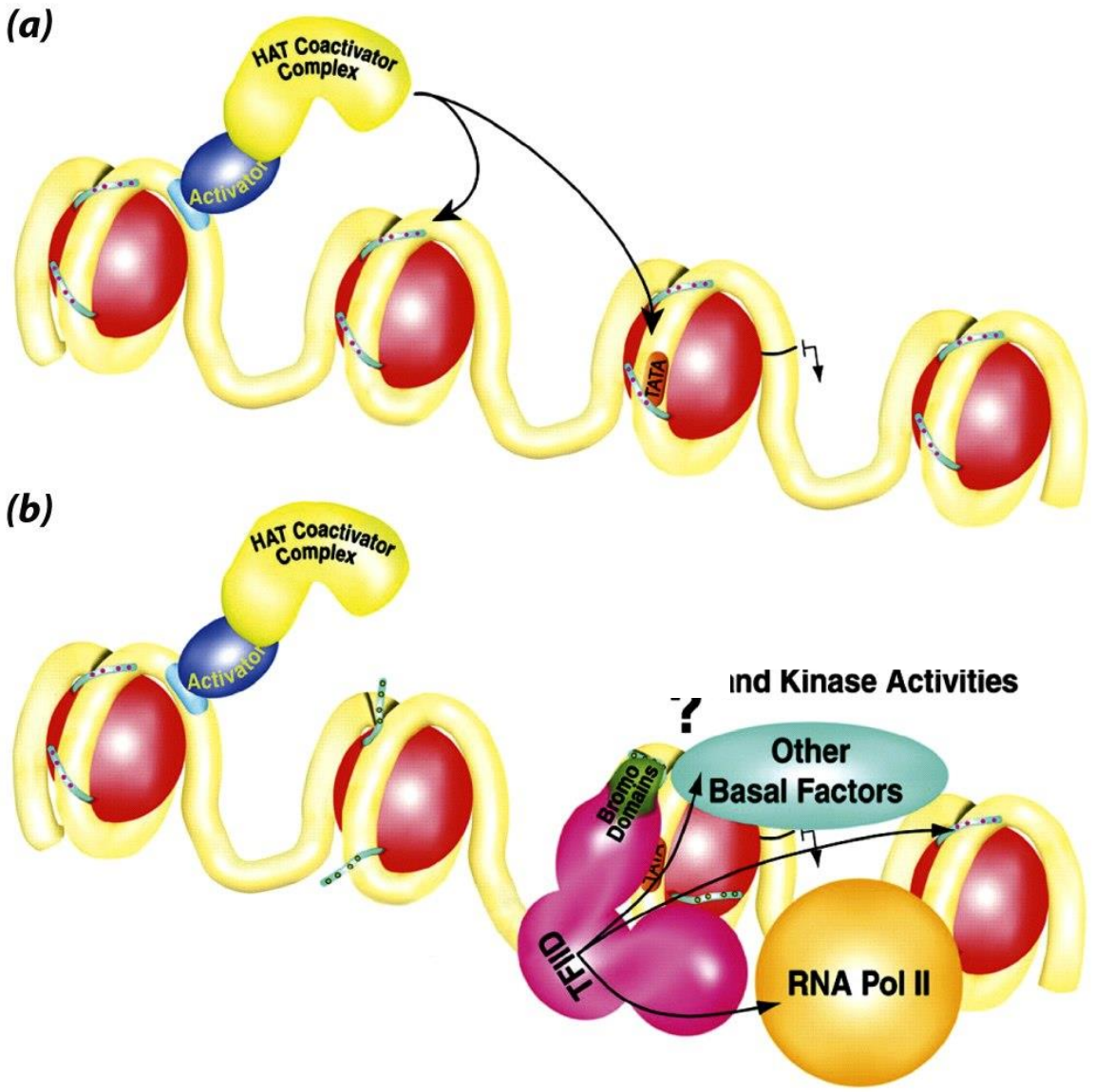
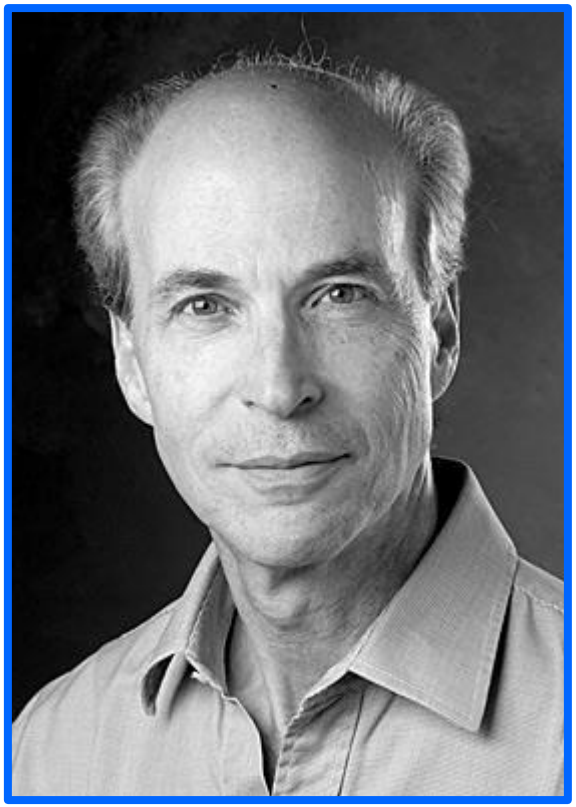


Figure 27-27 Fundamentals of Biochemistry, 2/e

The Nobel Prize in Chemistry 2006

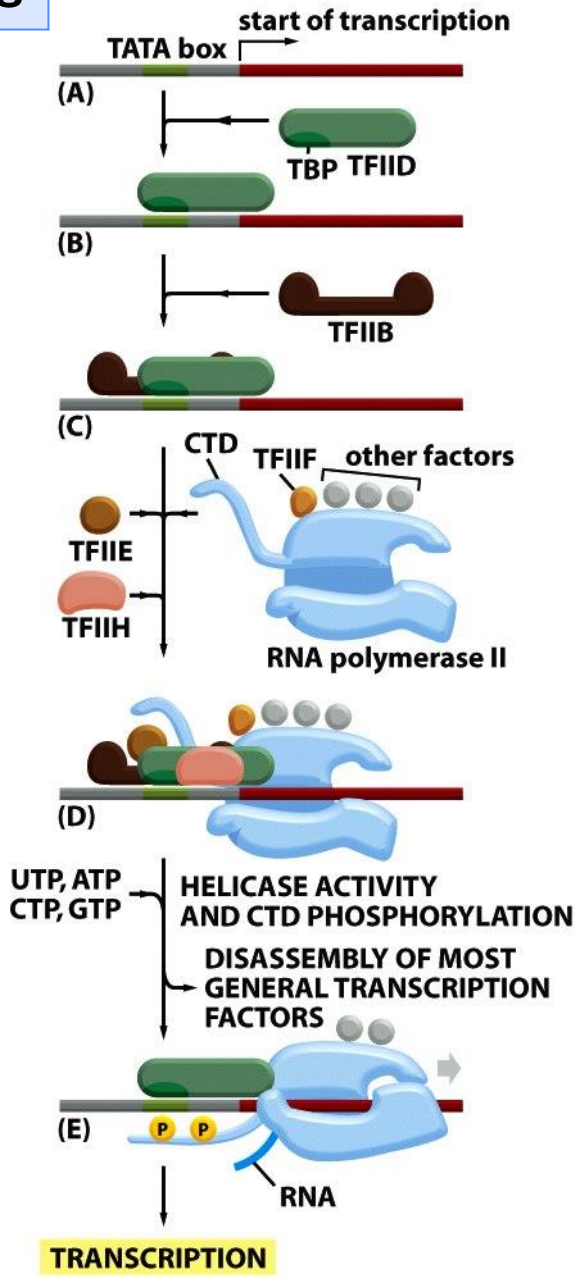
"for his studies of the molecular basis of eukaryotic transcription"



Roger D. Kornberg

Arthur Kornberg
Nobel 1959

Transcrição em Eucariotos



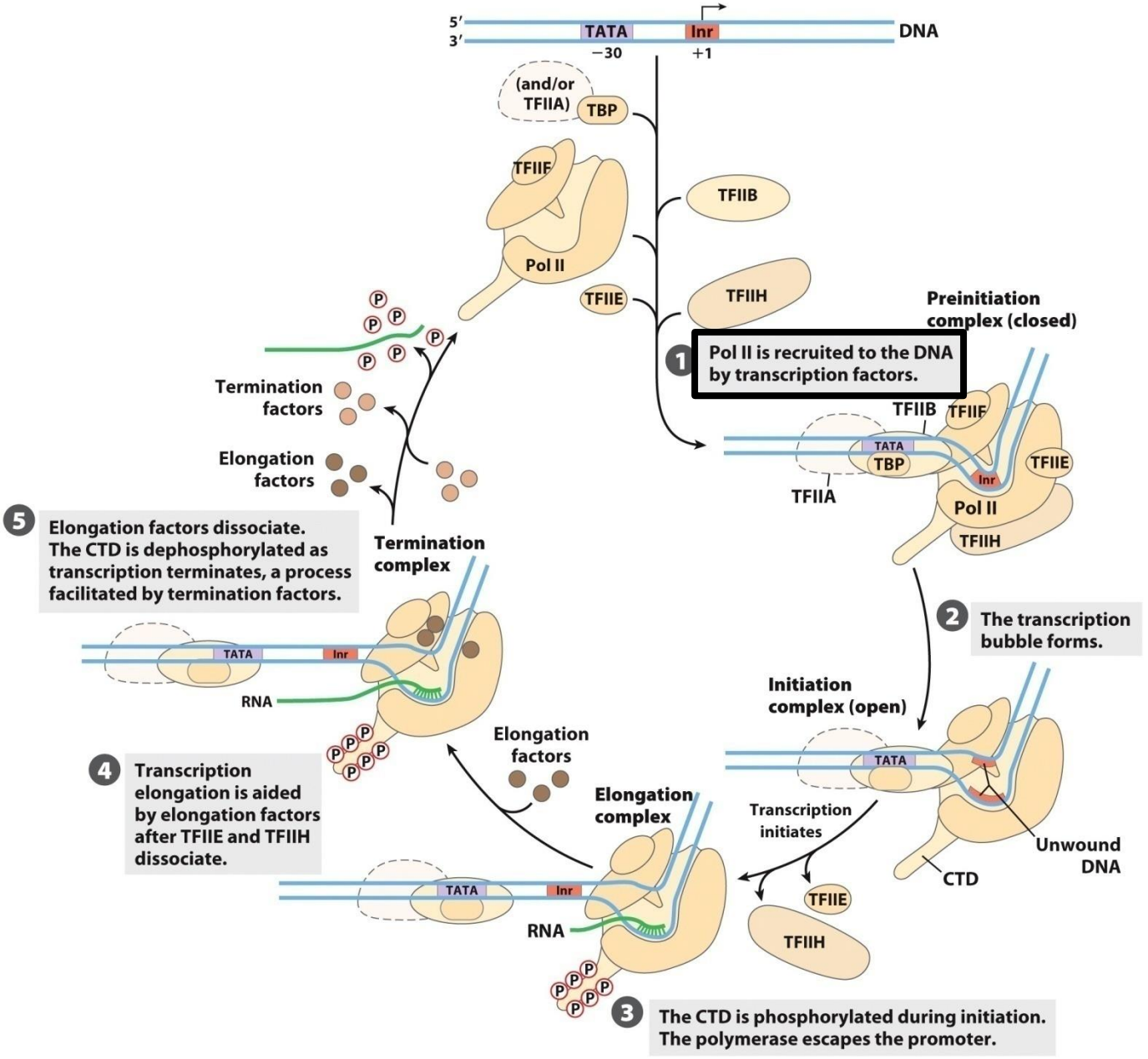


Figure 26-9a

Lehninger Principles of Biochemistry, Sixth Edition

Procariotos

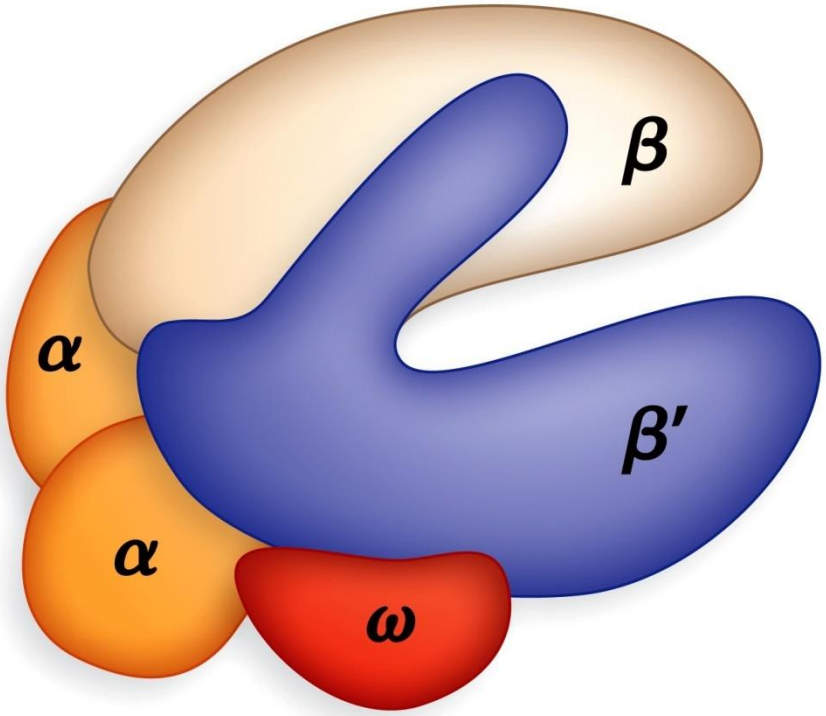


Figure 26-4
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Eucariotos

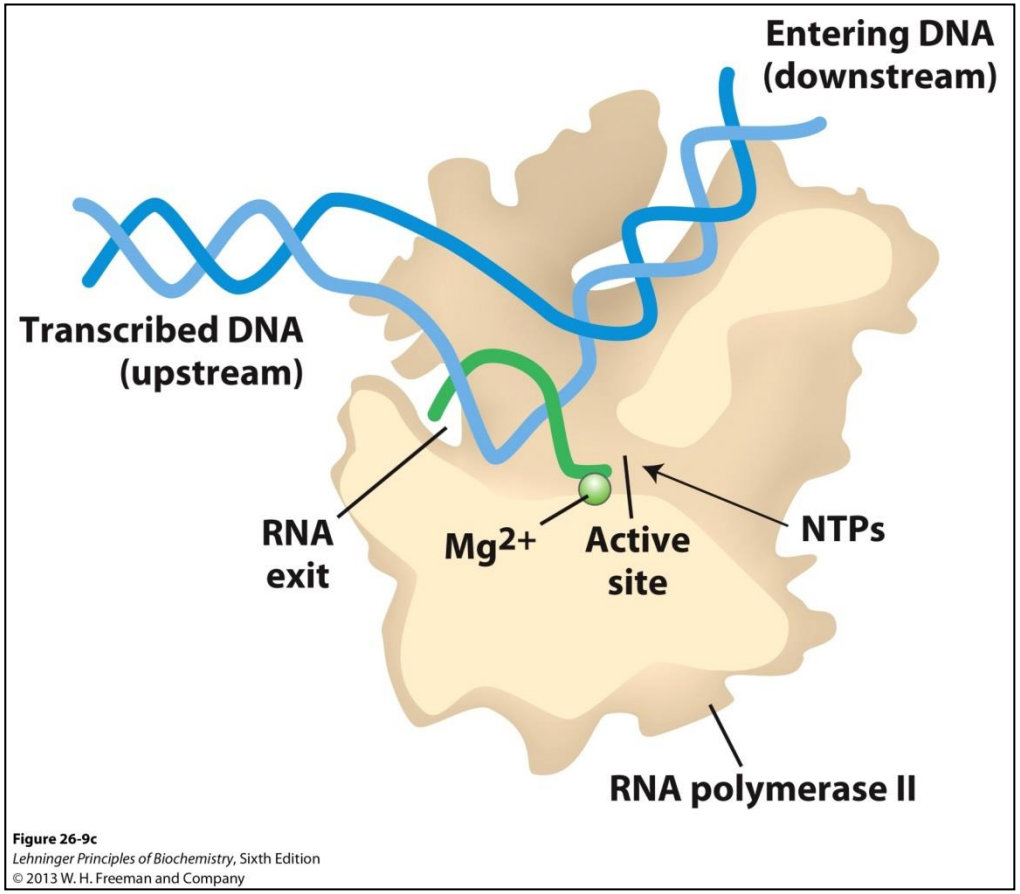
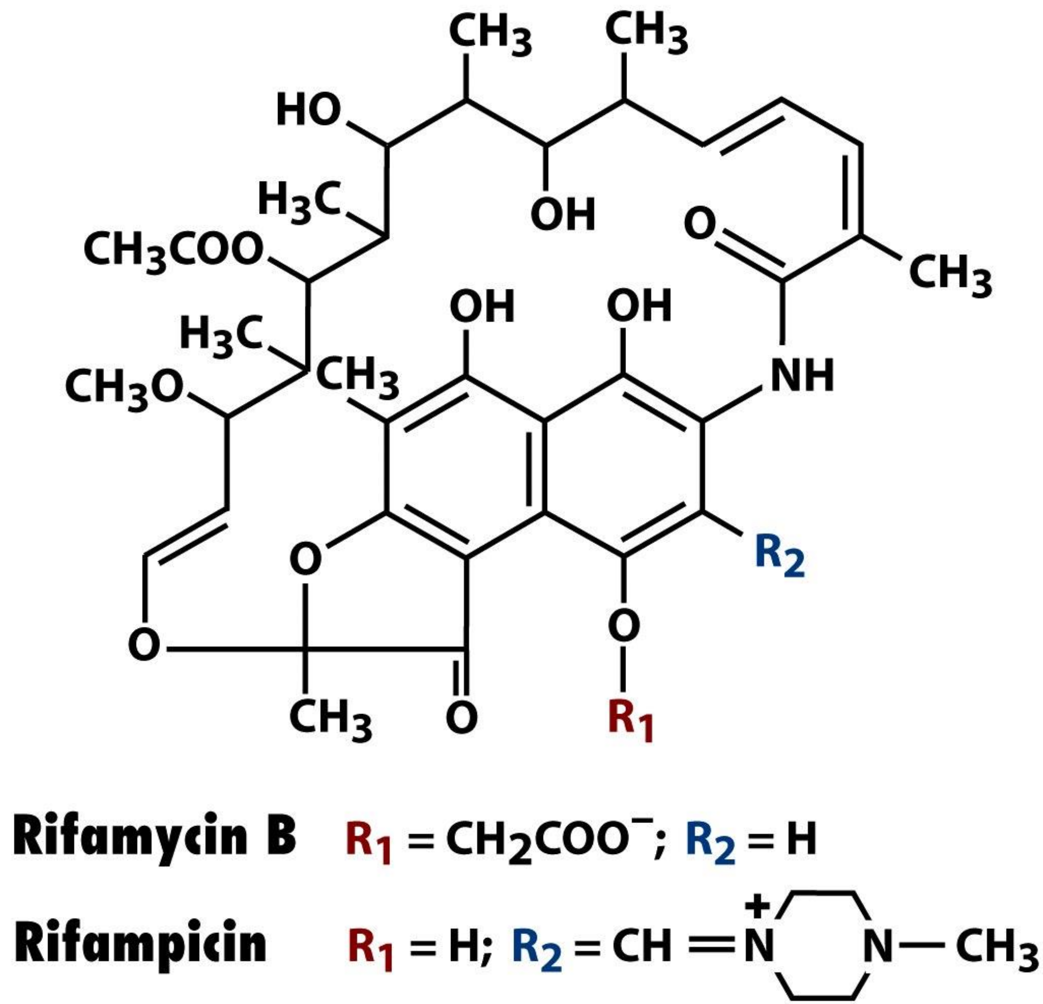


Figure 26-9c
Lehninger Principles of Biochemistry, Sixth Edition

Antibióticos que inibem a transcrição em procariotos

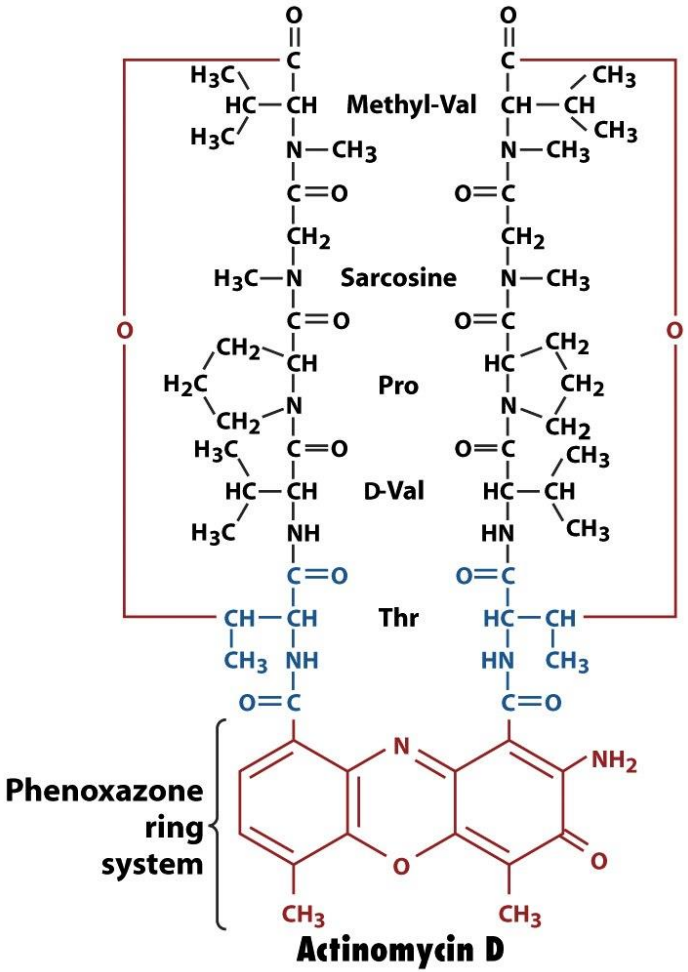
Rifamicinas ligam-se à subunidade β da RNA polimerase, inibindo a iniciação da transcrição em procariotos, mas não em eucariotos.



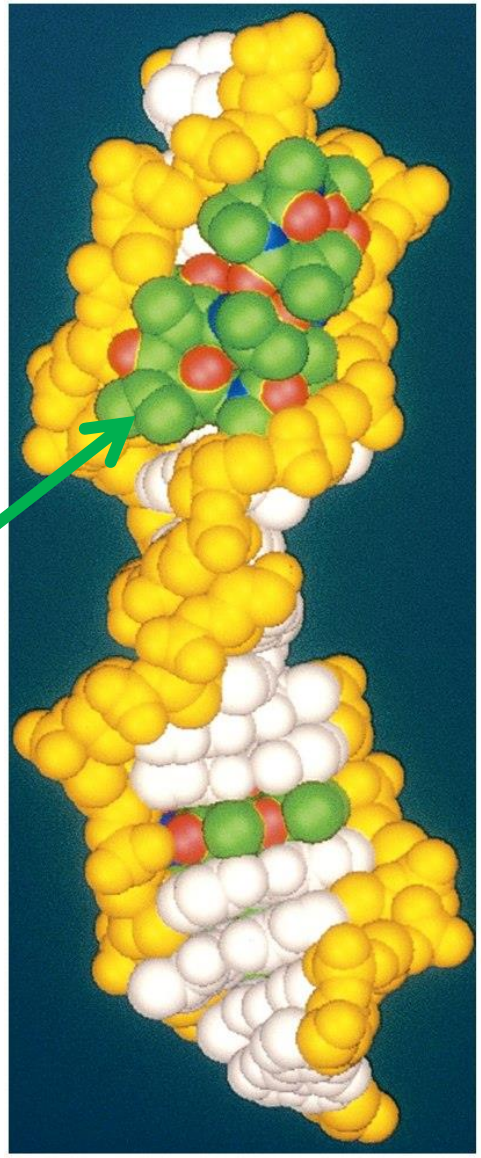
Box 25-2 figure 1 Fundamentals of Biochemistry, 2/e

Antibióticos que inibem a transcrição

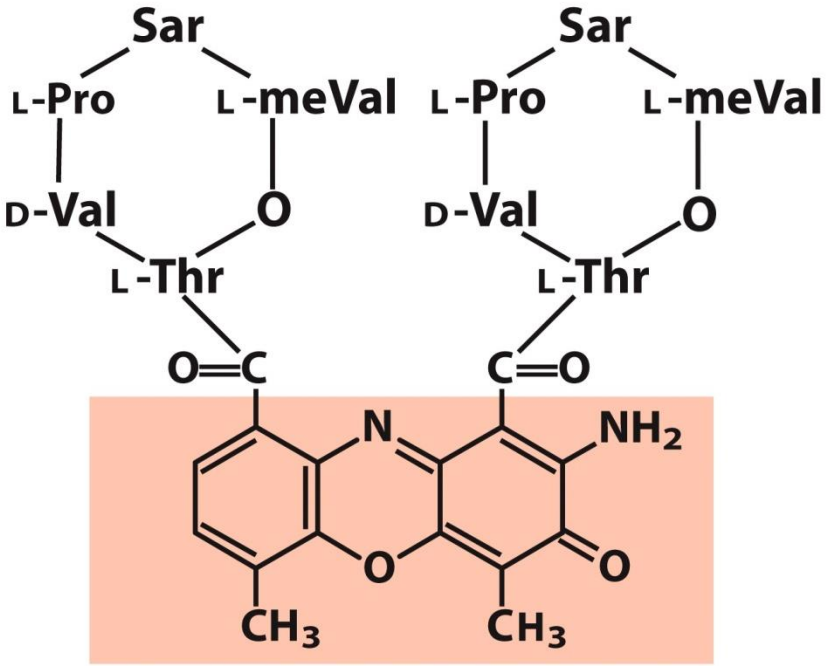
Actinomicina D intercala-se na dupla-fita de DNA, inibindo tanto transcrição como replicação de DNA, tanto de procariotos como de eucariotos.



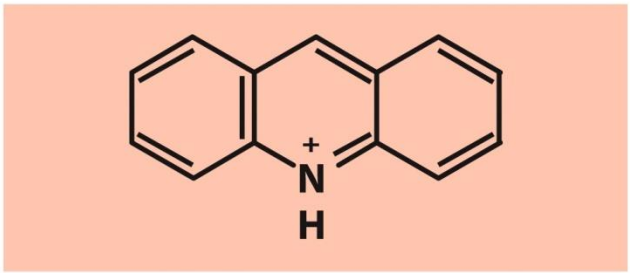
Box 25-2 figure 2 Fundamentals of Biochemistry, 2/e
© 2006 John Wiley & Sons



Box 25-2 figure 3 Fundamentals of Biochemistry, 2/e

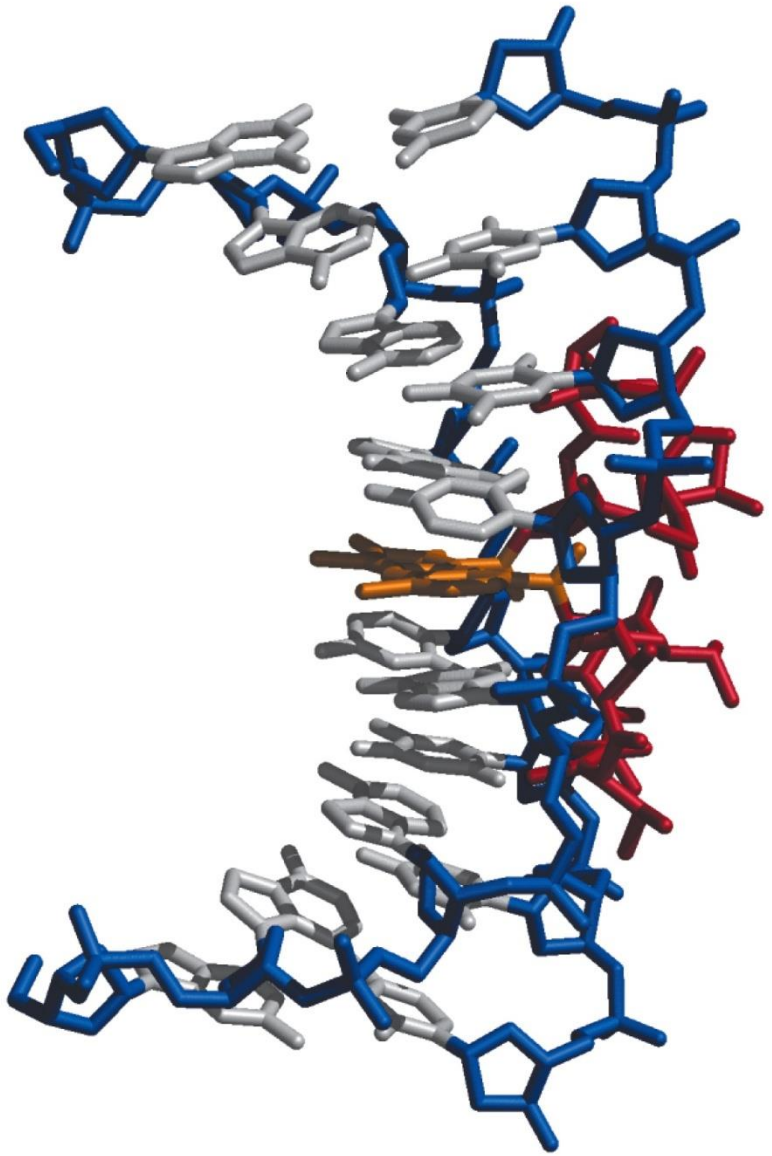


Actinomycin D



Acridine

(a)



(b)

Figure 26-10
Lehninger Principles of Biochemistry, Sixth Edition

α-amanitina liga-se à RNA polimerase II, inibindo a transcrição de eucariotos, mas não a de procariotos.

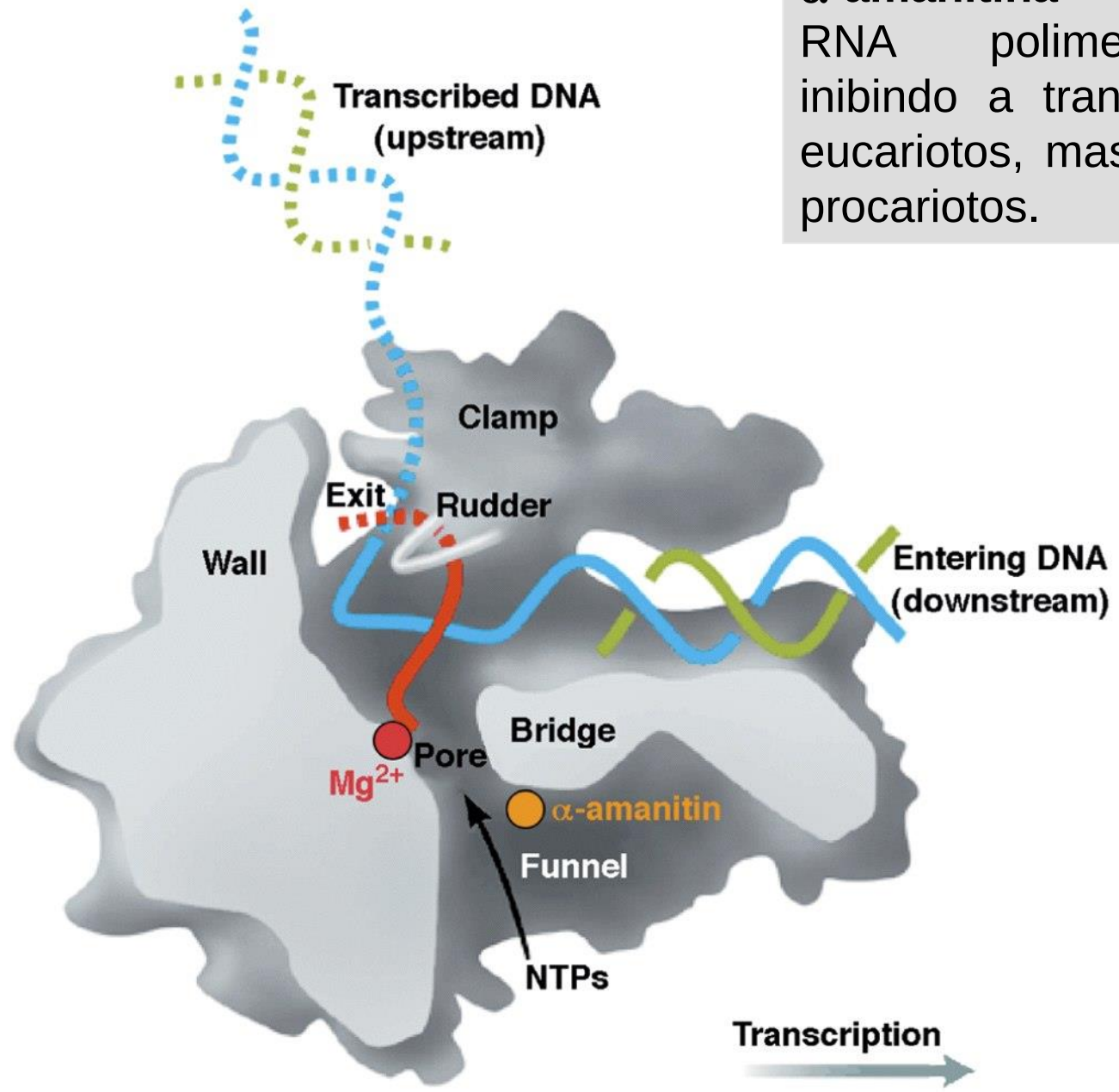


Figure 25-12b Fundamentals of Biochemistry, 2/e

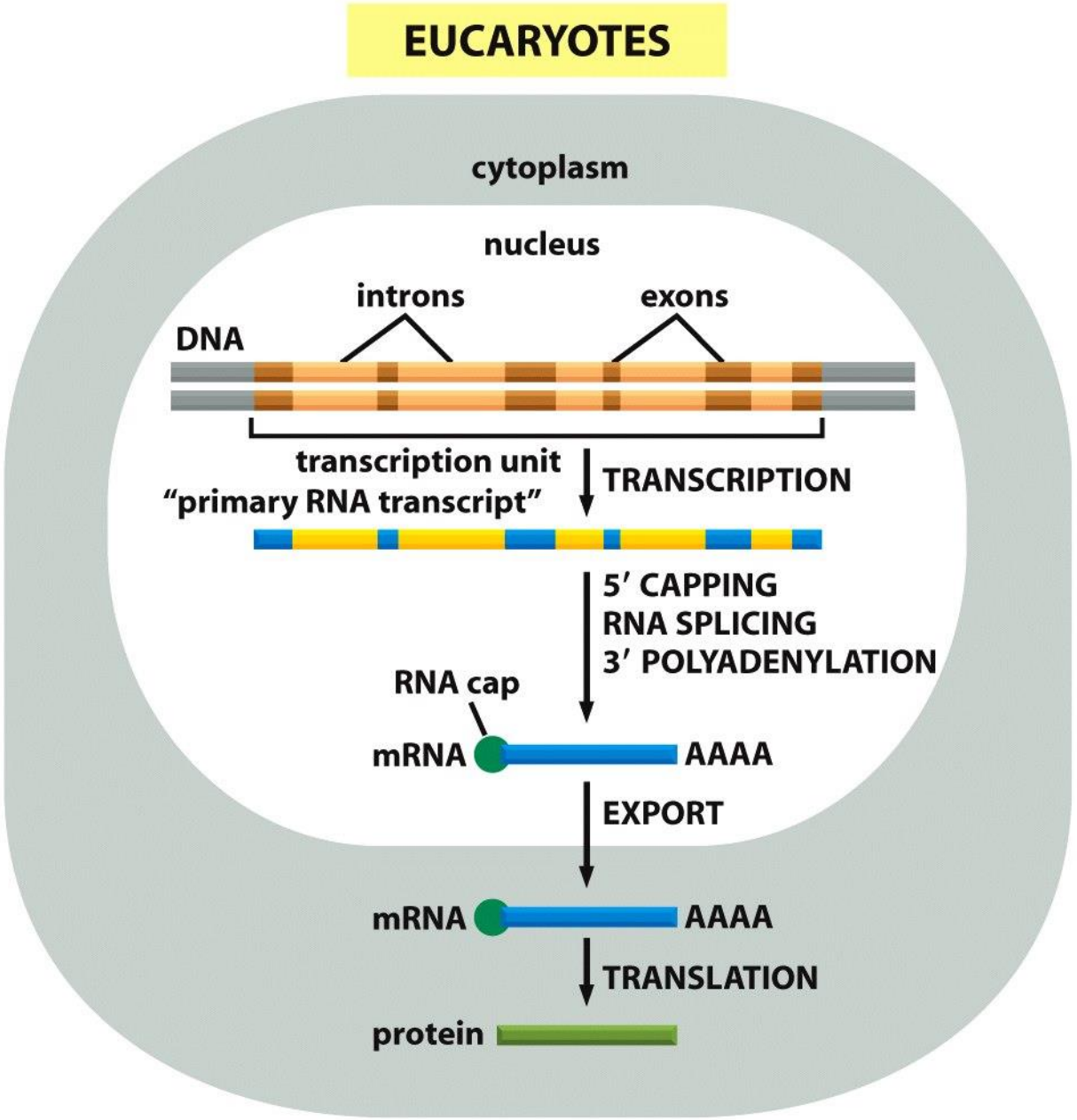


Figure 6-21a *Molecular Biology of the Cell* (© Garland Science 2008)