Nucleic acids

Dr. Hadi Ansarihadipour

dezazma.com

دزآزما

آموزش بیوشیمی بالینی

جستجو

CV پرستاری دکتر هادی انصاری هادی پور دندانپزشکی سامانه کاربران

کارشناسی ارشد بیوشیمی مسیرهای بیوشیمیایی هوشبری منابع علوم آزمایشگاهی

پزشکی

درباره وب‌سایت

این سایت برای آموزش بیوشیمی بالینی و تبادل آرا بین علاقمندان این علم طراحی شده است. نام سایت شامل دو کلمه است. دز مخفف دزفول بعنوان یکی از قدیمی ترین مراکز علم و تمدن در ایران و آز که مخفف آزمایشگاه است و اشاره به نقش تحقیقات در توسعه علم بیوشیمی دارد.

مدیر سایت

دکتر هادی انصاری هادی پور

ترم پائیز ۱۳۹۸

نویسنده: ادمین سایت 14 آگوست 19

دانشجویان محترم

فرا رسیدن سال تحصیلی جدید را تبریک می گویم.

فایل های درس بیوشیمی به شرح ذیل است:

Research Design دریافت

DNA and RNA دریافت

Proteins دریافت

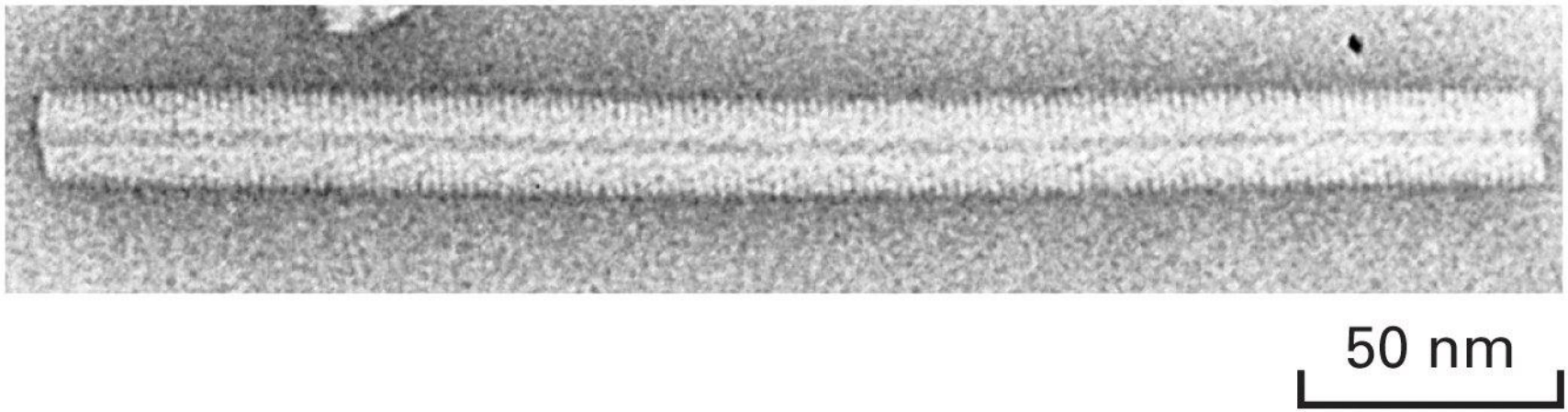
Carbohydrates دریافت

Lipids دریافت

عضله اسکلتی و قلب دریافت

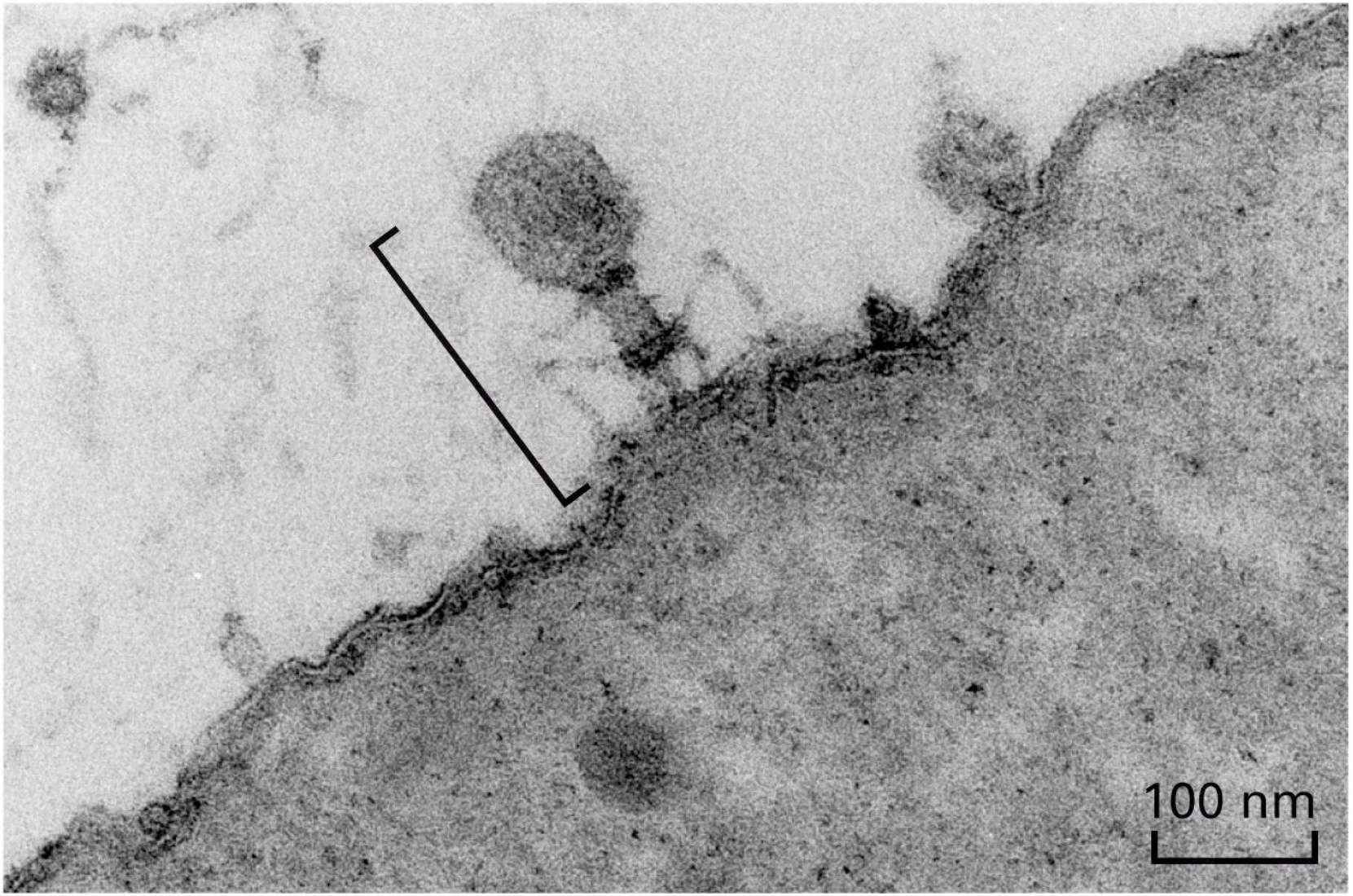
آزمایشگاه بیوشیمی دریافت

(b) Tobacco mosaic virus

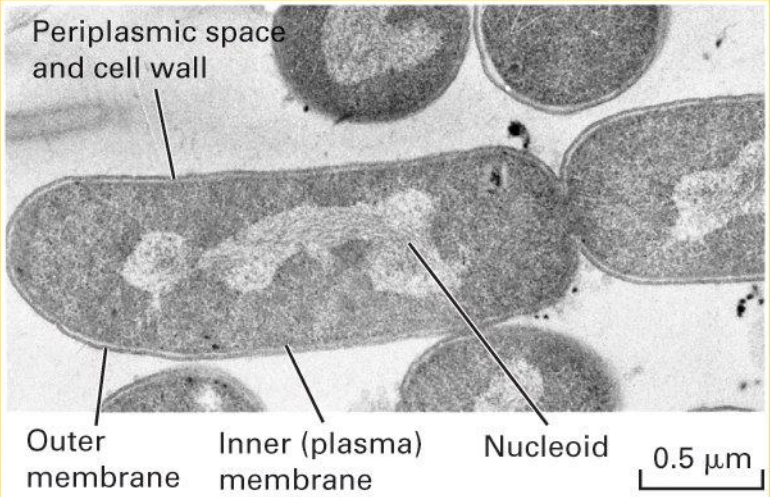


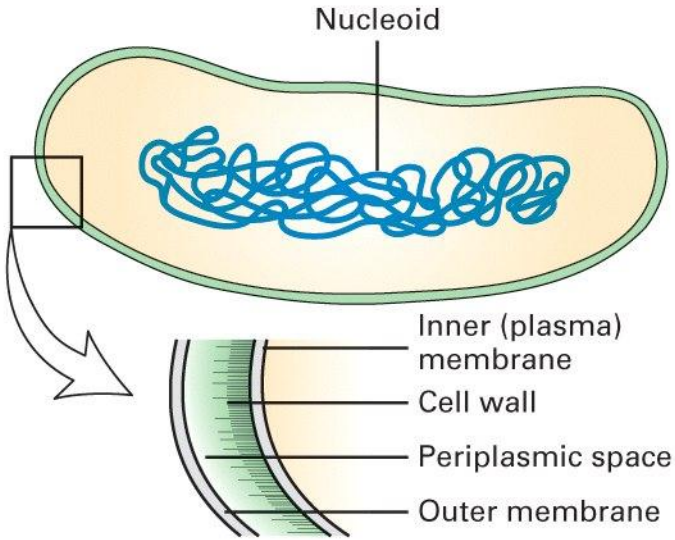
Tobacco mosaic virus (TMV) is a positive-sense single stranded RNA virus that infects plants, especially tobacco and other members of the family Solanaceae.

T4 bacteriophage

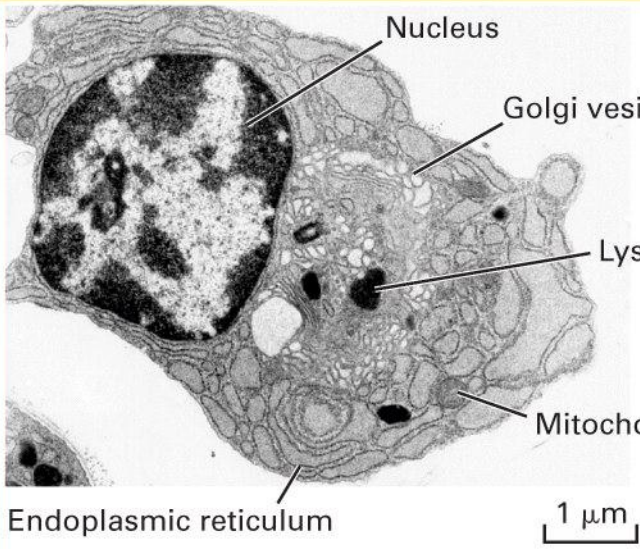


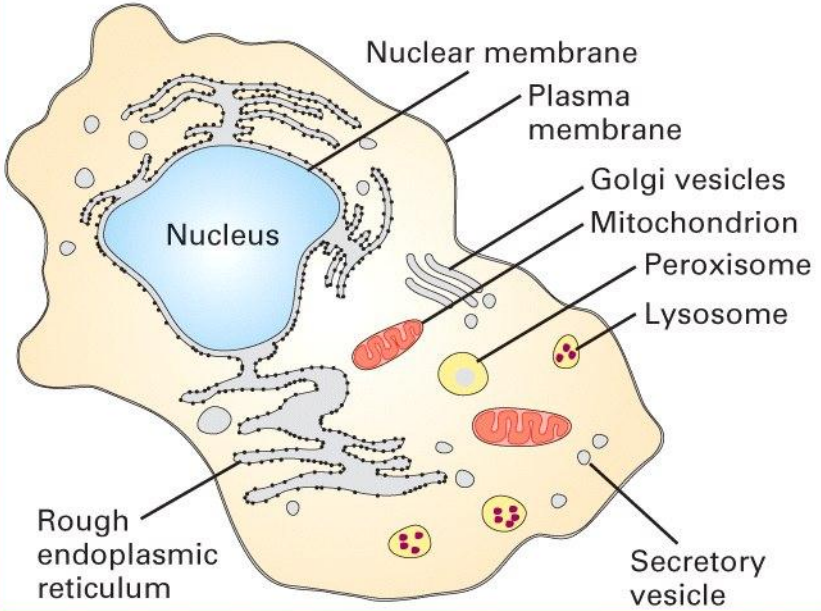
(a) Prokaryotic cell

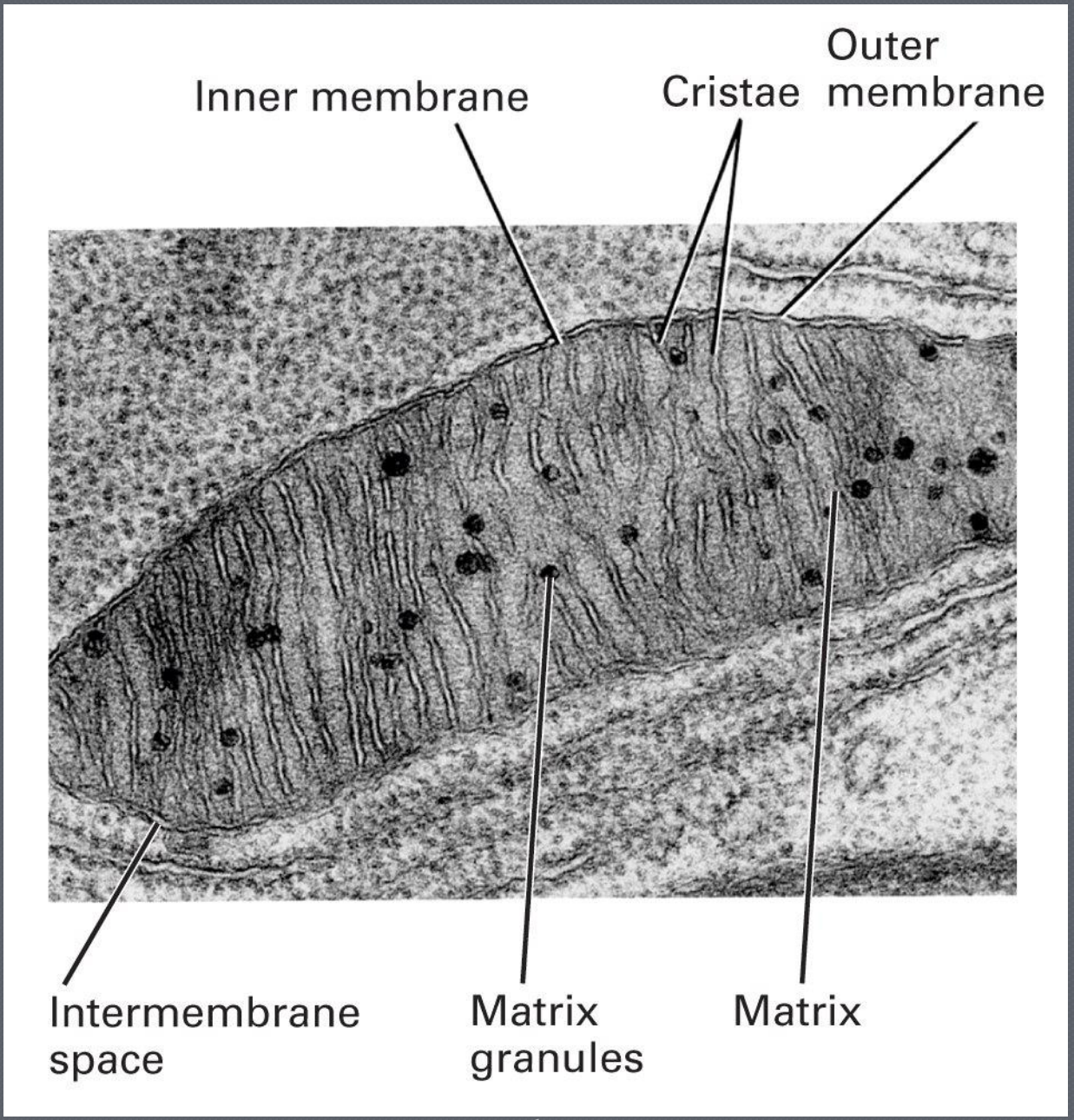


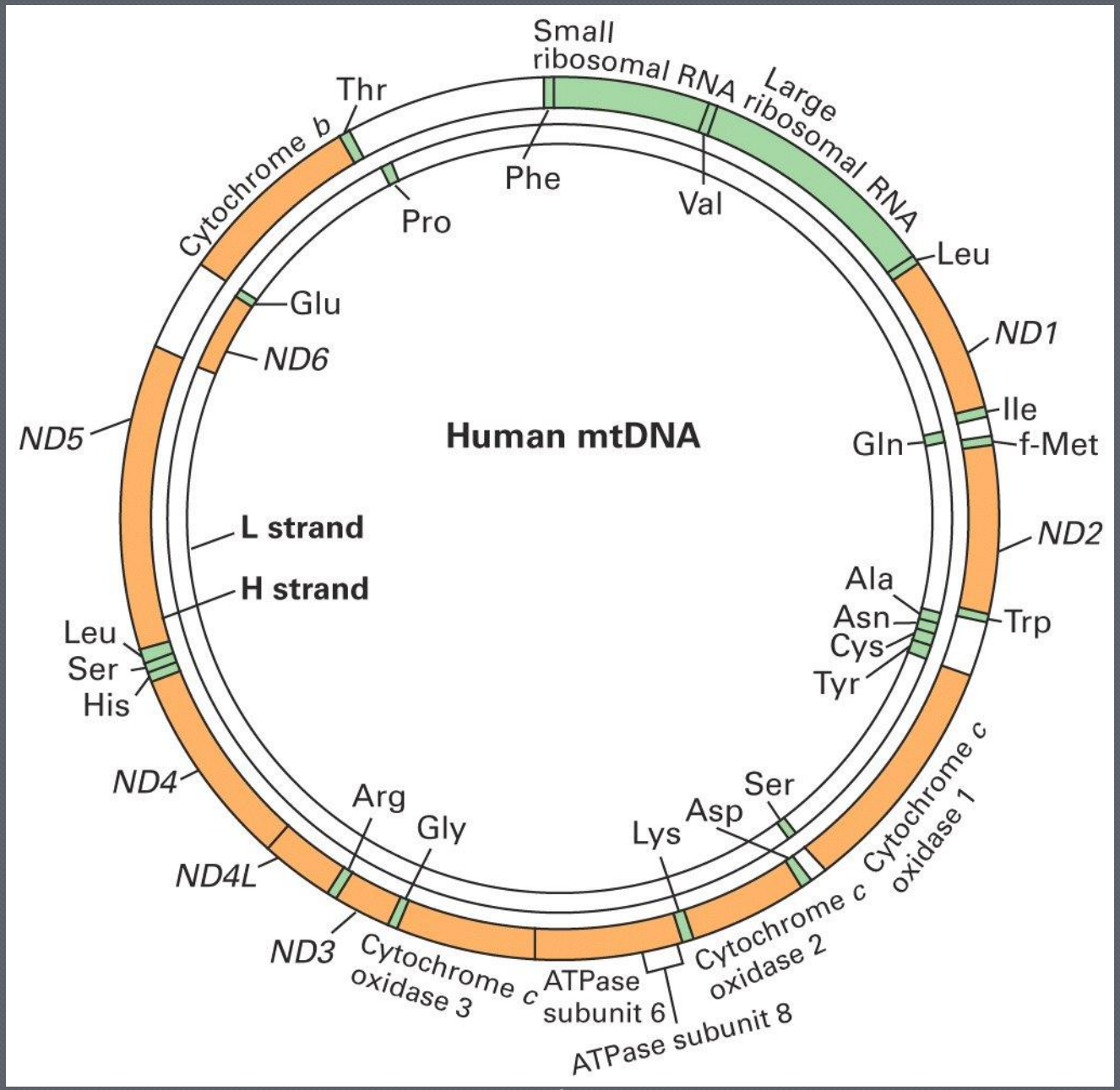


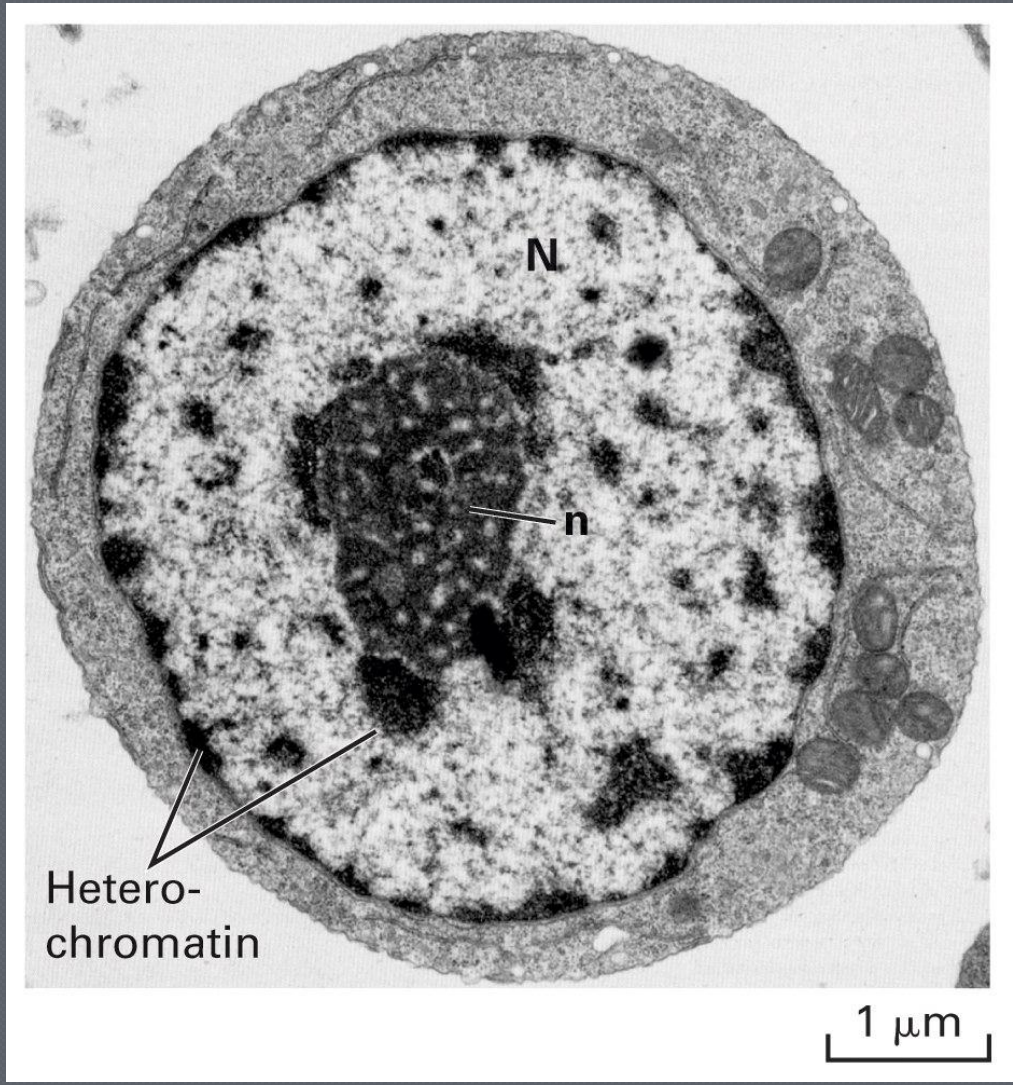
(b) Eukaryotic cell



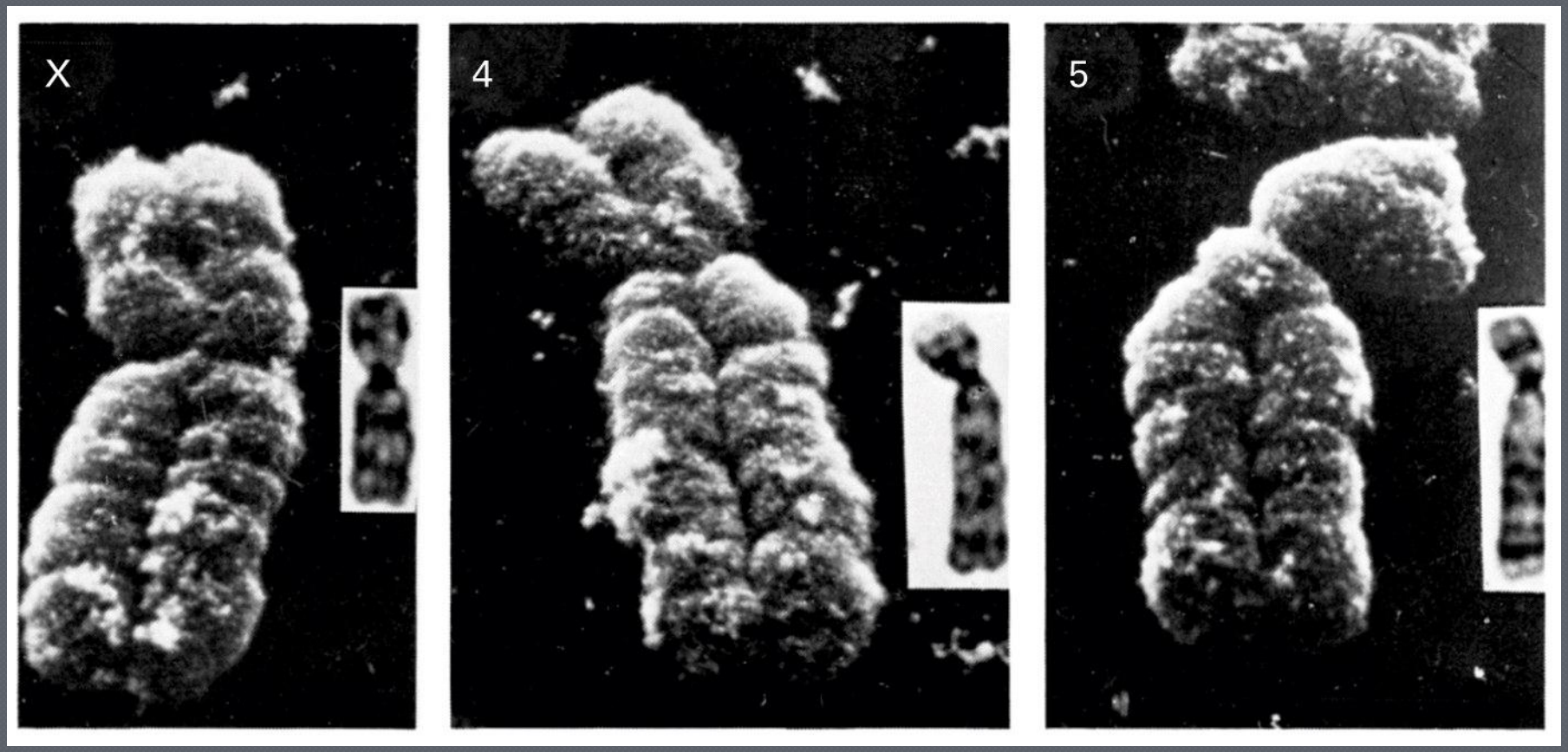


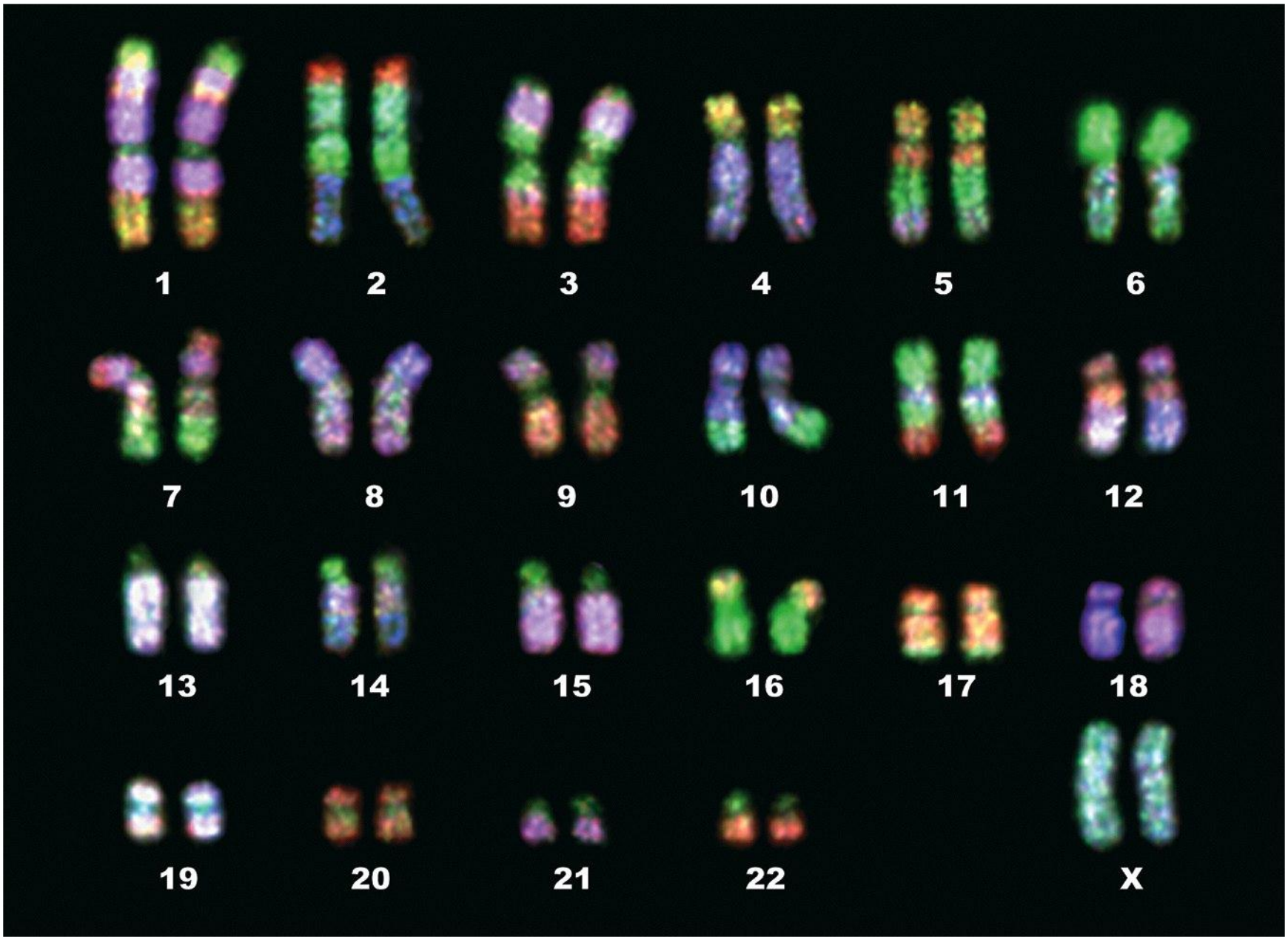

Inner membrane
Cristae
Outer membrane
Intermembrane space
Matrix granules
Matrix

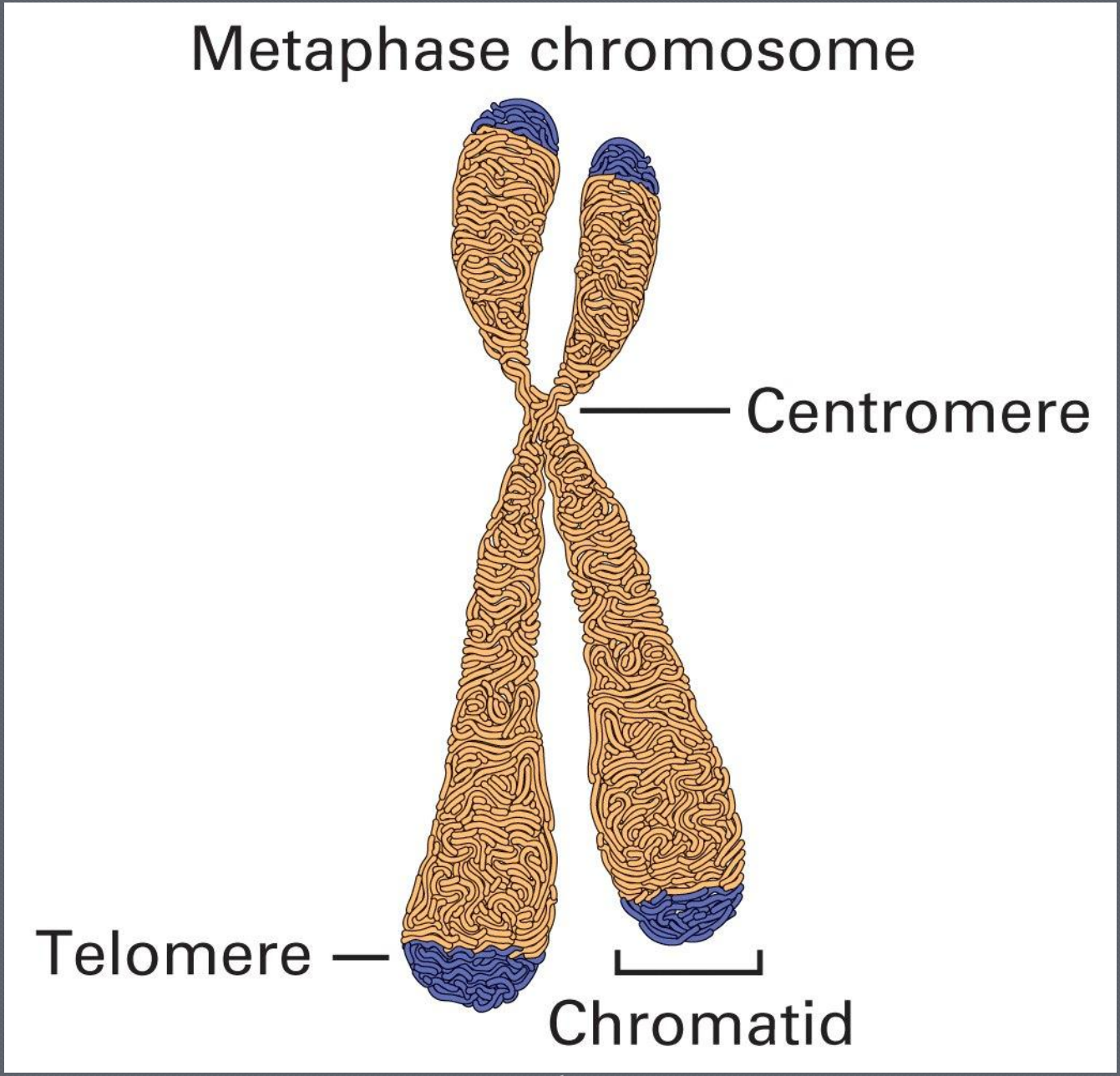

Small ribosomal RNA
Large ribosomal RNA
Thr
Cytochrome b
Pro
Phe
Val
Leu
Glu
ND6
ND1
ND5
Human mtDNA
Ile
Gln
f-Met
L strand
H strand
ND2
Ala
Asn
Cys
Tyr
Trp
Leu
Ser
His
ND4
Arg
Gly
Ser
Asp
Lys
Cytochrome c oxidase 1
ND4L
ND3
Cytochrome c oxidase 3
ATPase subunit 6
Cytochrome c oxidase 2
ATPase subunit 8

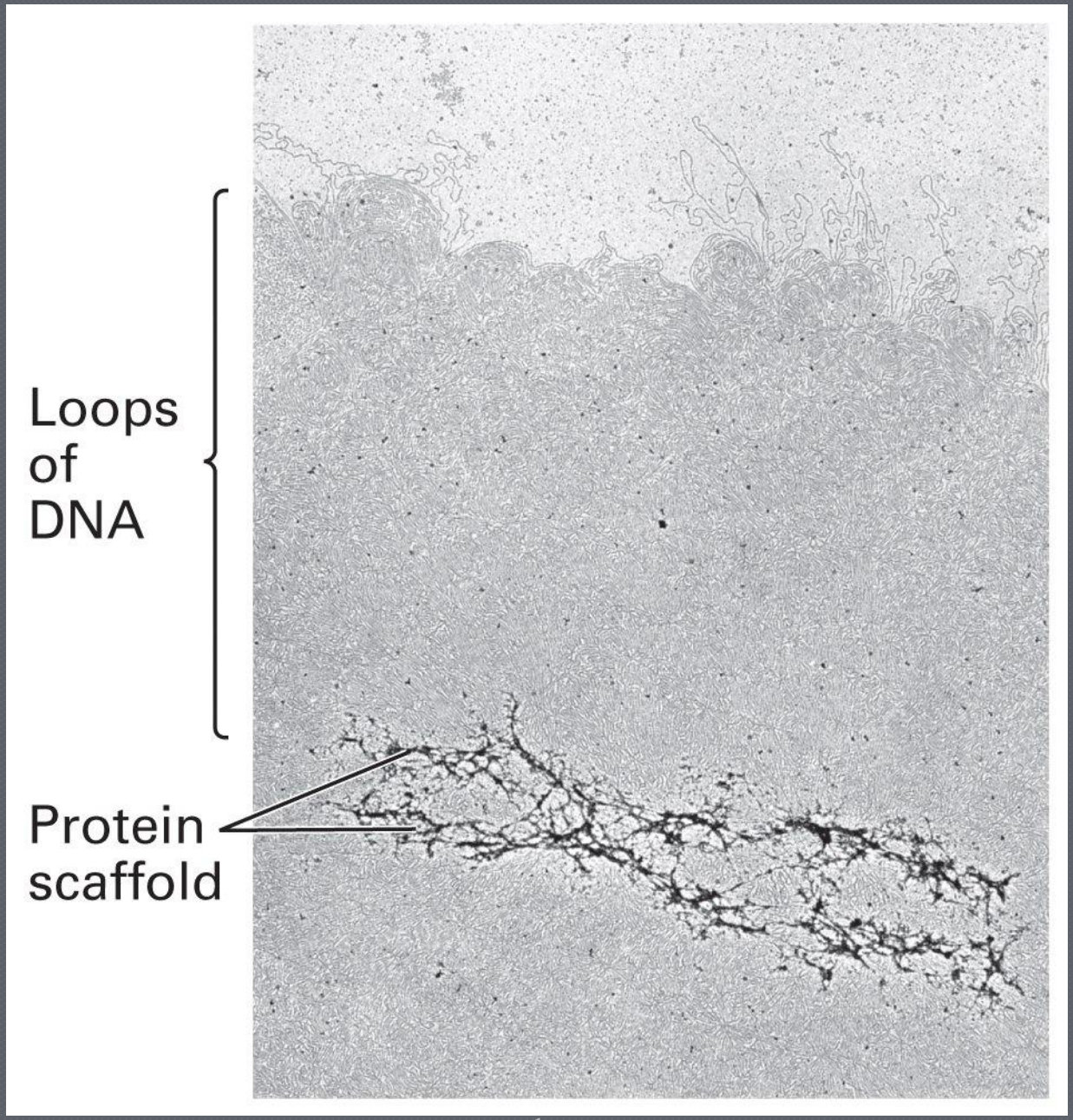


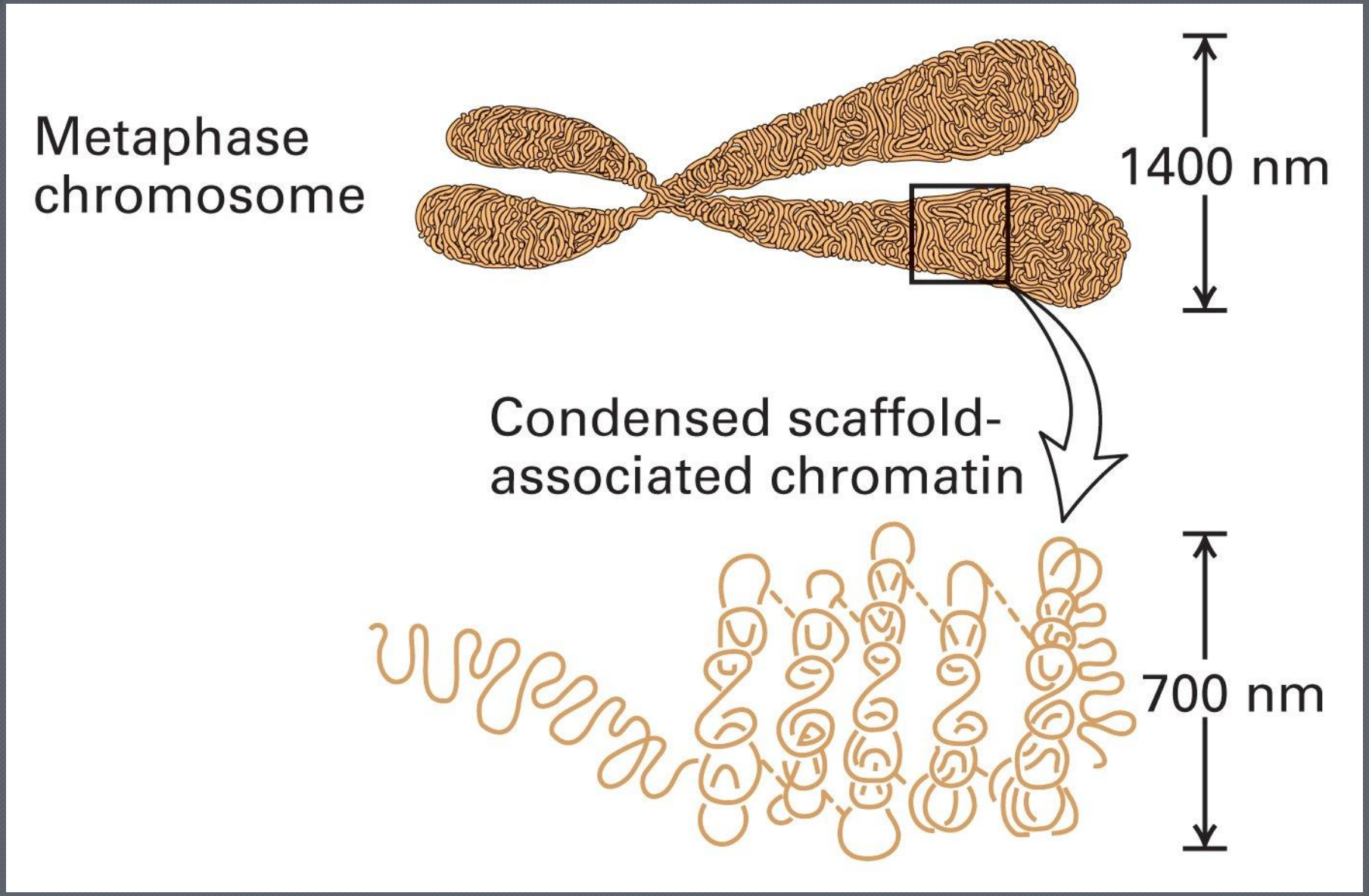
Electron micrograph of a thin section of a bone marrow stem cell.

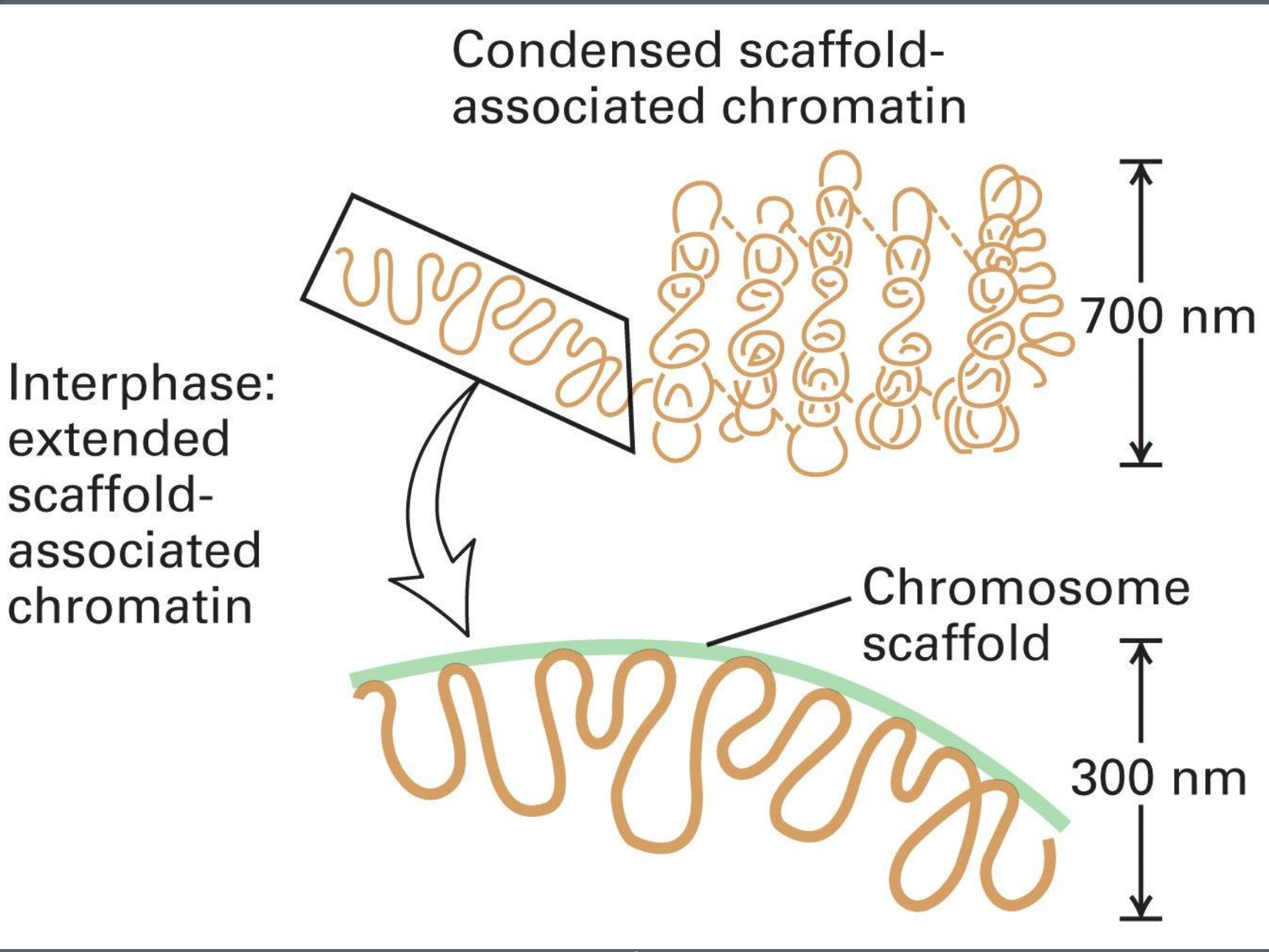

X
4
5

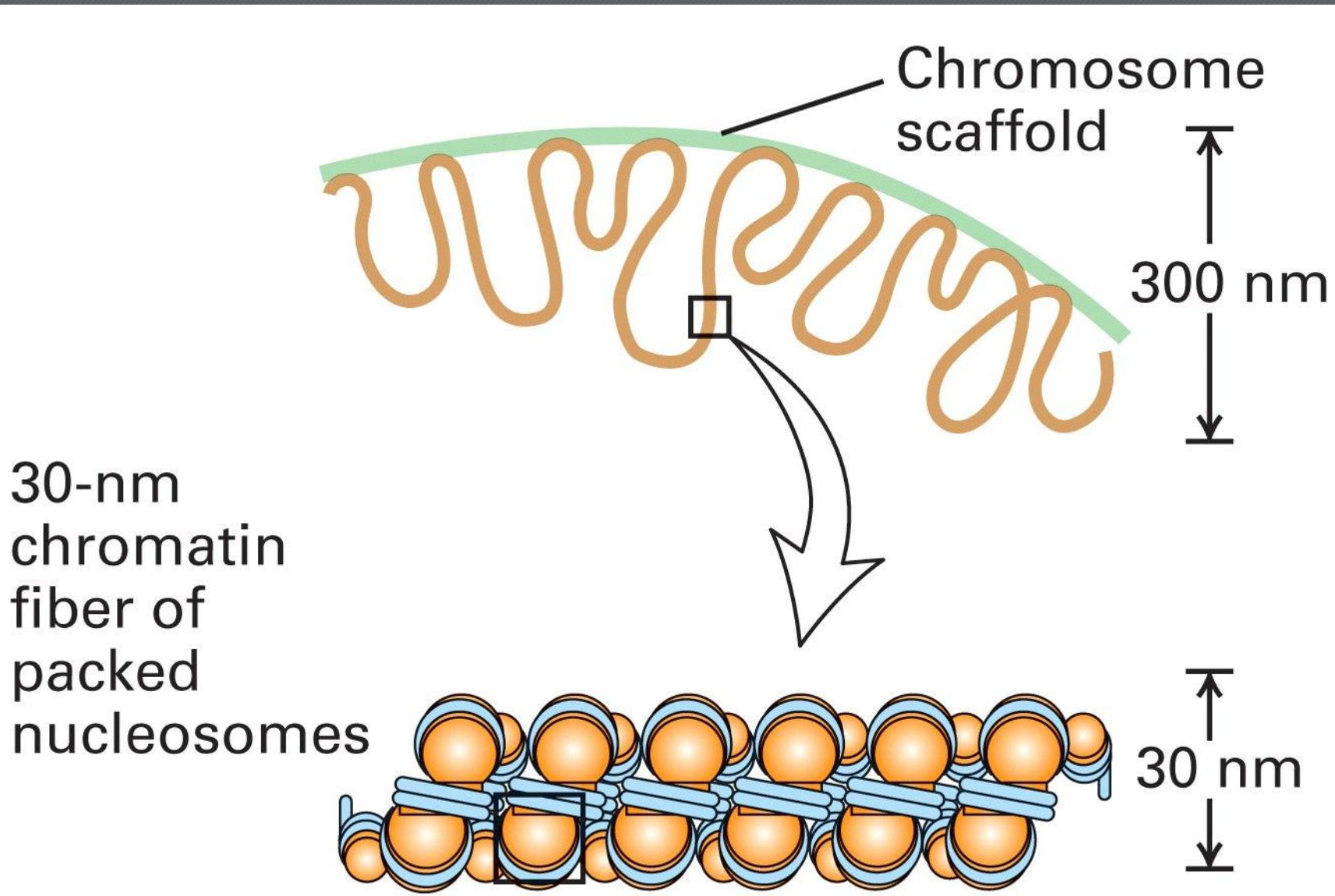

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
X

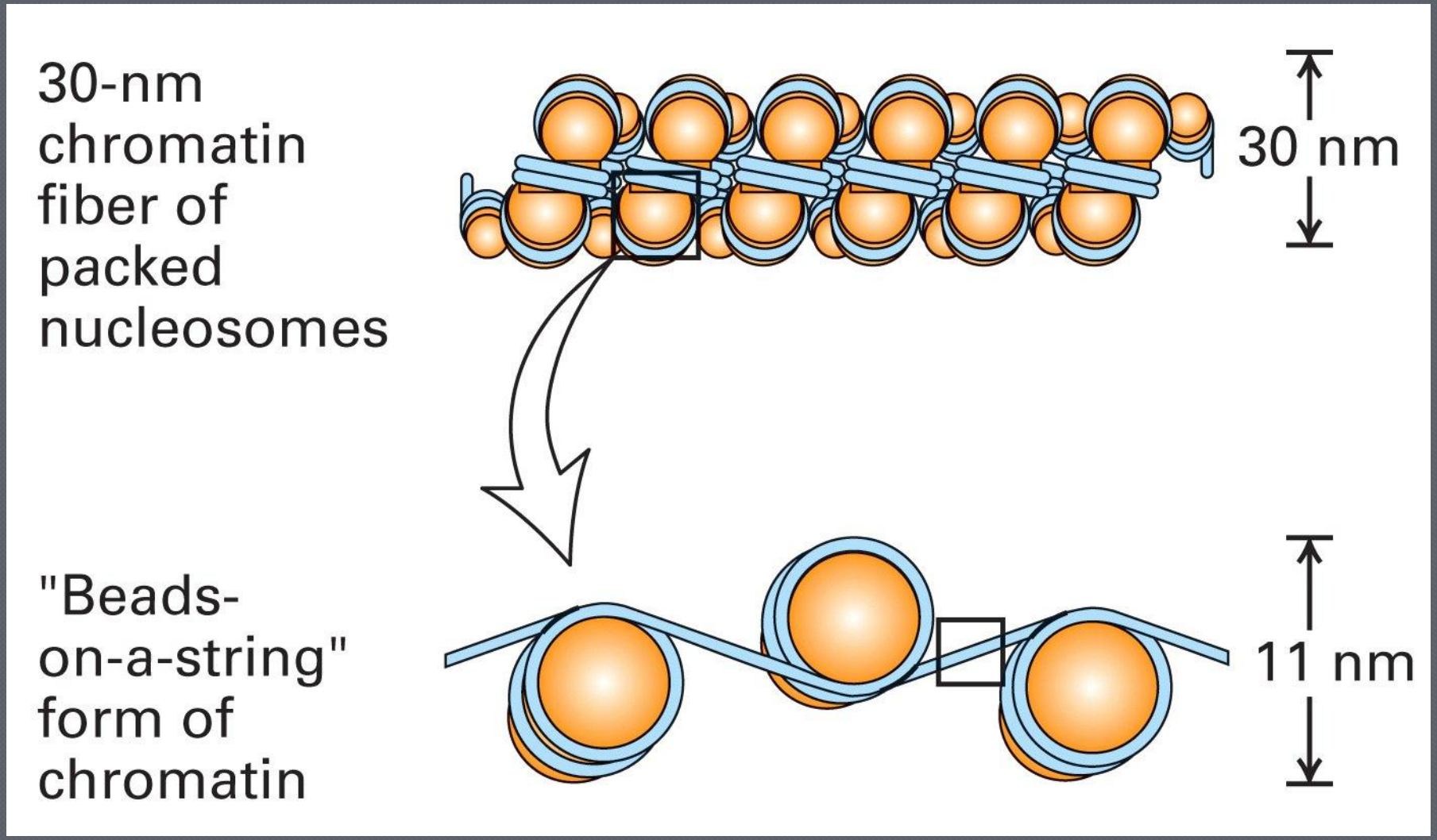

Metaphase chromosome
Centromere
Telomere
Chromatid

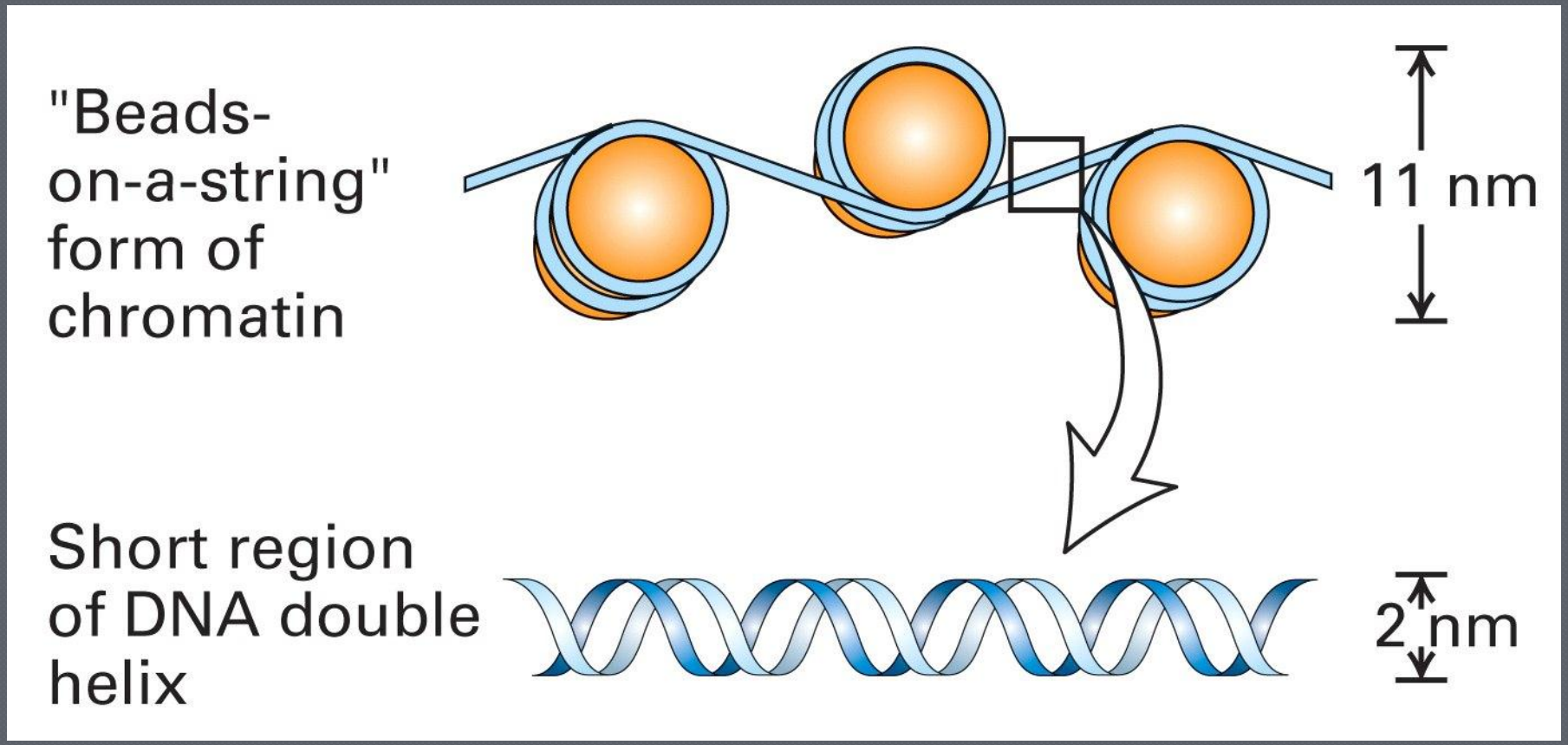


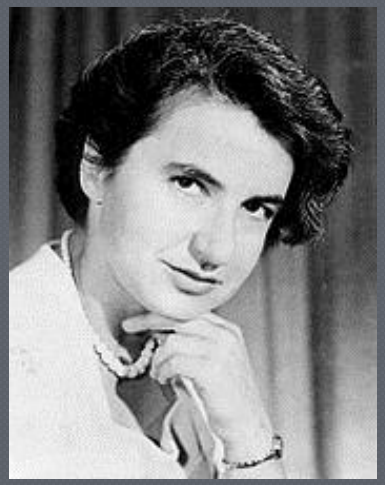

Metaphase chromosome
1400 nm
Condensed scaffold-associated chromatin
700 nm


Condensed scaffold-associated chromatin
700 nm
Interphase: extended scaffold-associated chromatin
Chromosome scaffold
300 nm


Chromosome scaffold
300 nm
30-nm chromatin fiber of packed nucleosomes
30 nm

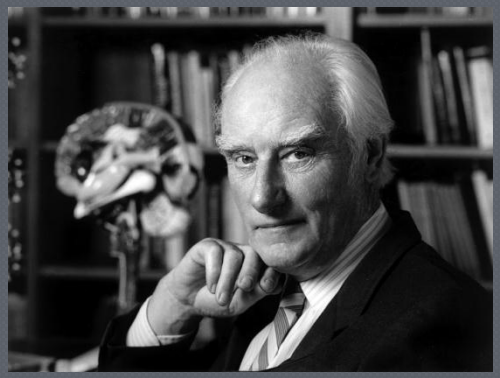

30-nm chromatin fiber of packed nucleosomes
30 nm
"Beads-on-a-string" form of chromatin
11 nm


"Beads-on-a-string" form of chromatin
11 nm
Short region of DNA double helix
2 nm

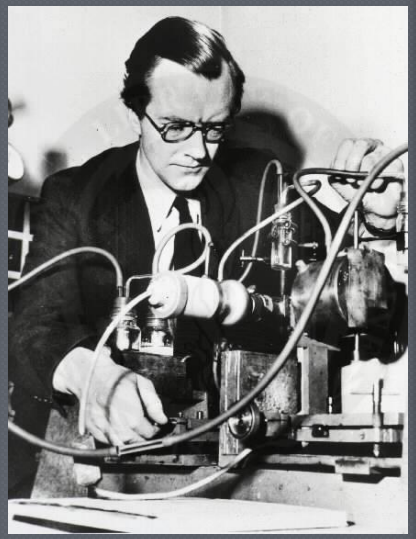


Rosalind Franklin

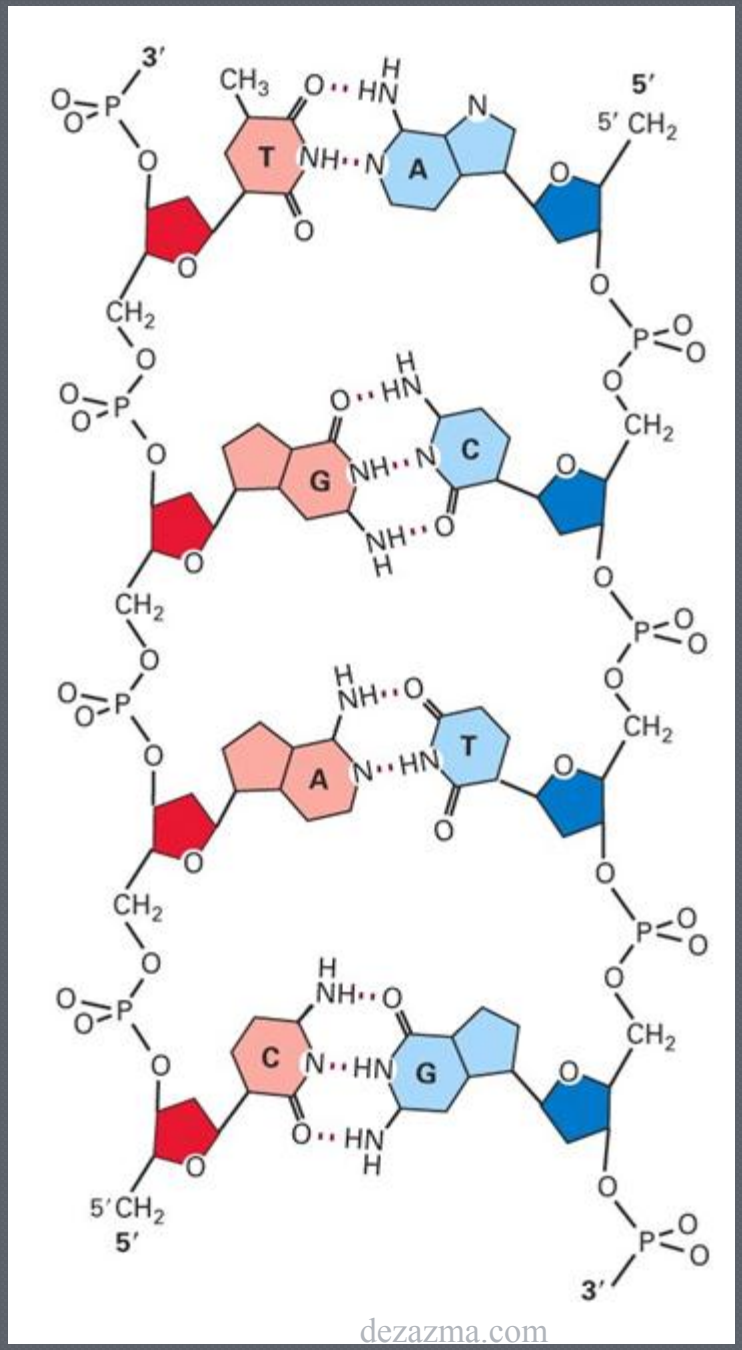
James Dewey Watson
(born April 6, 1928)

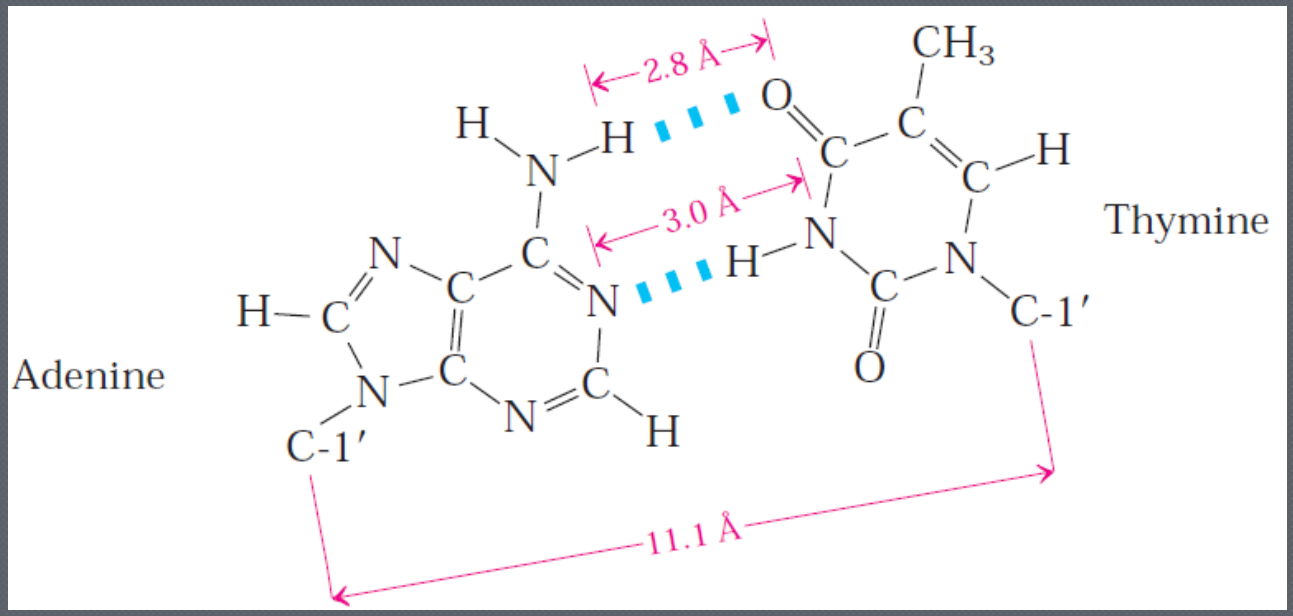


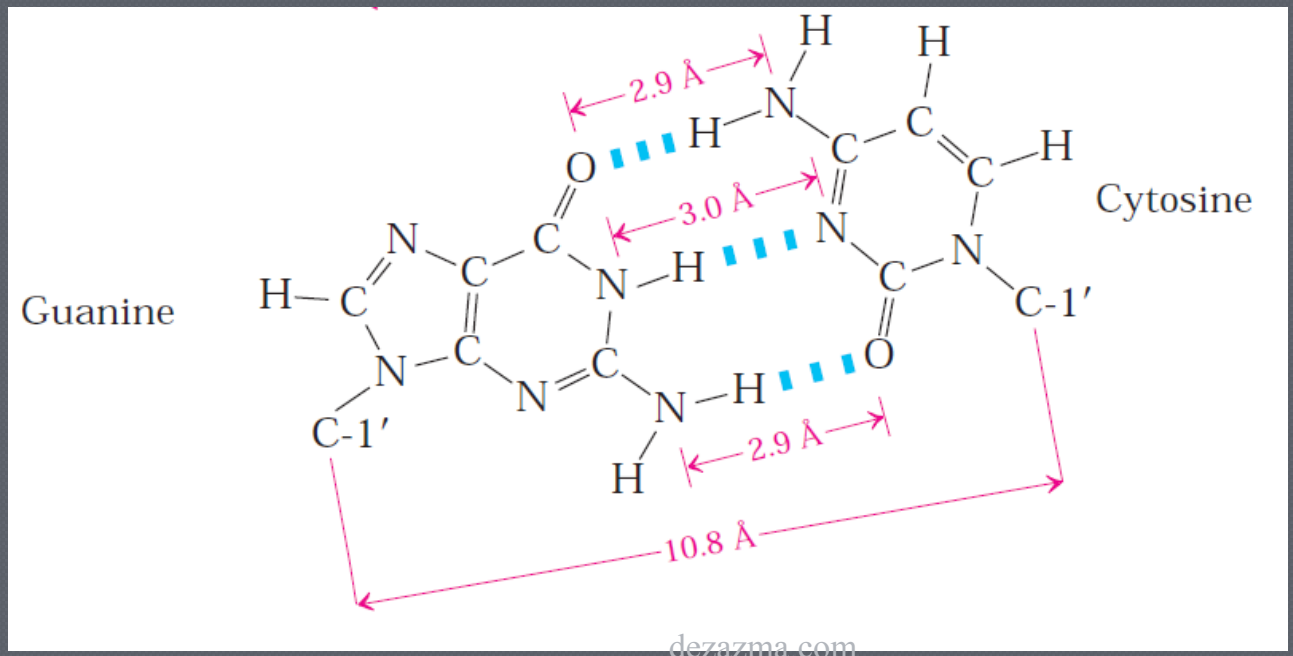
Francis Harry Compton Crick

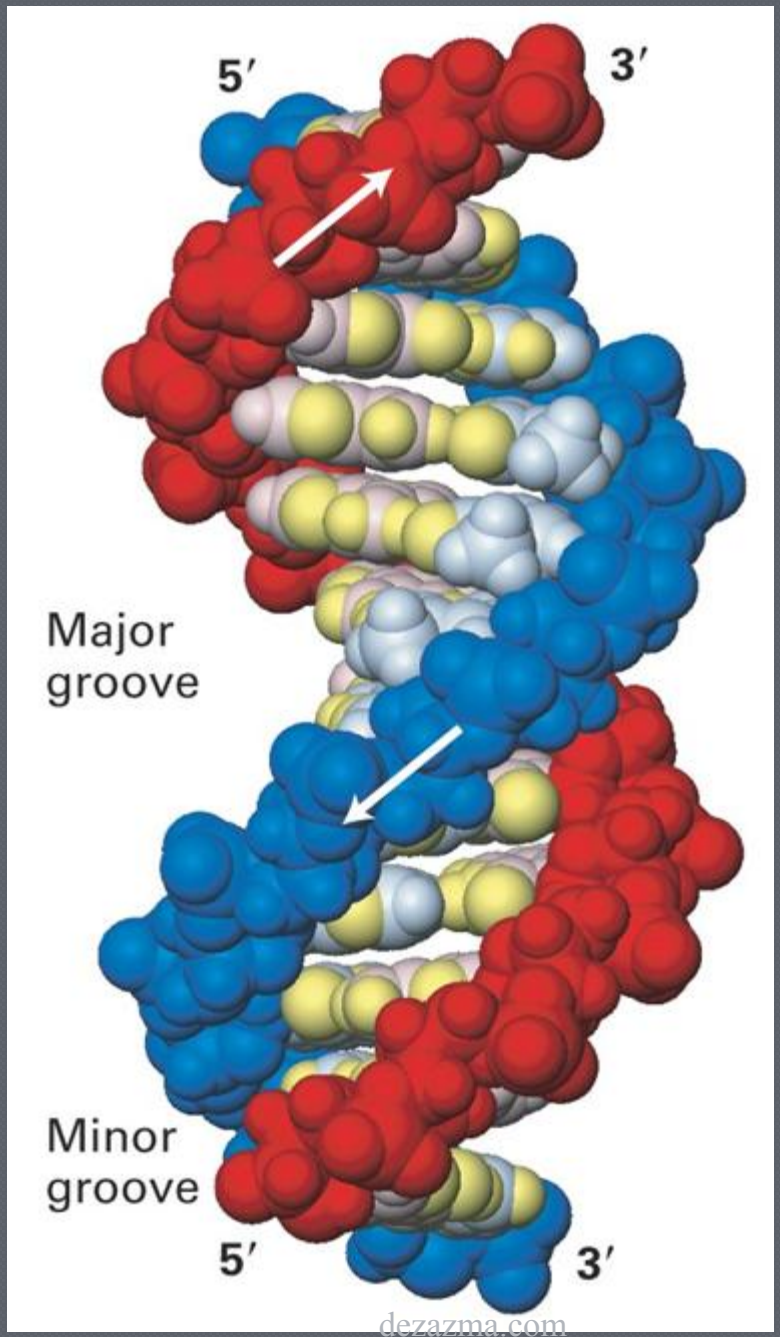


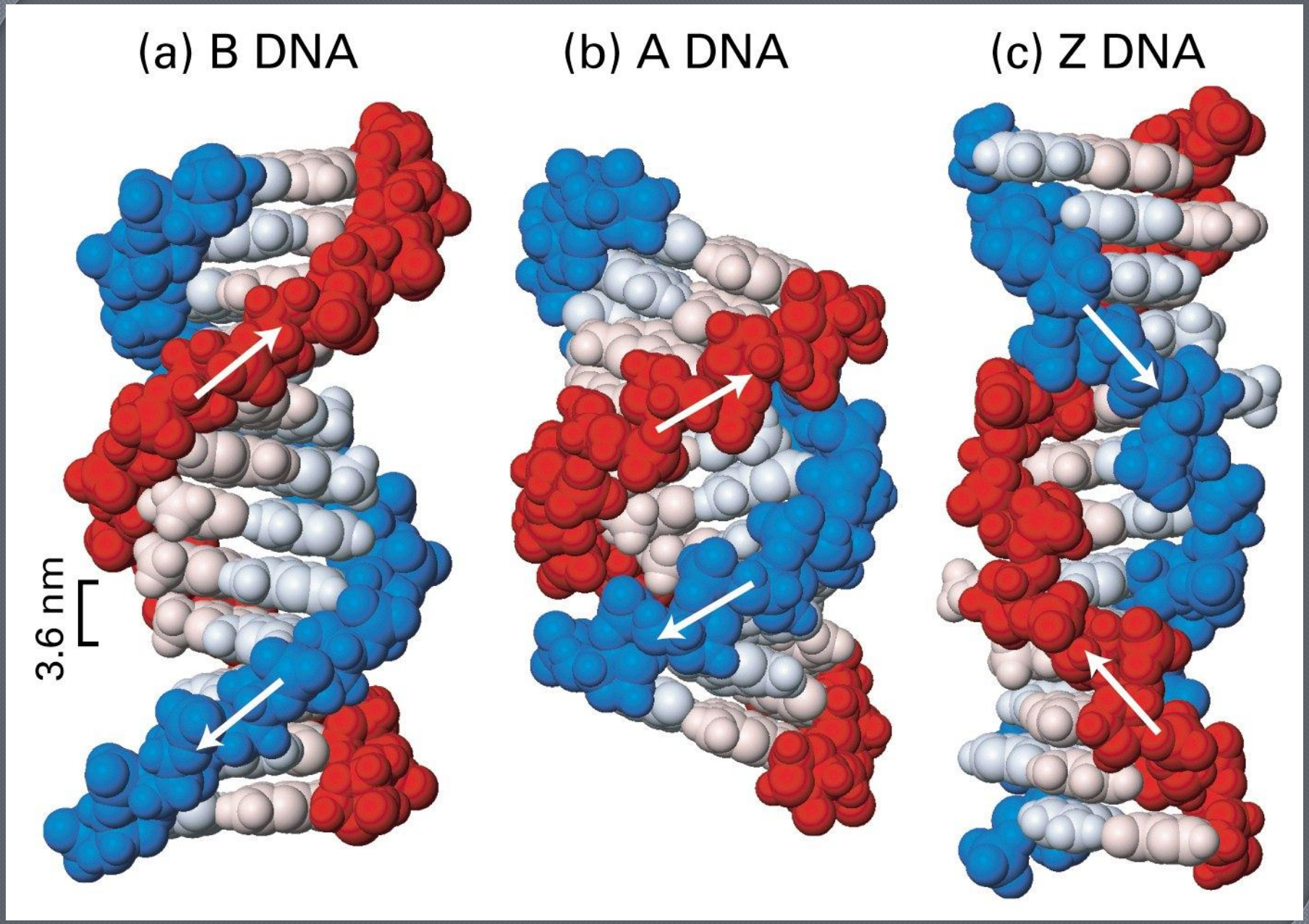
Maurice Hugh Frederick Wilkins



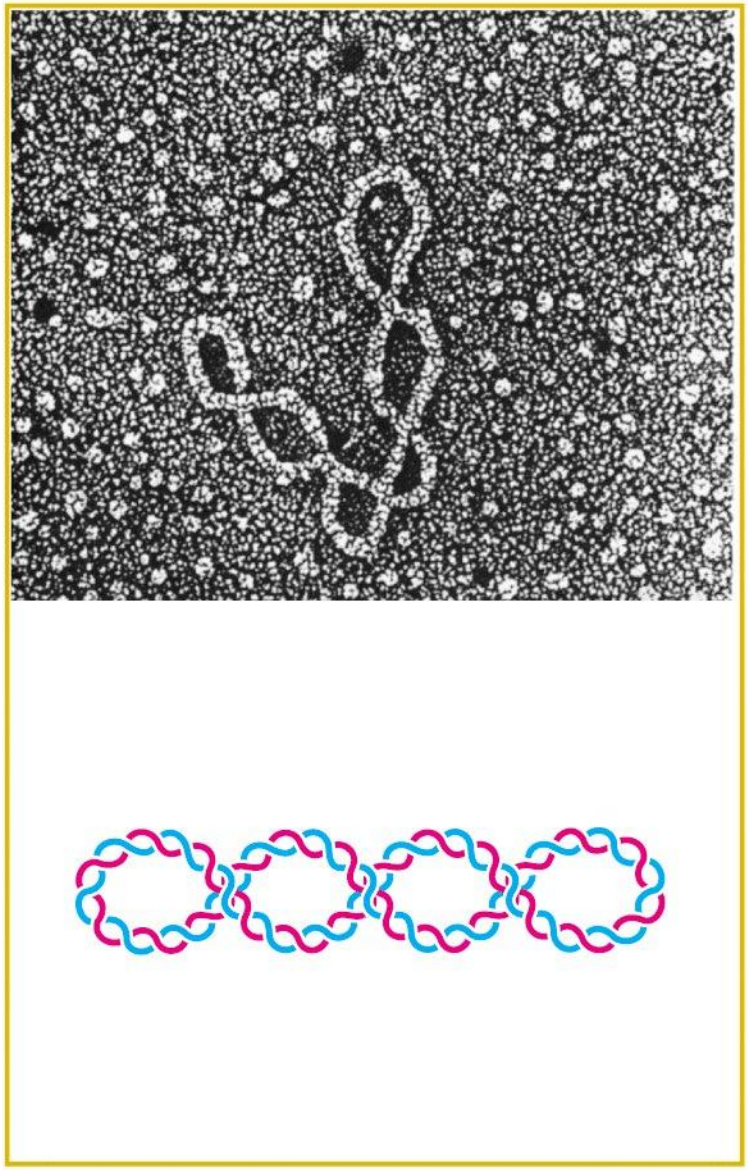

Adenine
Thymine
2.8 Å
3.0 Å
11.1 Å
CH3
C-1′


Guanine
Cytosine
2.9 Å
3.0 Å
2.9 Å
10.8 Å
C-1′

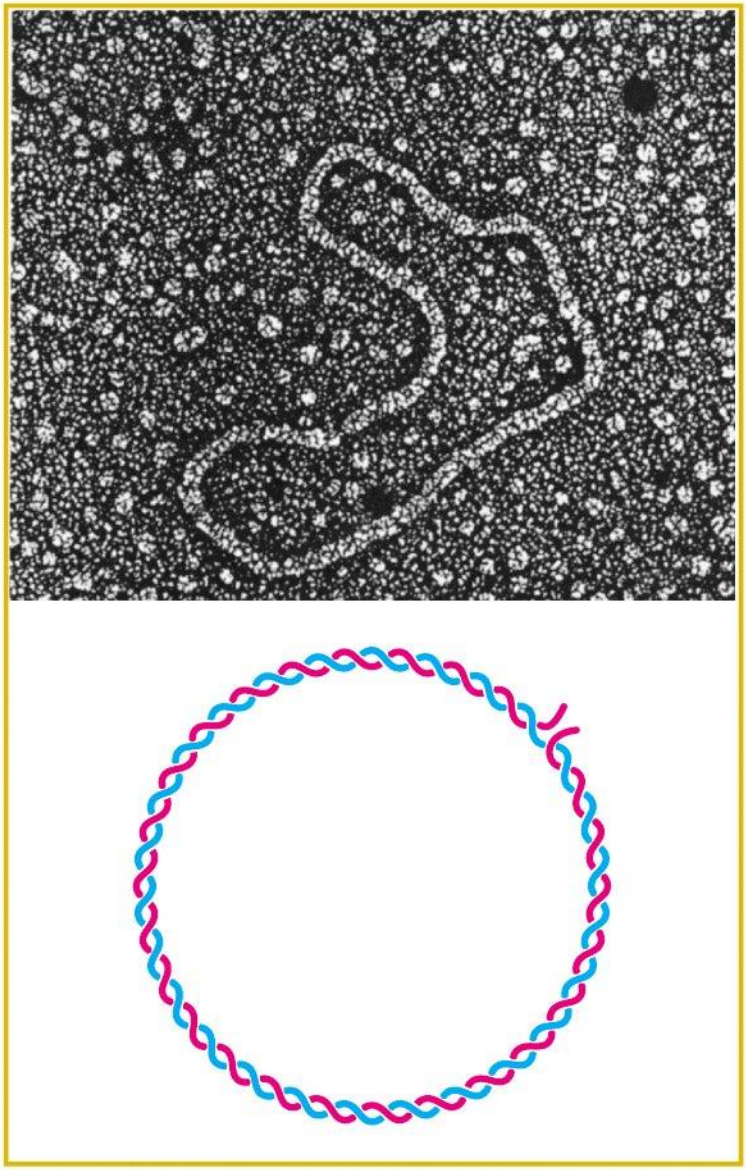


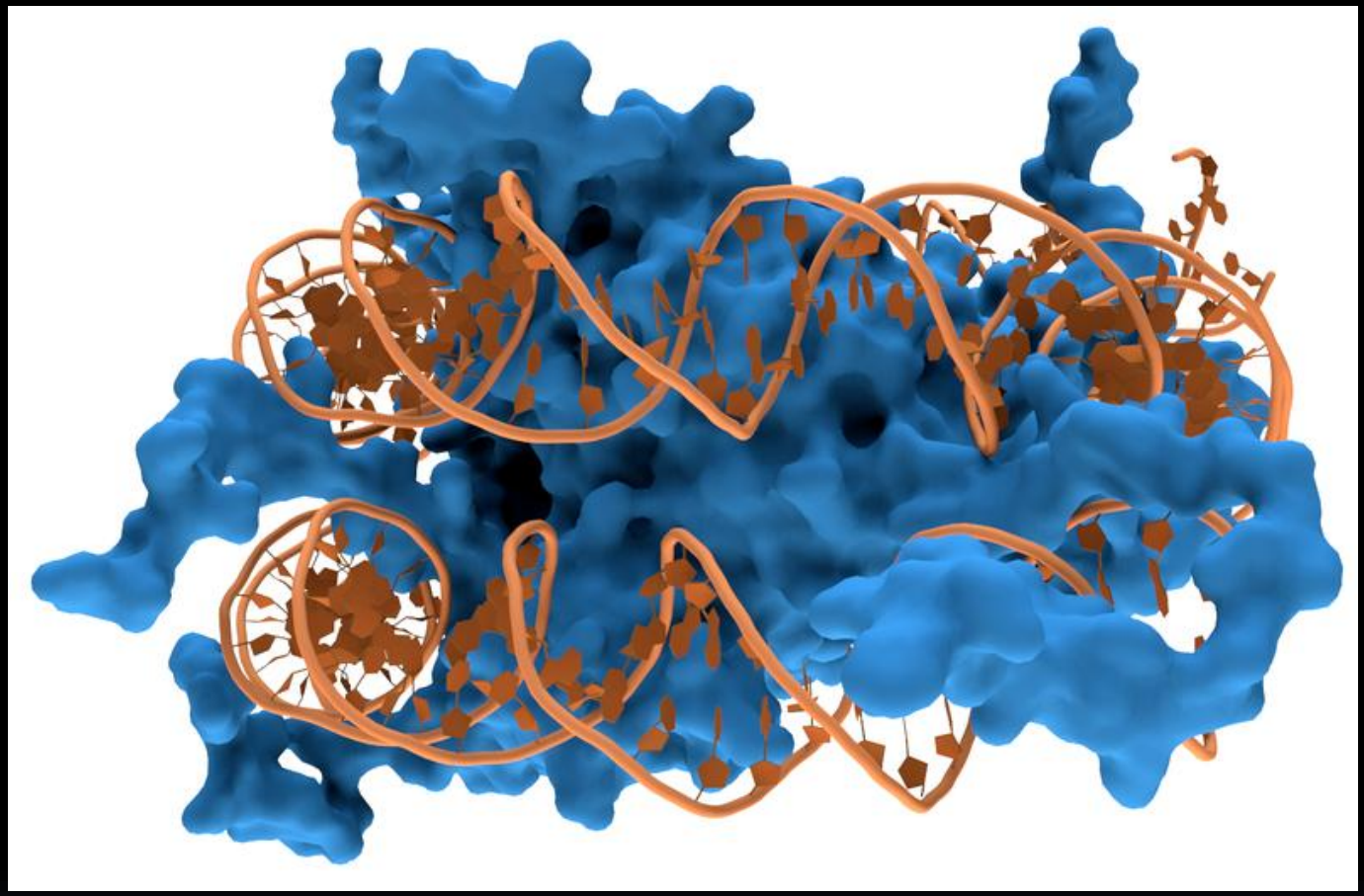


(a) Supercoiled



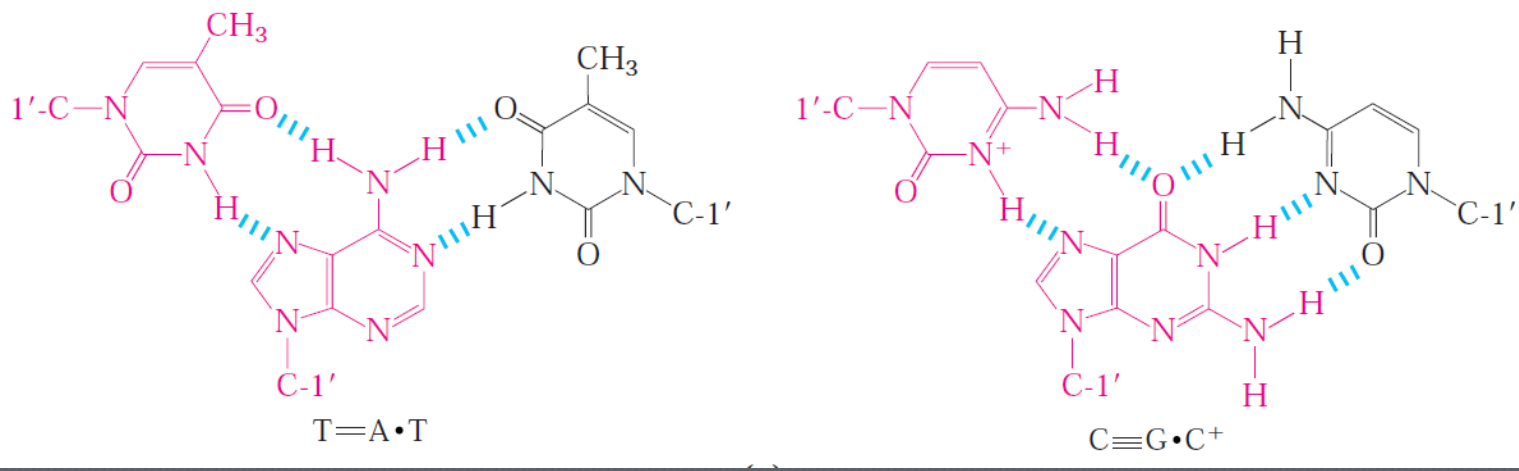
(b) Relaxed circle





Interaction of DNA with histones.

These proteins' basic amino acids bind to the acidic phosphate groups on DNA.



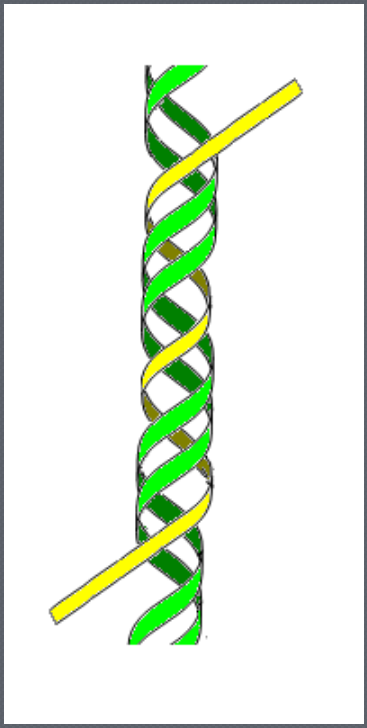
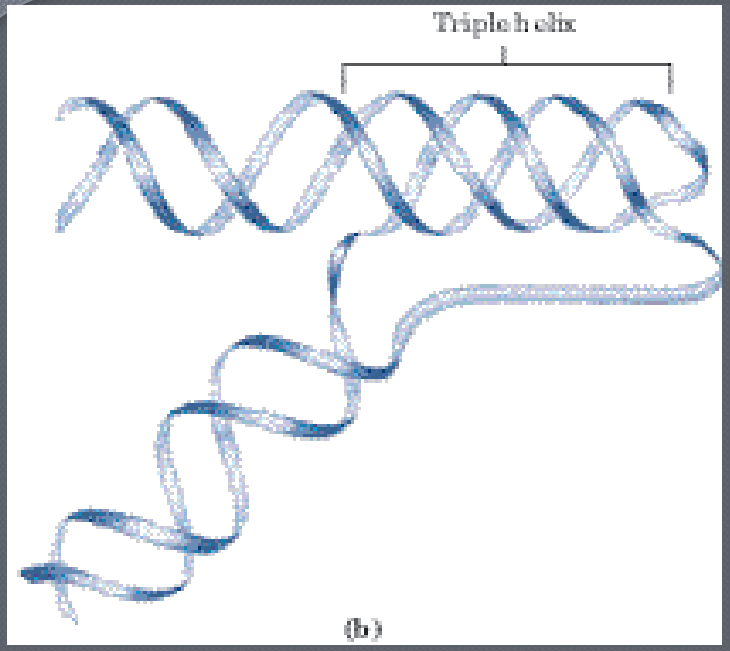


FIGURE 8–22 DNA structures containing three or four DNA strands.

Base-pairing patterns in one well-characterized form of triplex DNA.
The Hoogsteen pair in each case is shown in red.

Biochemistry. Lehninger. 4th Edition, 2005



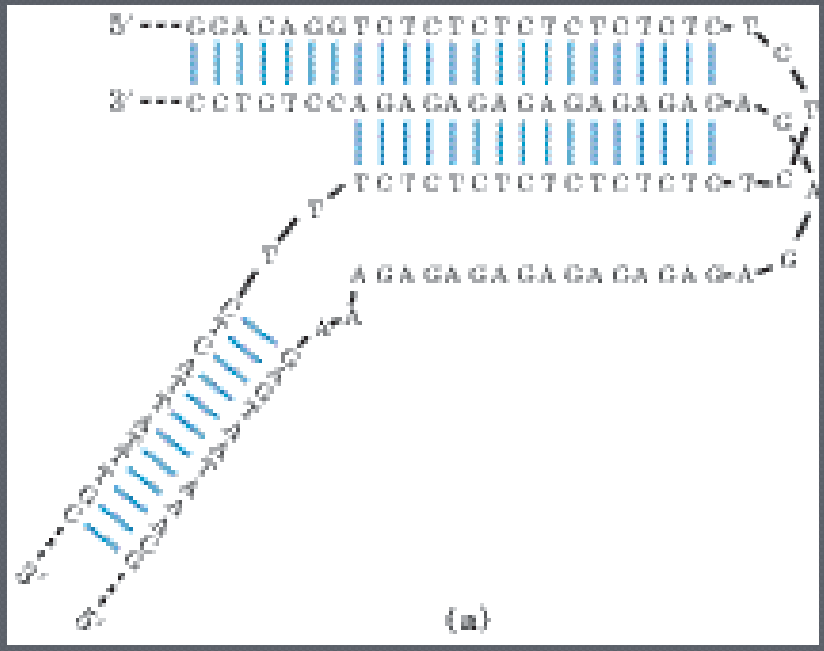


FIGURE 8–23 H-DNA.

(a) A sequence of alternating T and C residues can be considered a mirror repeat centered about a central T or C.

(b) These sequences form an unusual structure in which the strands in one half of the mirror repeat are separated and the pyrimidinecontaining strand (alternating T and C residues) folds back on the other half of the repeat to form a triple helix. The purine strand (alternating A and G residues) is left unpaired. This structure produces a sharp bend in the DNA.

Biochemistry. Lehninger. 4th Edition, 2005

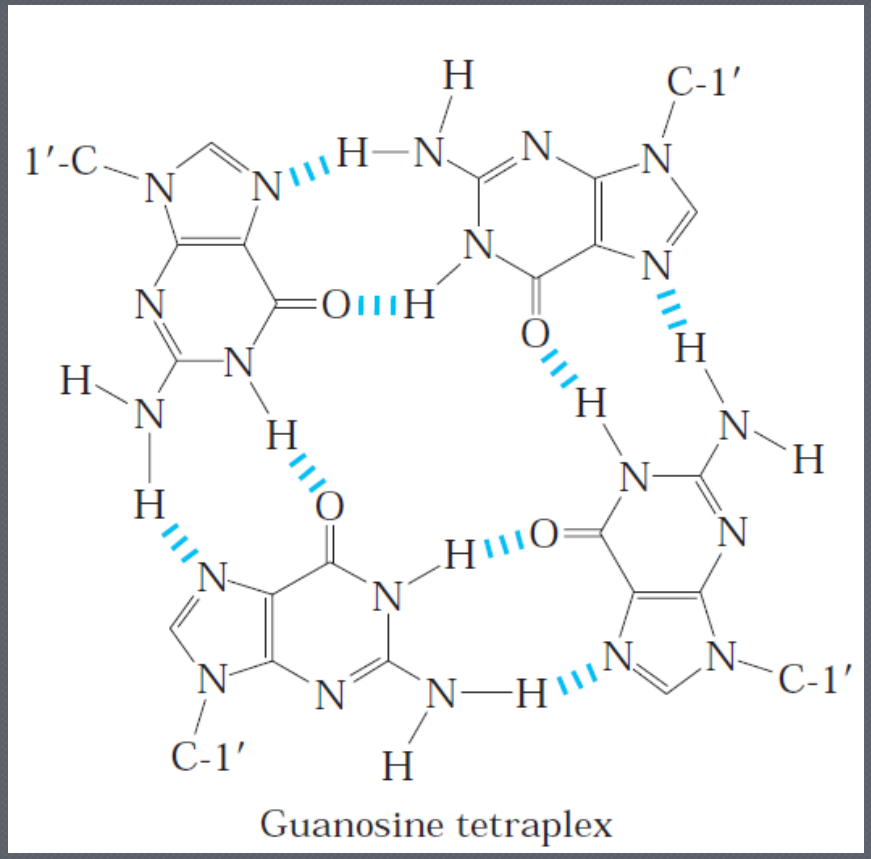
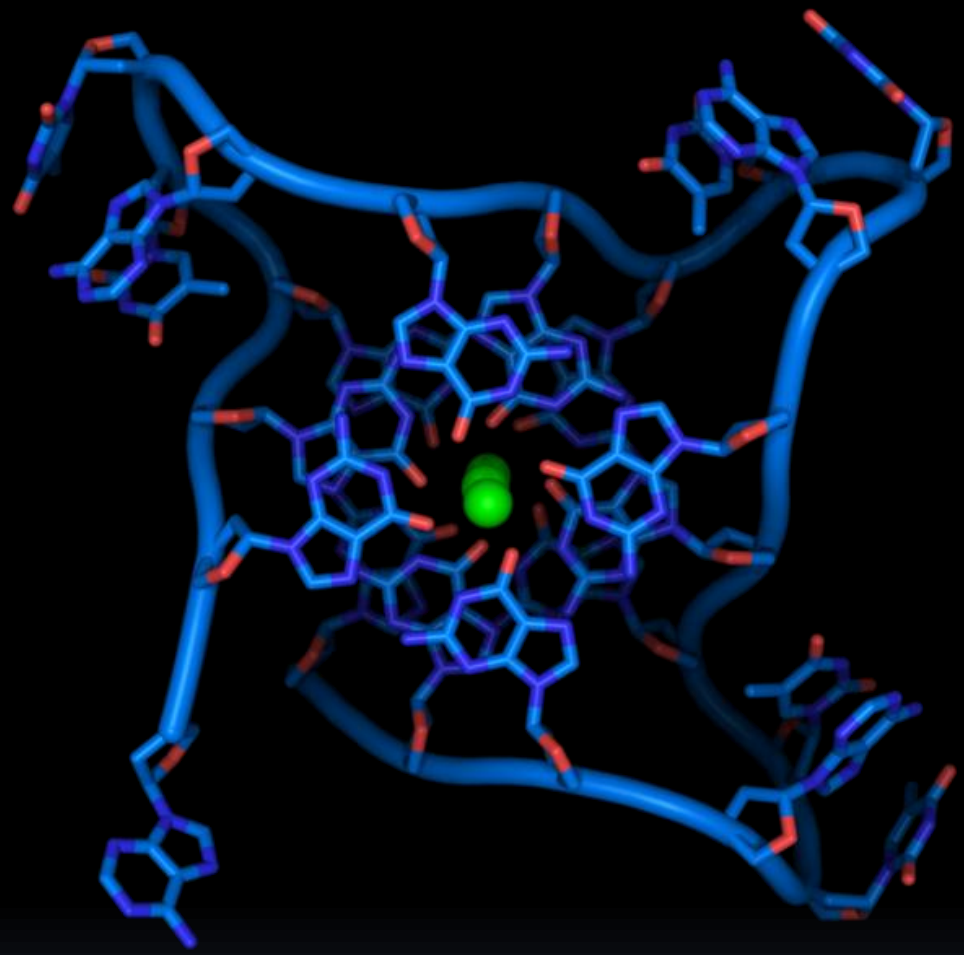


FIGURE 8–22 DNA structures containing three or four DNA strands.

Base-pairing pattern in the guanosine tetraplex structure.

Biochemistry. Lehninger. 4th Edition, 2005



DNA quadruplex formed by telomere repeats.

The looped conformation of the DNA backbone is very different from the typical DNA helix.

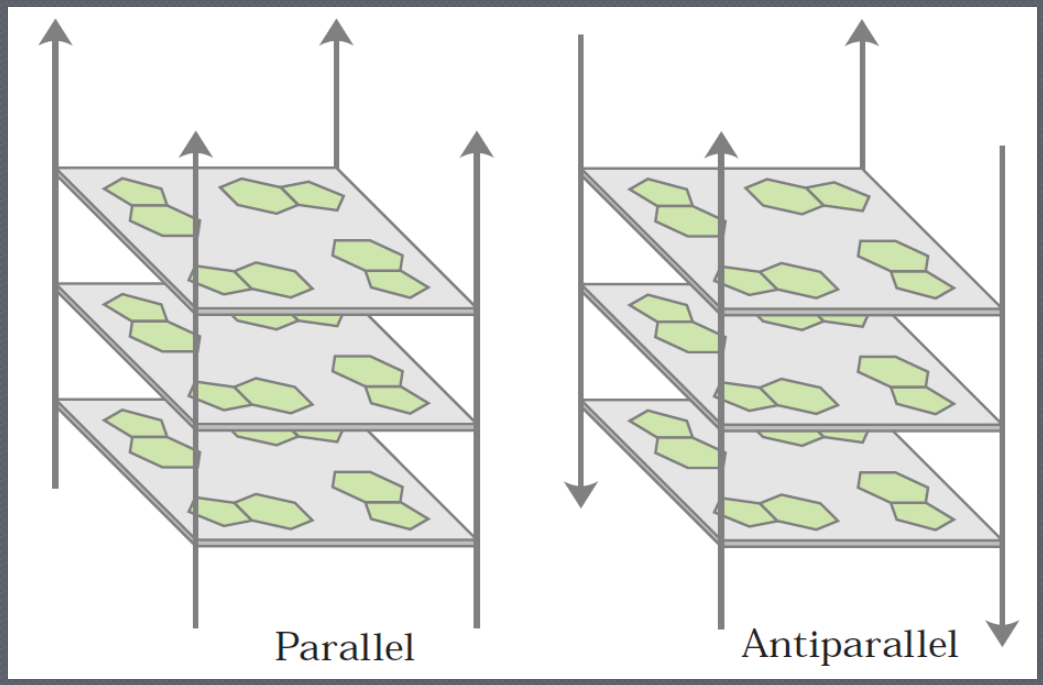
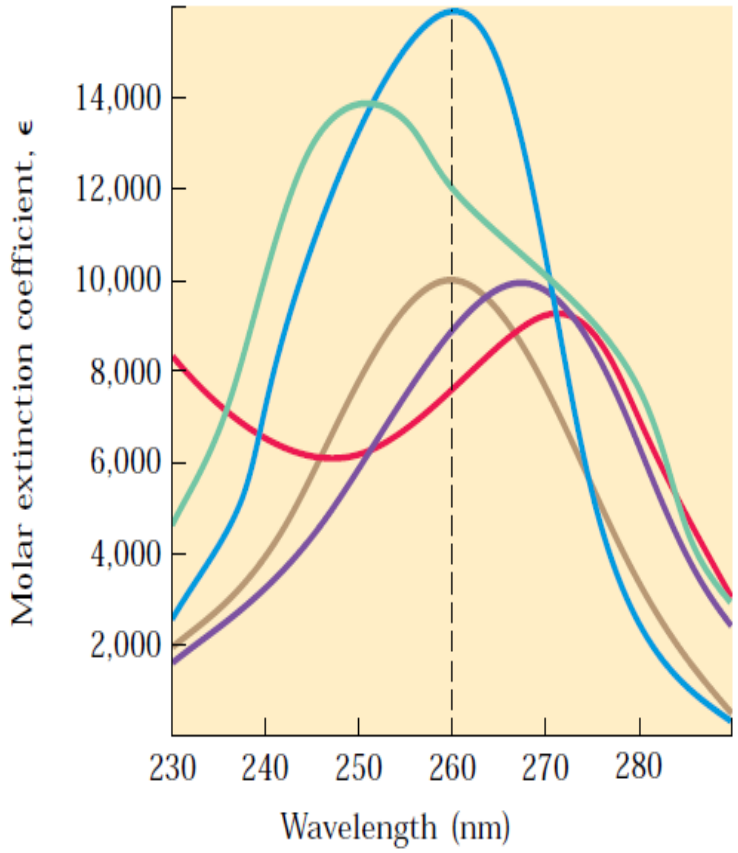


FIGURE 8–22 DNA structures containing three or four DNA strands.

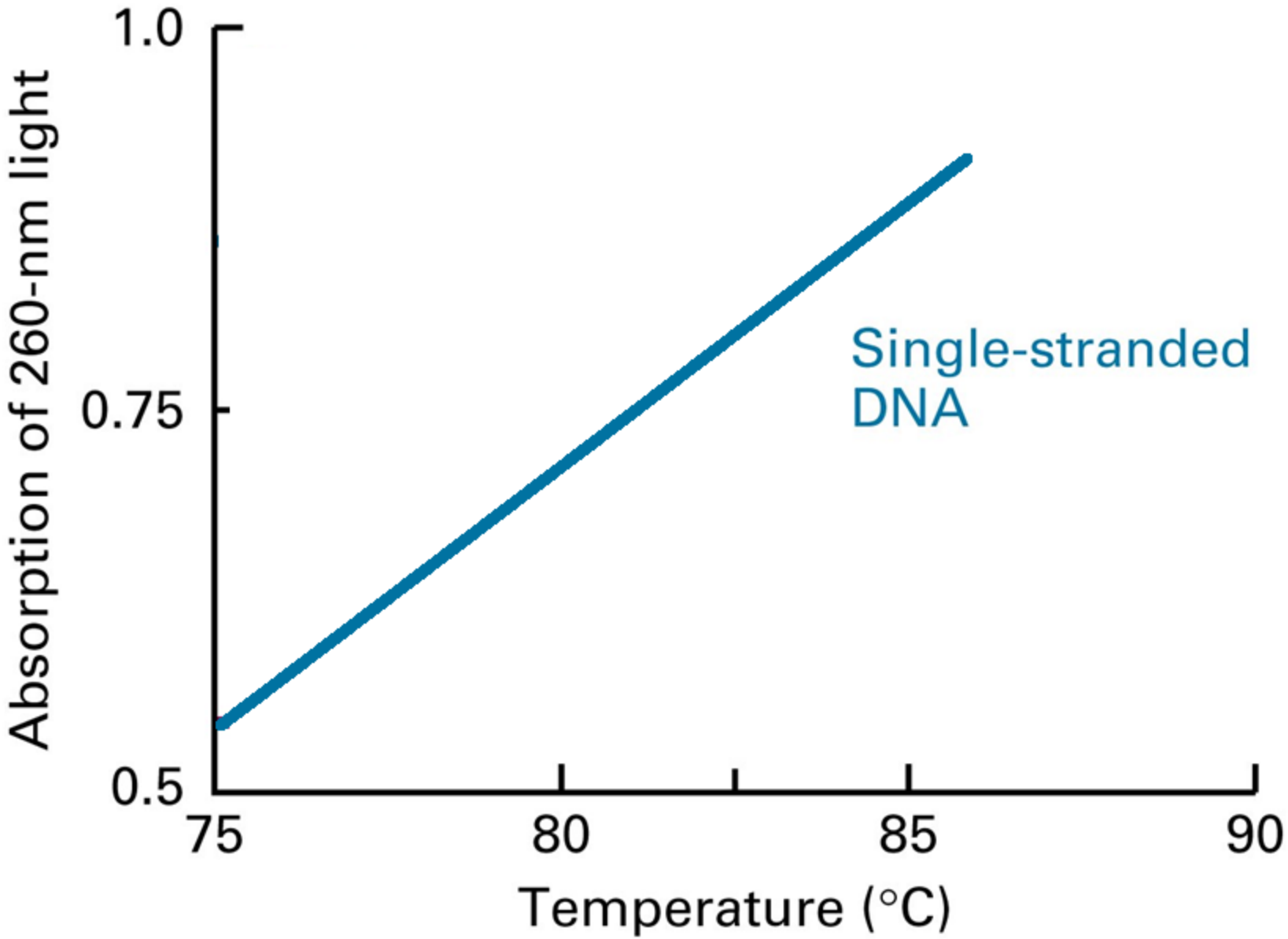
Possible variants in the orientation of strands in a G tetraplex.

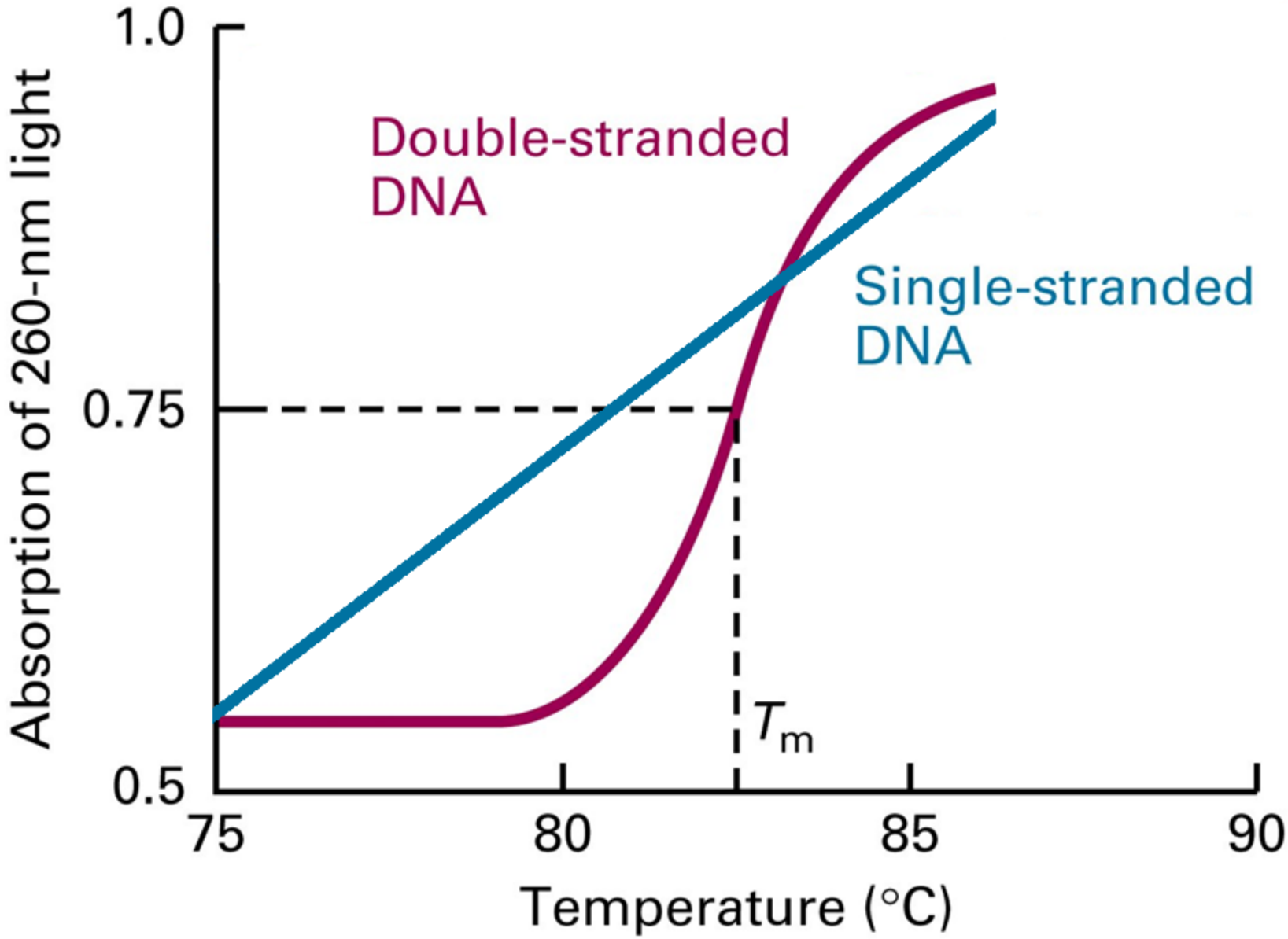
Biochemistry. Lehninger. 4th Edition, 2005

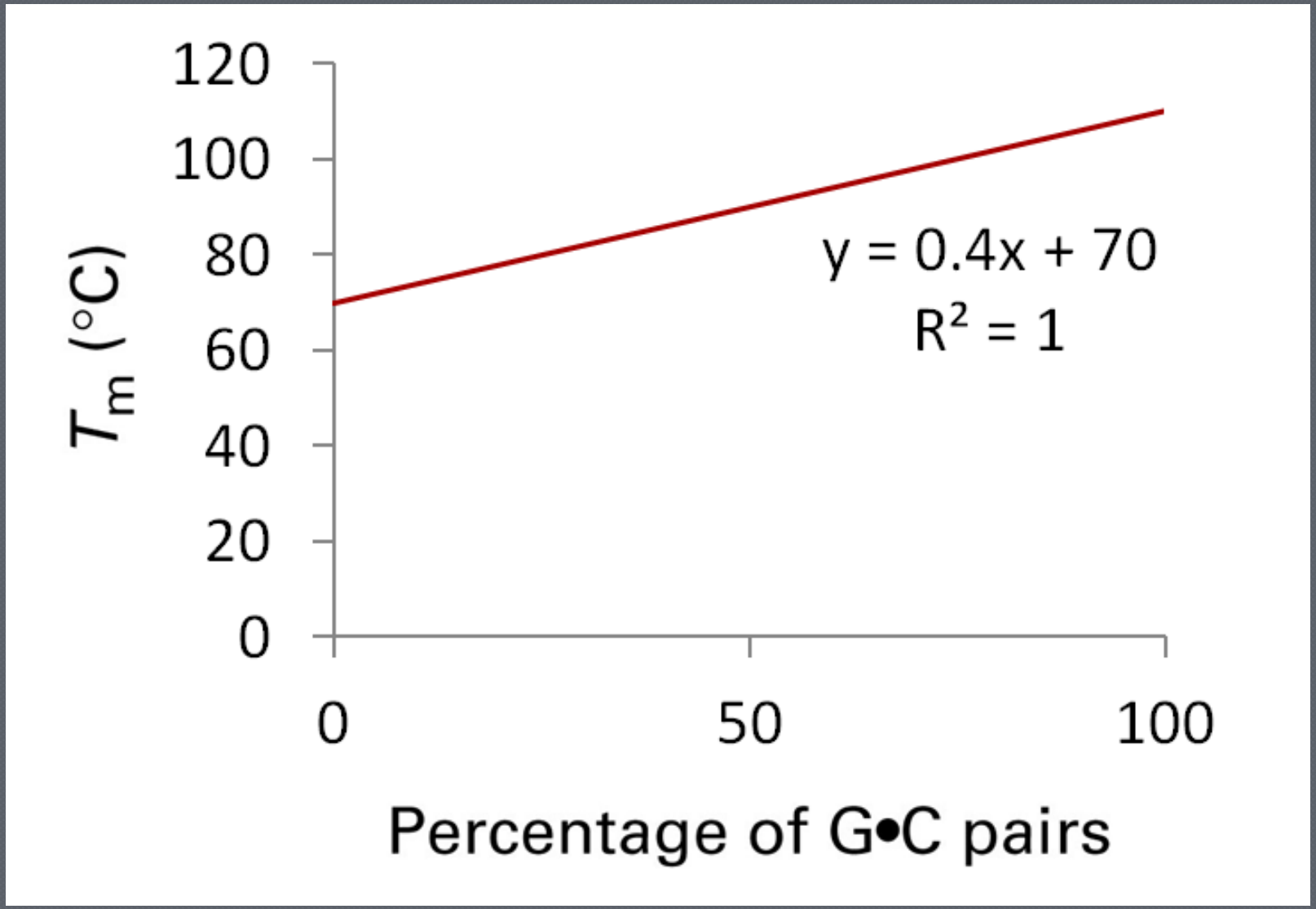


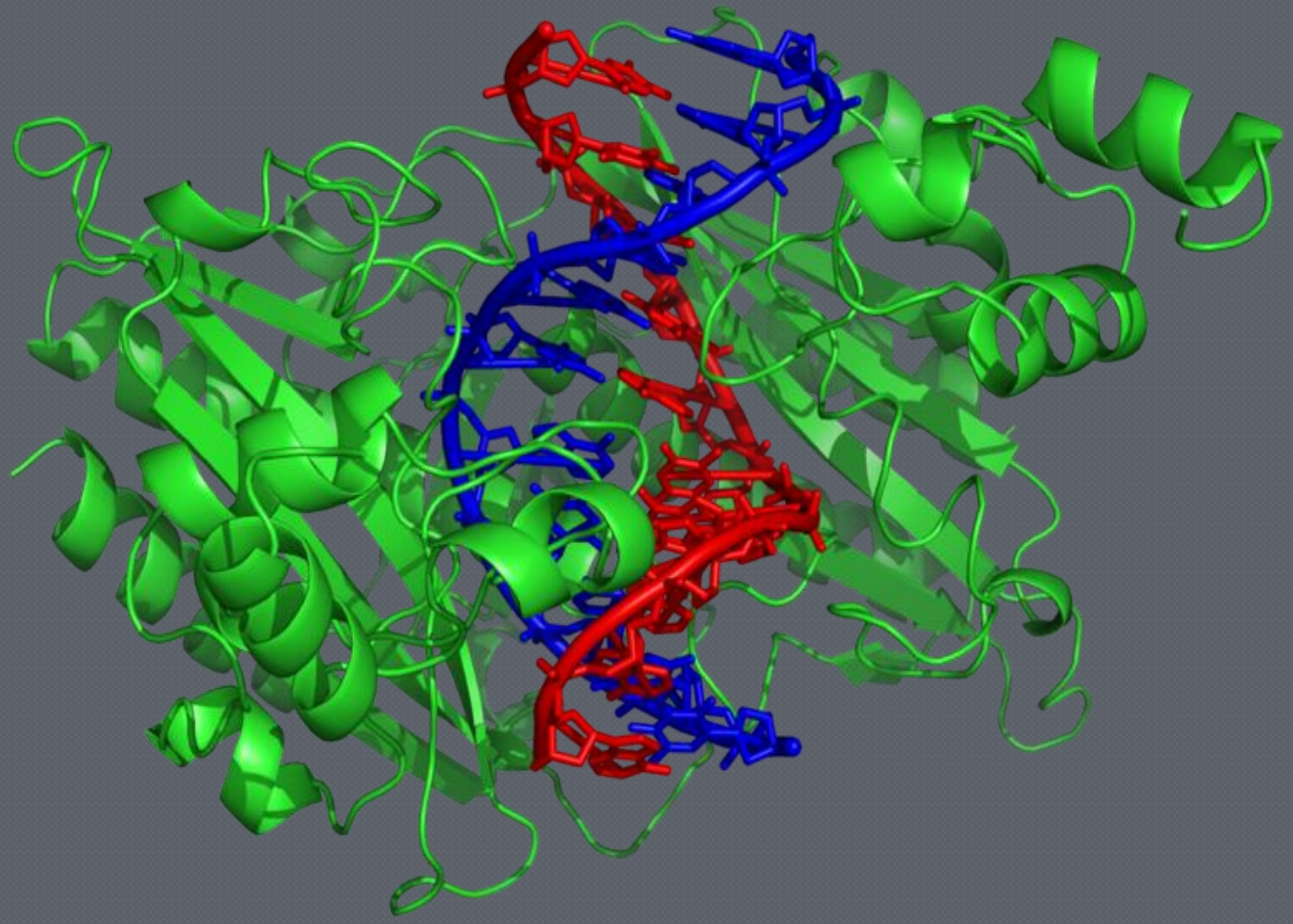
Molar extinction coefficient at 260 nm, ϵ_{260} ($M^{-1}cm^{-1}$)	
AMP	15,400
GMP	11,700
UMP	9,900
dTMP	9,200
CMP	7,500

FIGURE 8–10 Absorption spectra of the common nucleotides. The spectra are shown as the variation in molar extinction coefficient with wavelength. The molar extinction coefficients at 260 nm and pH 7.0 (ε_{260}) are listed in the table. The spectra of corresponding ribonucleotides and deoxyribonucleotides, as well as the nucleosides, are essentially identical. For mixtures of nucleotides, a wavelength of 260 nm (dashed vertical line) is used for absorption measurements.

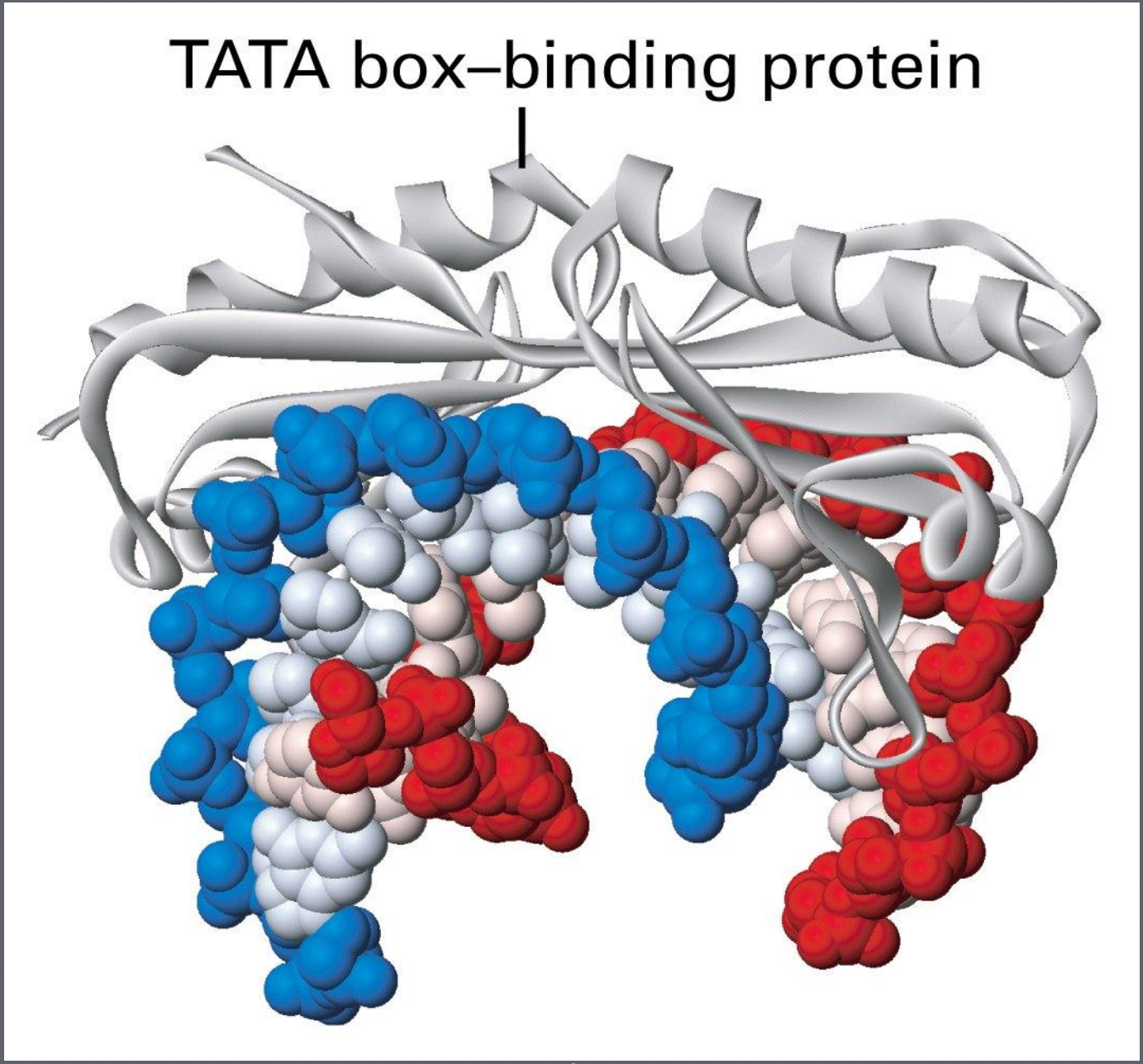

1.0
0.75
0.5
Absorption of 260-nm light
Single-stranded
DNA
75
80
85
90
Temperature (°C)

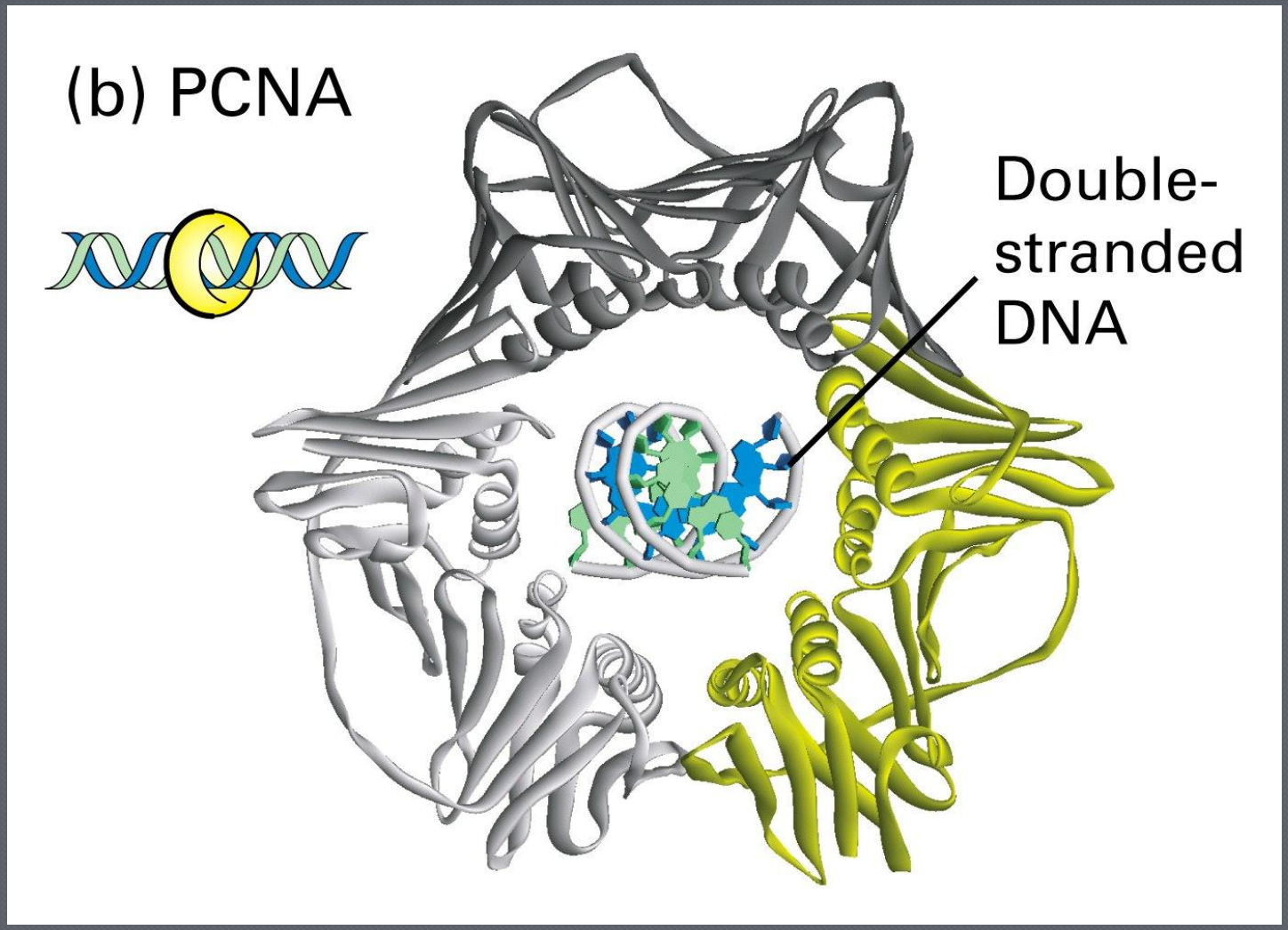

1.0
0.75
0.5
Absorption of 260-nm light
Double-stranded DNA
Single-stranded DNA
T_m
75
80
85
90
Temperature (°C)


120
100
80
60
40
20
0
T_m (°C)
y = 0.4x + 70
R² = 1
0
50
100
Percentage of G•C pairs

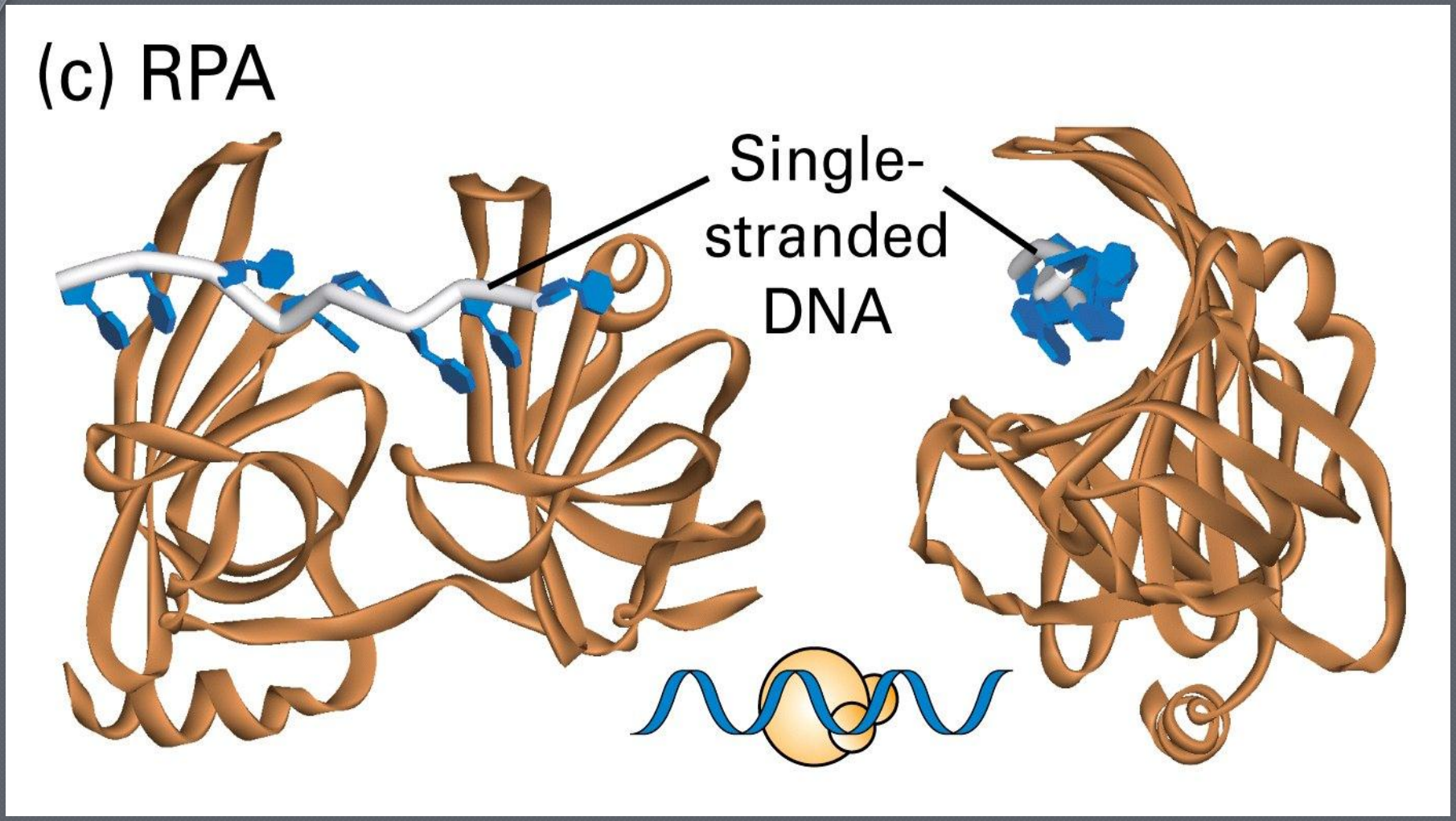


The restriction enzyme EcoRV (green) in a complex with its substrate DNA.

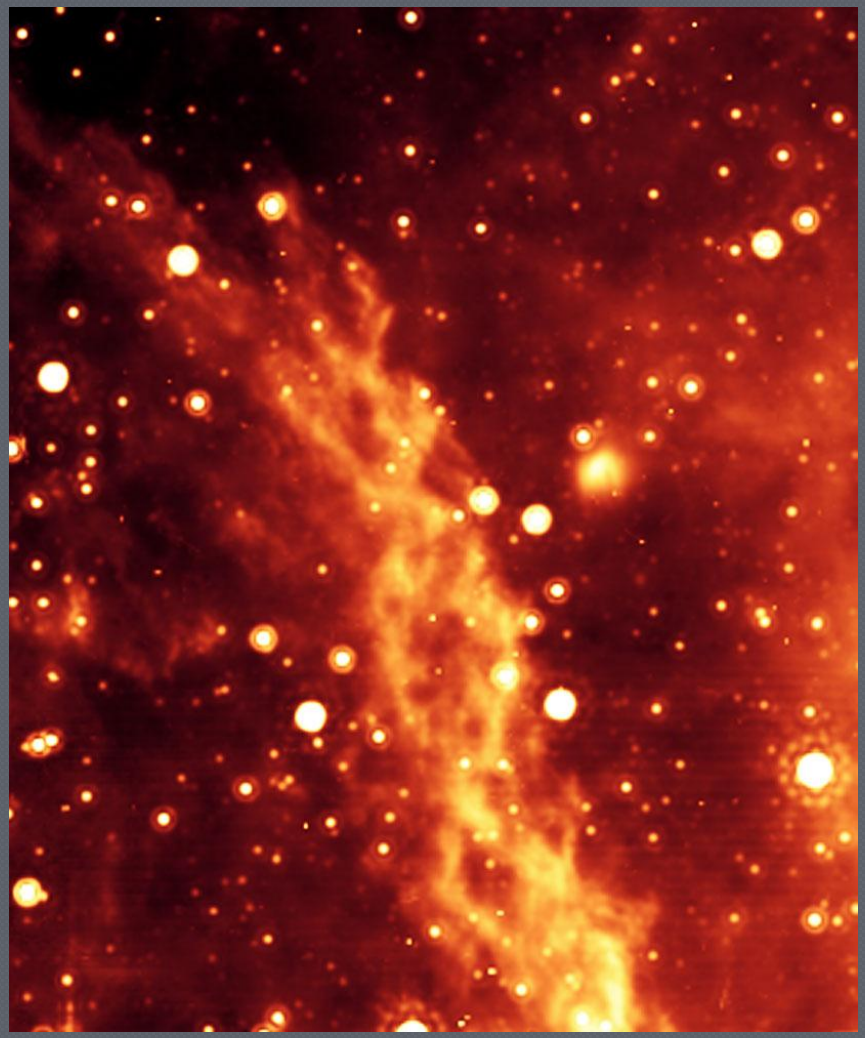

TATA box–binding protein



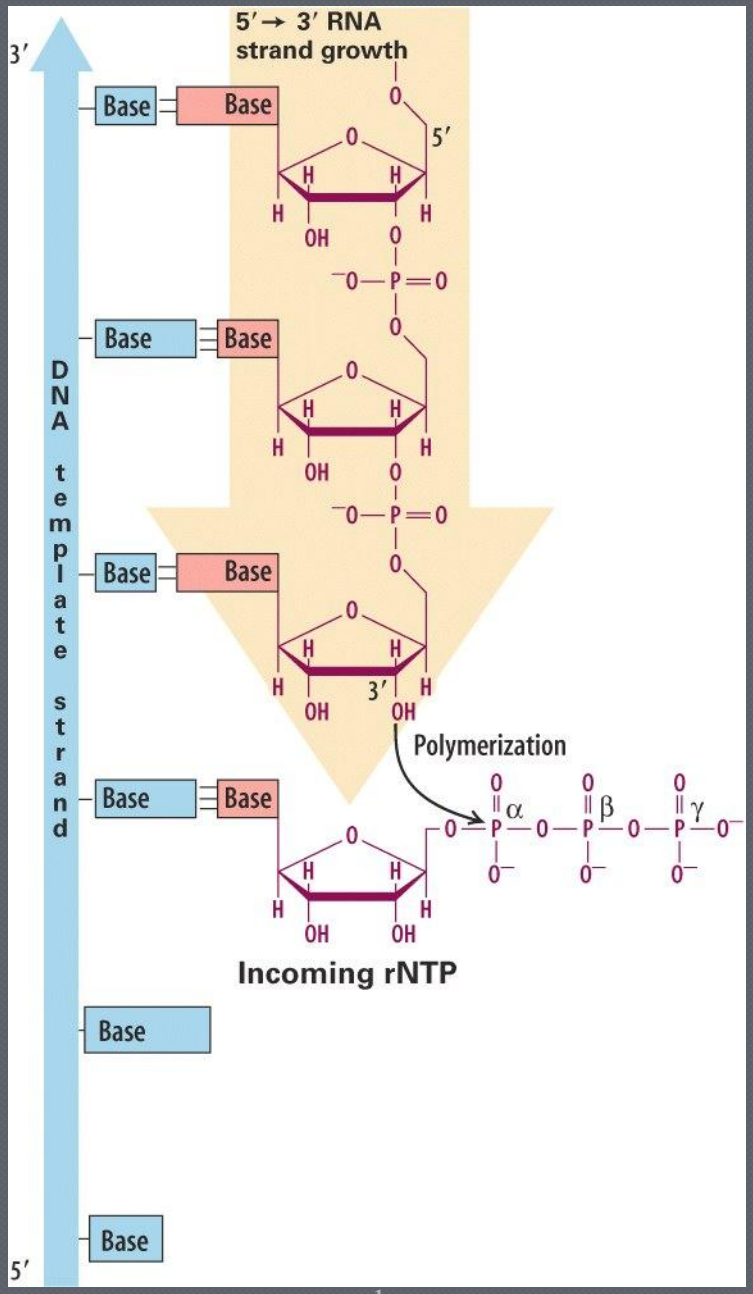
PCNA: Proliferating cell nuclear antigen is a DNA clamp that acts as a processivity factor for DNA polymerase δ in eukaryotic cells and is essential for replication.

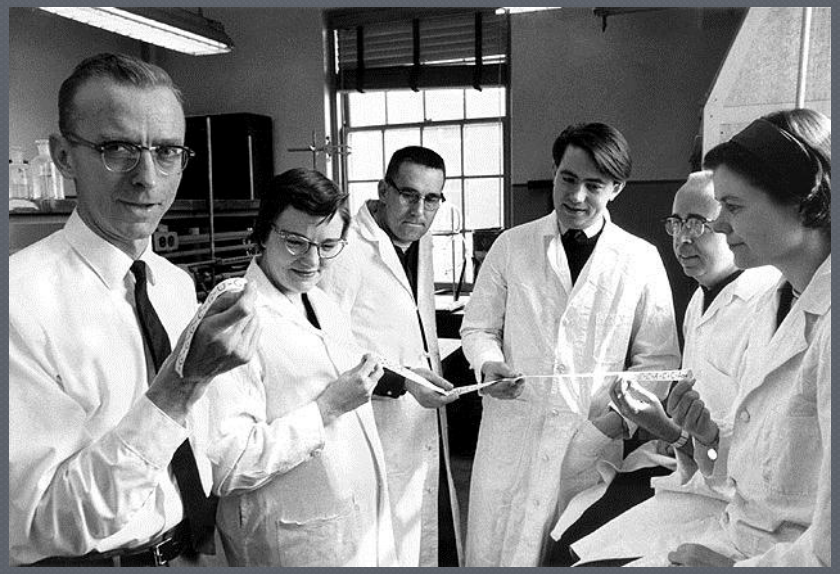


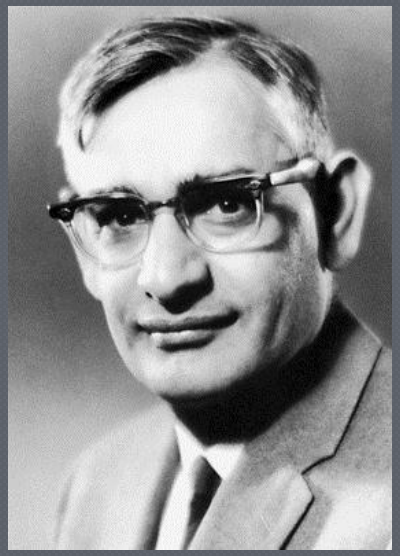
Replication protein A (RPA) is the major **protein** that binds to single-stranded DNA (ssDNA) in eukaryotic cells.



Double helix nebula

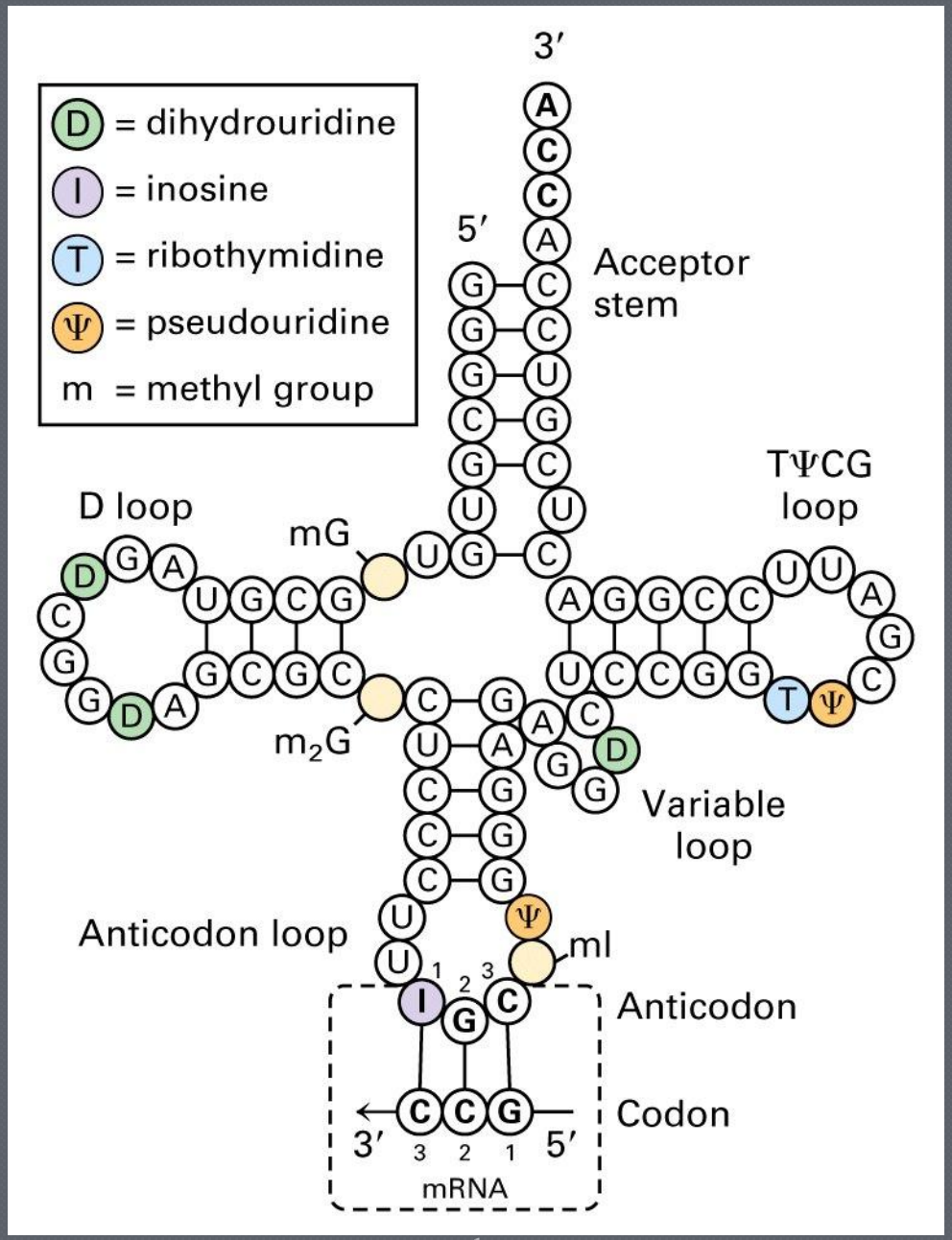

5′→ 3′ RNA strand growth
3′
5′
DNA template strand
Base
Polymerization
Incoming rNTP

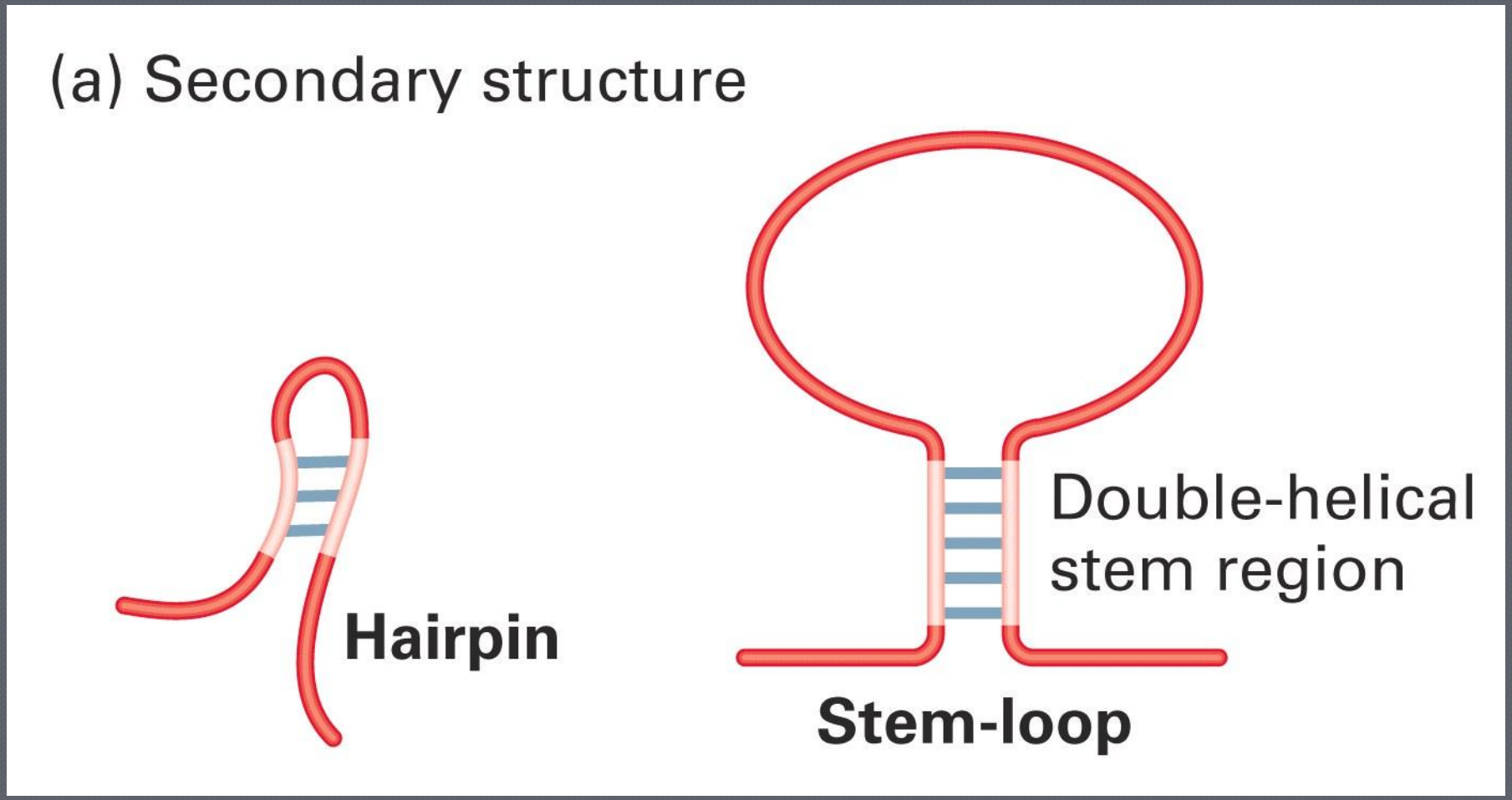


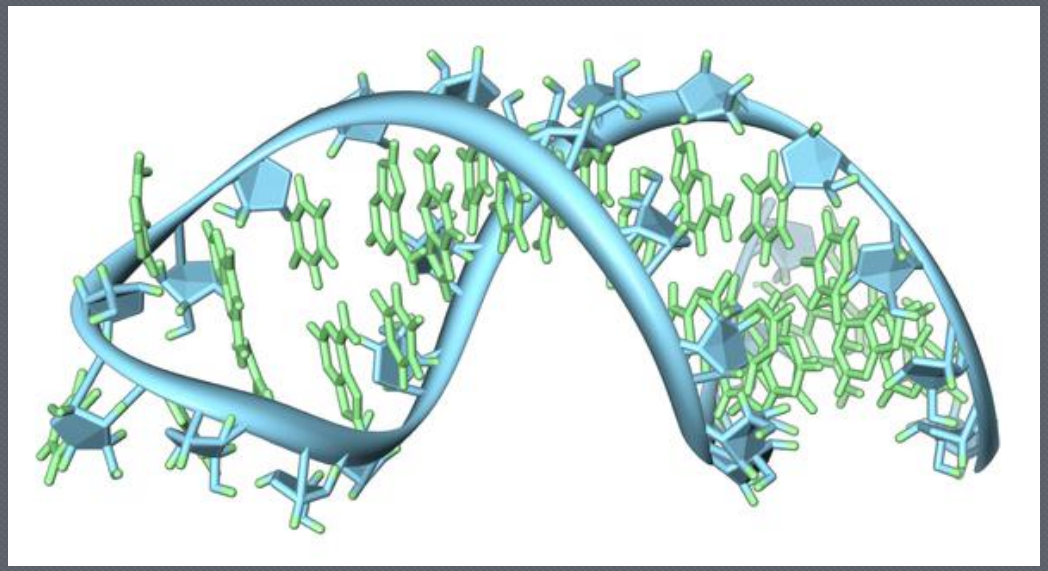


Robert William Holley **Har Gobind Khorana**

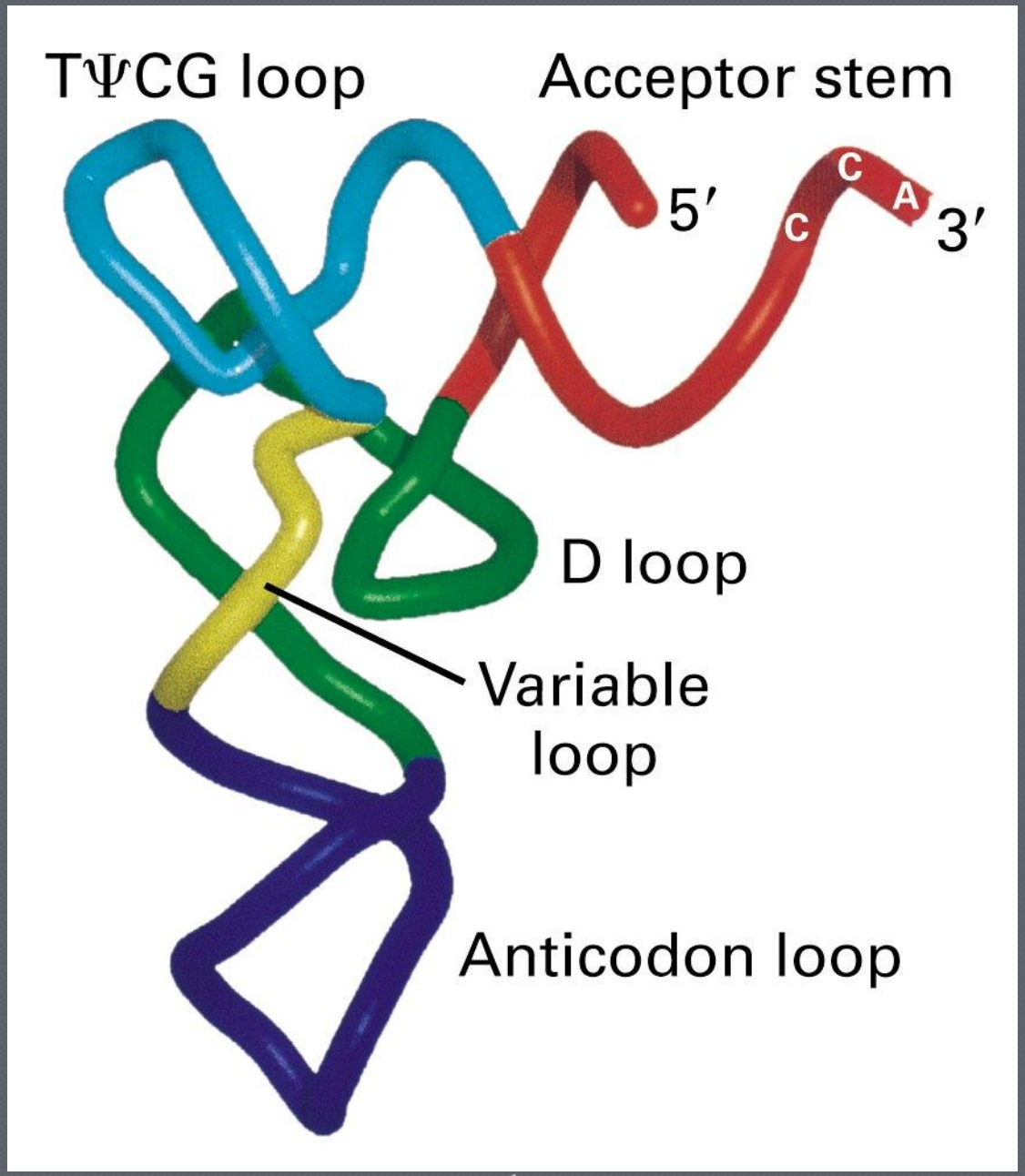
The sequence of the 77 nucleotides of a yeast tRNA


D = dihydrouridine
I = inosine
T = ribothymidine
Ψ = pseudouridine
m = methyl group
3′
5′
Acceptor stem
D loop
mG
TΨCG loop
m2G
Variable loop
Anticodon loop
ml
Anticodon
Codon
3′
5′
mRNA


(a) Secondary structure
Hairpin
Double-helical
stem region
Stem-loop



A hairpin loop from a pre-mRNA. Highlighted are the nucleobases (green) and the ribose-phosphate backbone (blue).


TΨCG loop
Acceptor stem
5′
C
C
A
3′
D loop
Variable loop
Anticodon loop

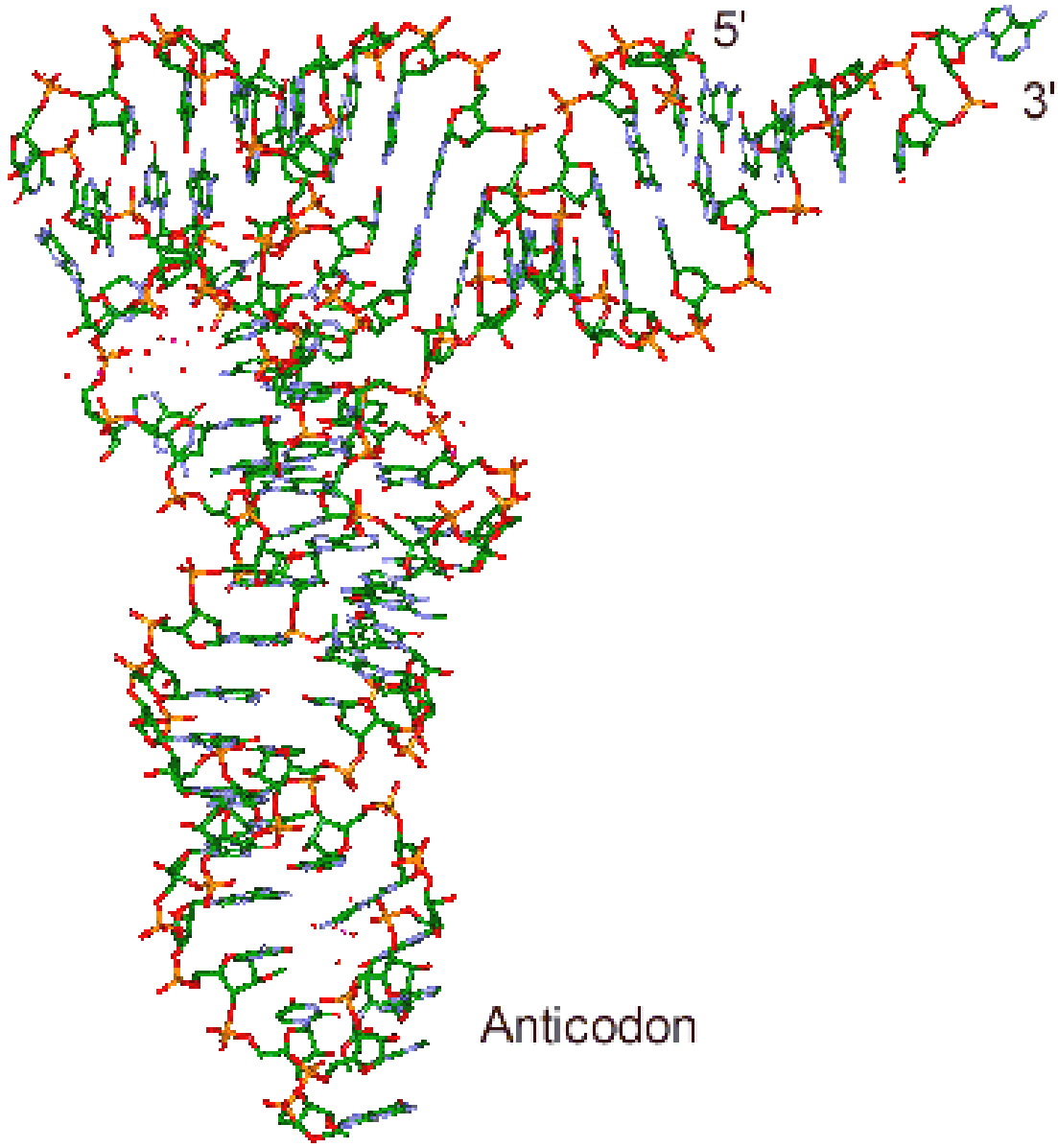
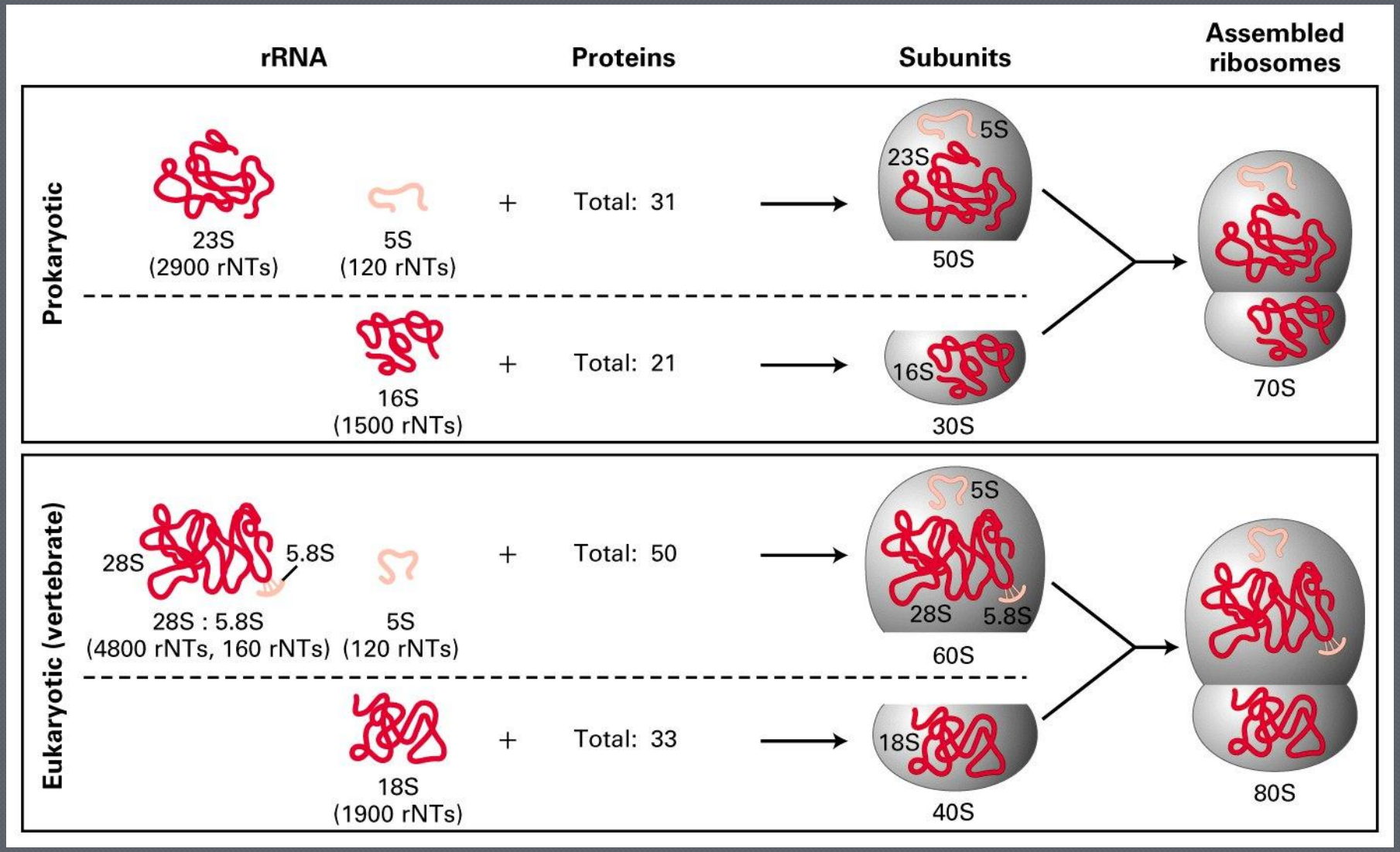
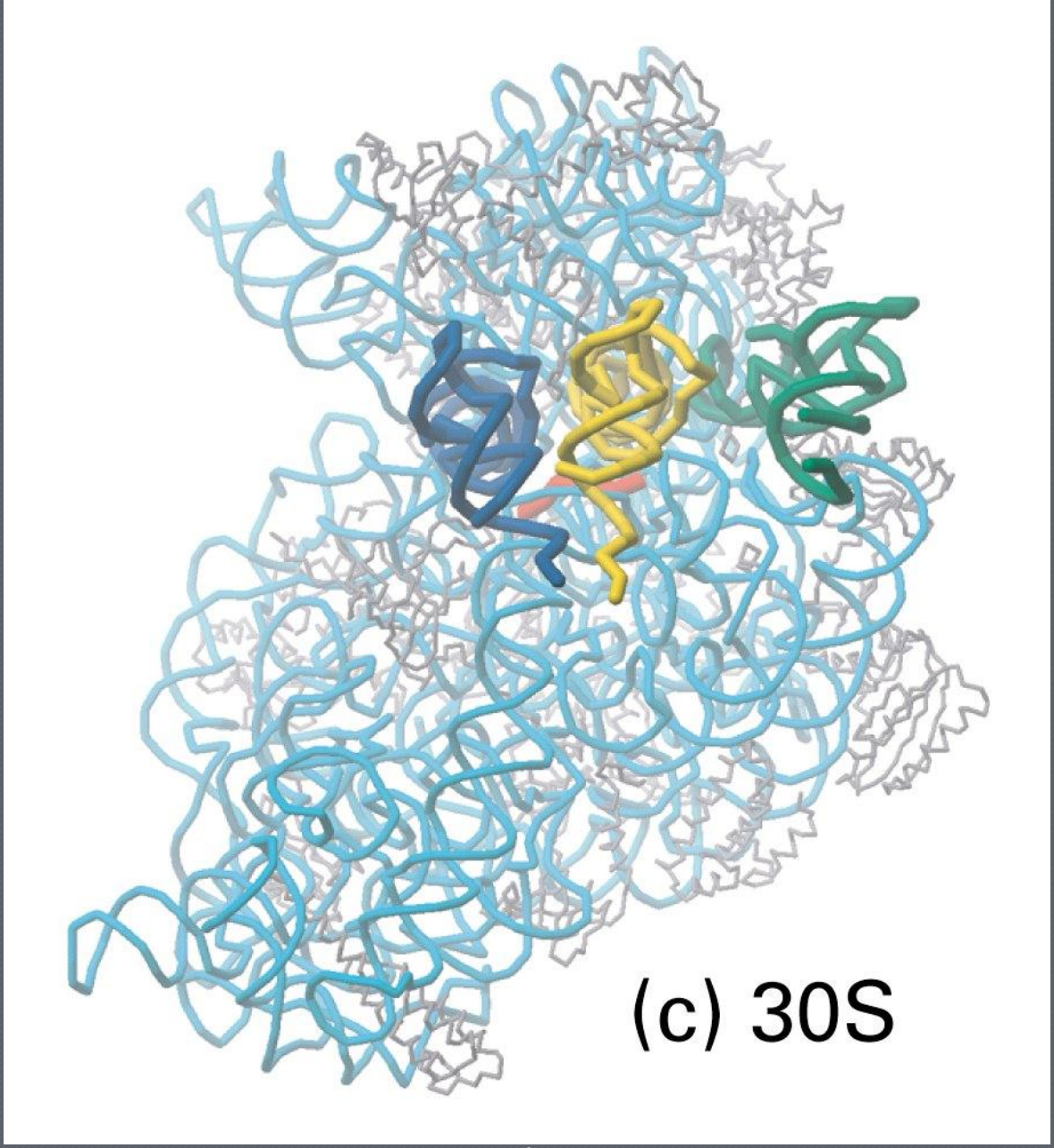
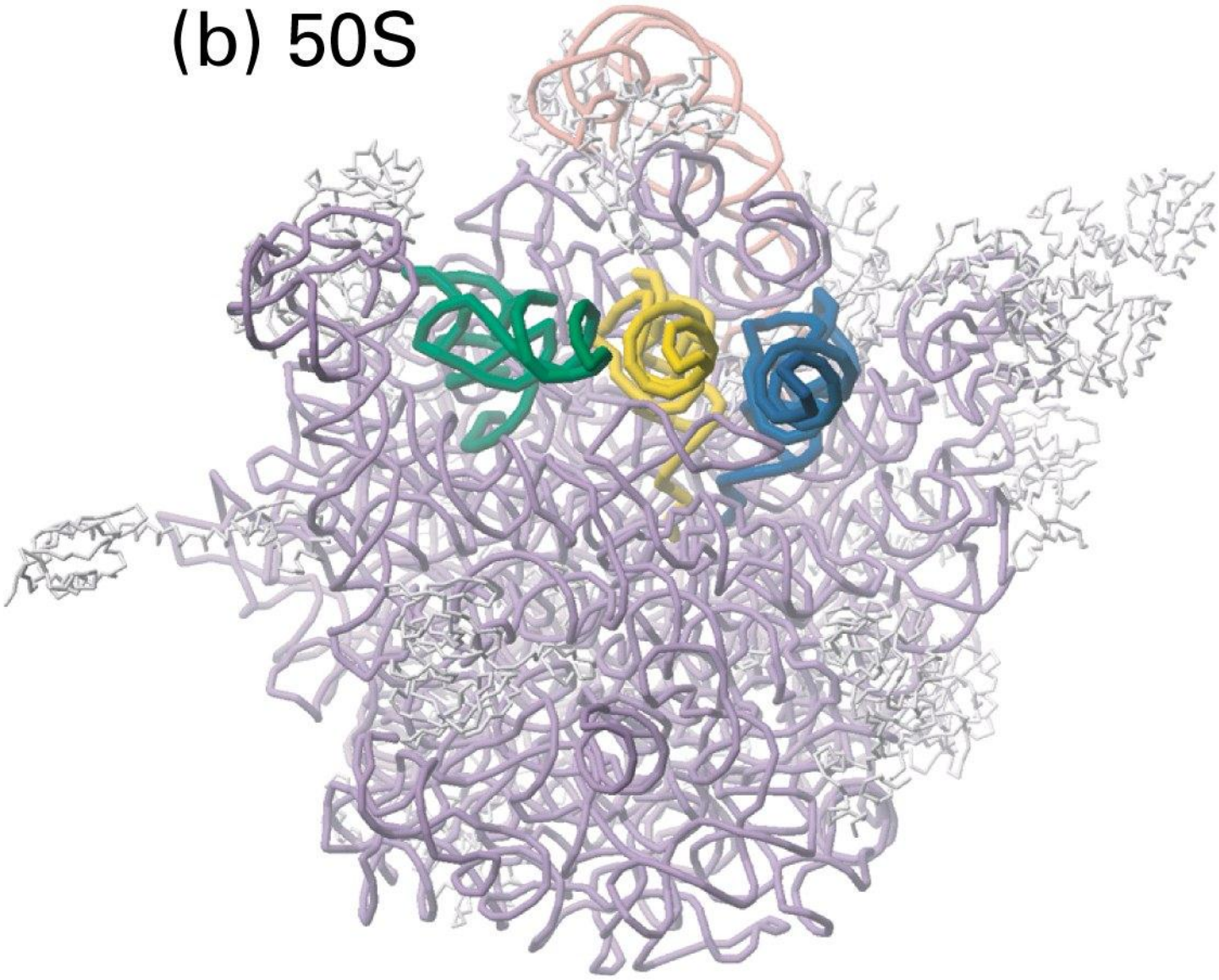
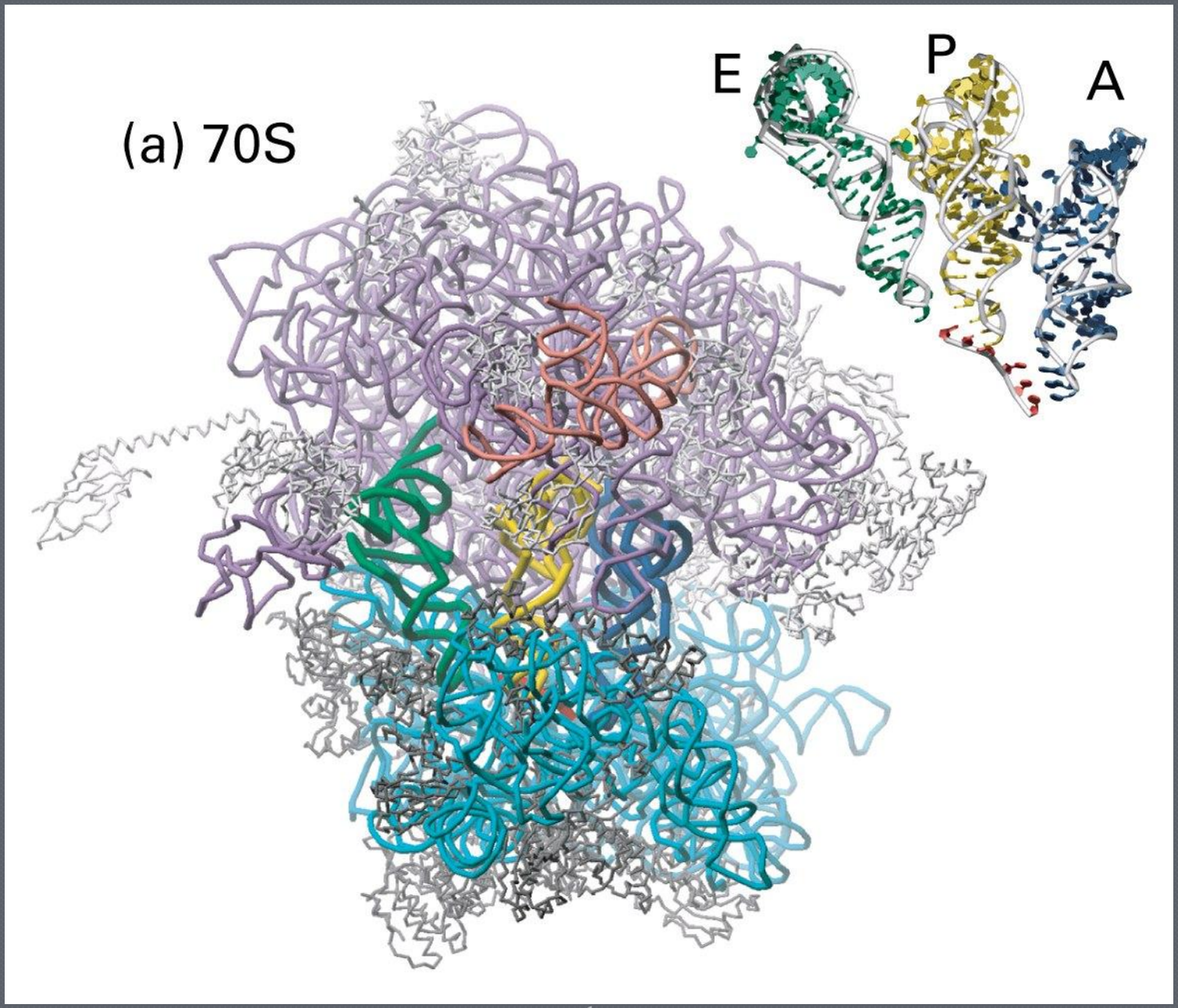


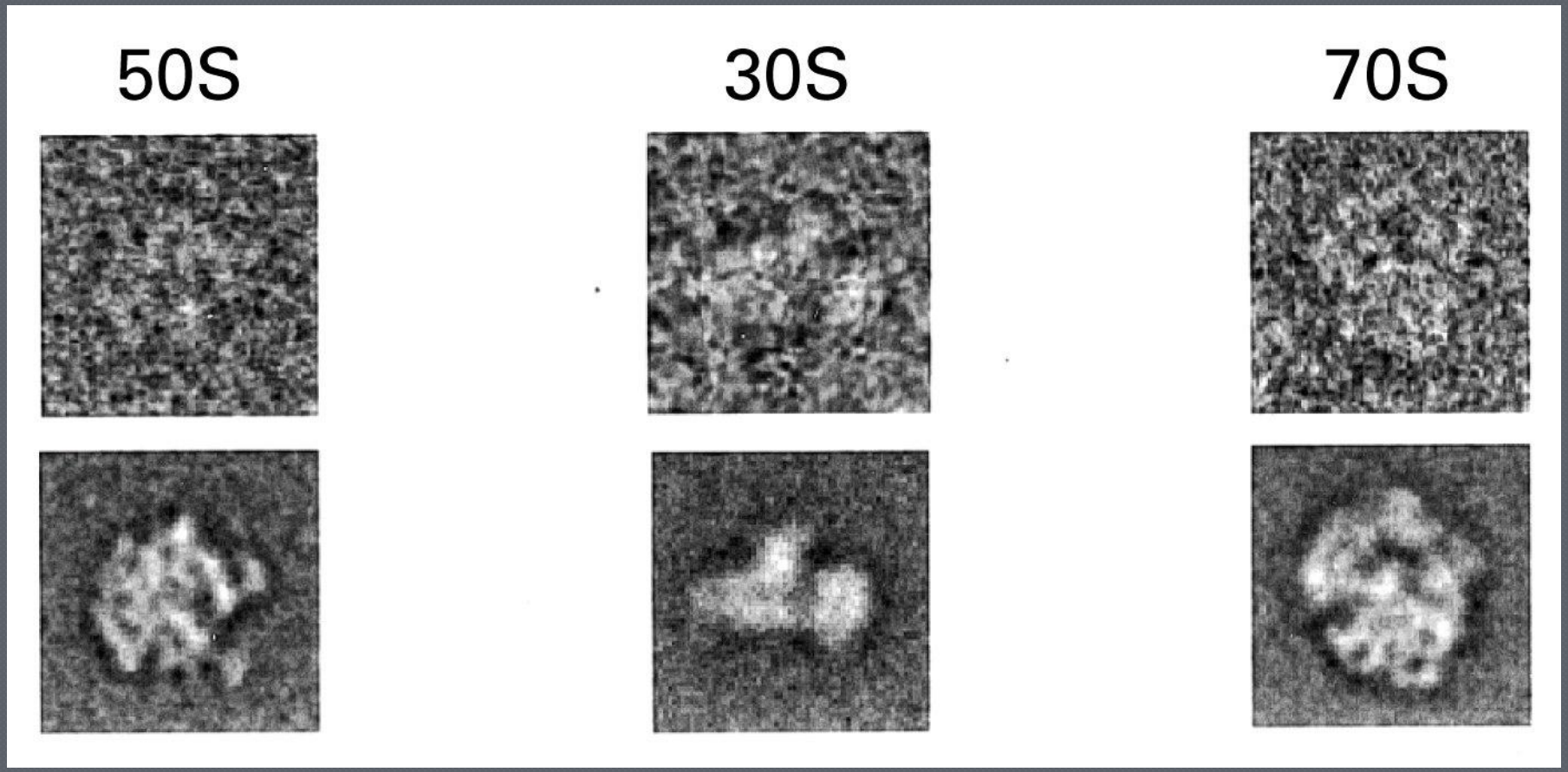
Figure 3-C-3. The tertiary structure of tRNA. PDB ID = 1TN2.


rRNA
Proteins
Subunits
Assembled ribosomes
Prokaryotic
23S
(2900 rNTs)
5S
(120 rNTs)
+
Total: 31
5S
23S
50S
16S
(1500 rNTs)
+
Total: 21
16S
30S
70S
Eukaryotic (vertebrate)
28S
5.8S
28S : 5.8S
(4800 rNTs, 160 rNTs)
5S
(120 rNTs)
+
Total: 50
5S
28S
5.8S
60S
18S
(1900 rNTs)
+
Total: 33
18S
40S
80S

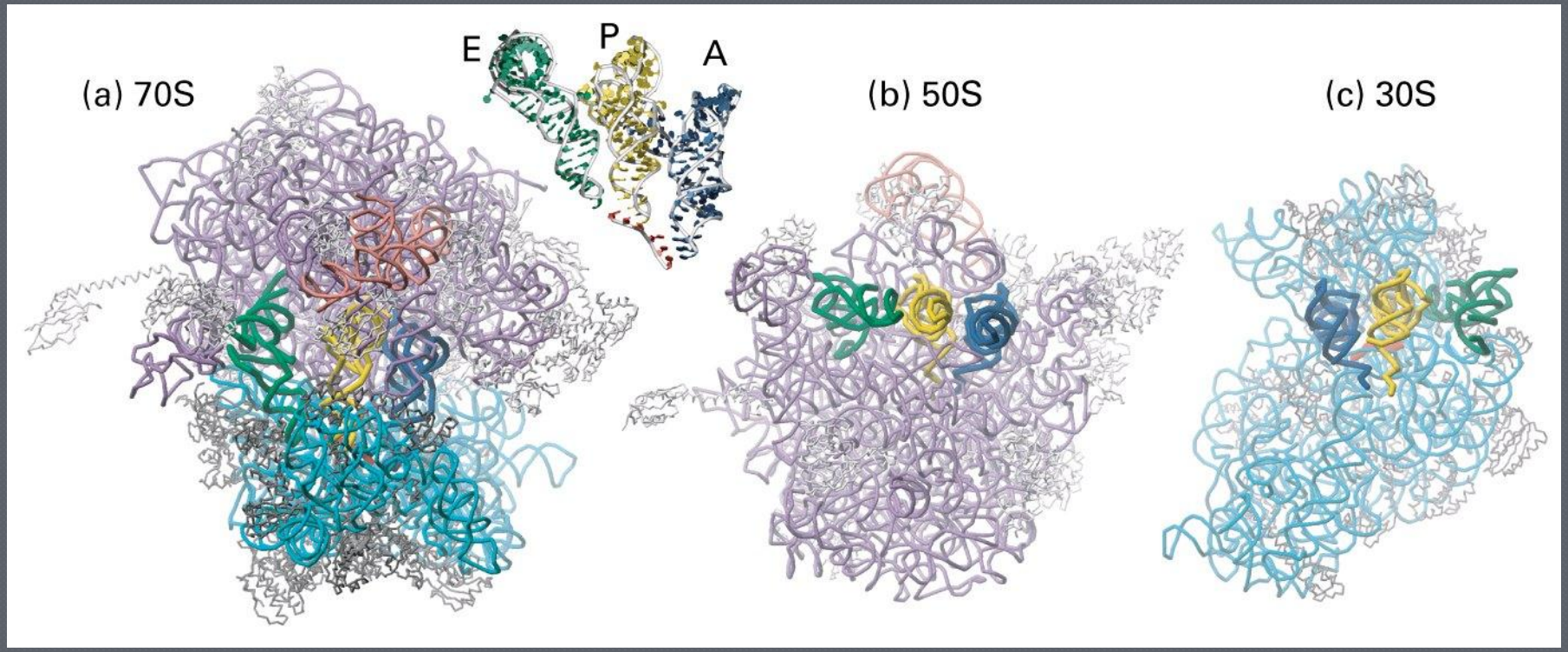

(c) 30S

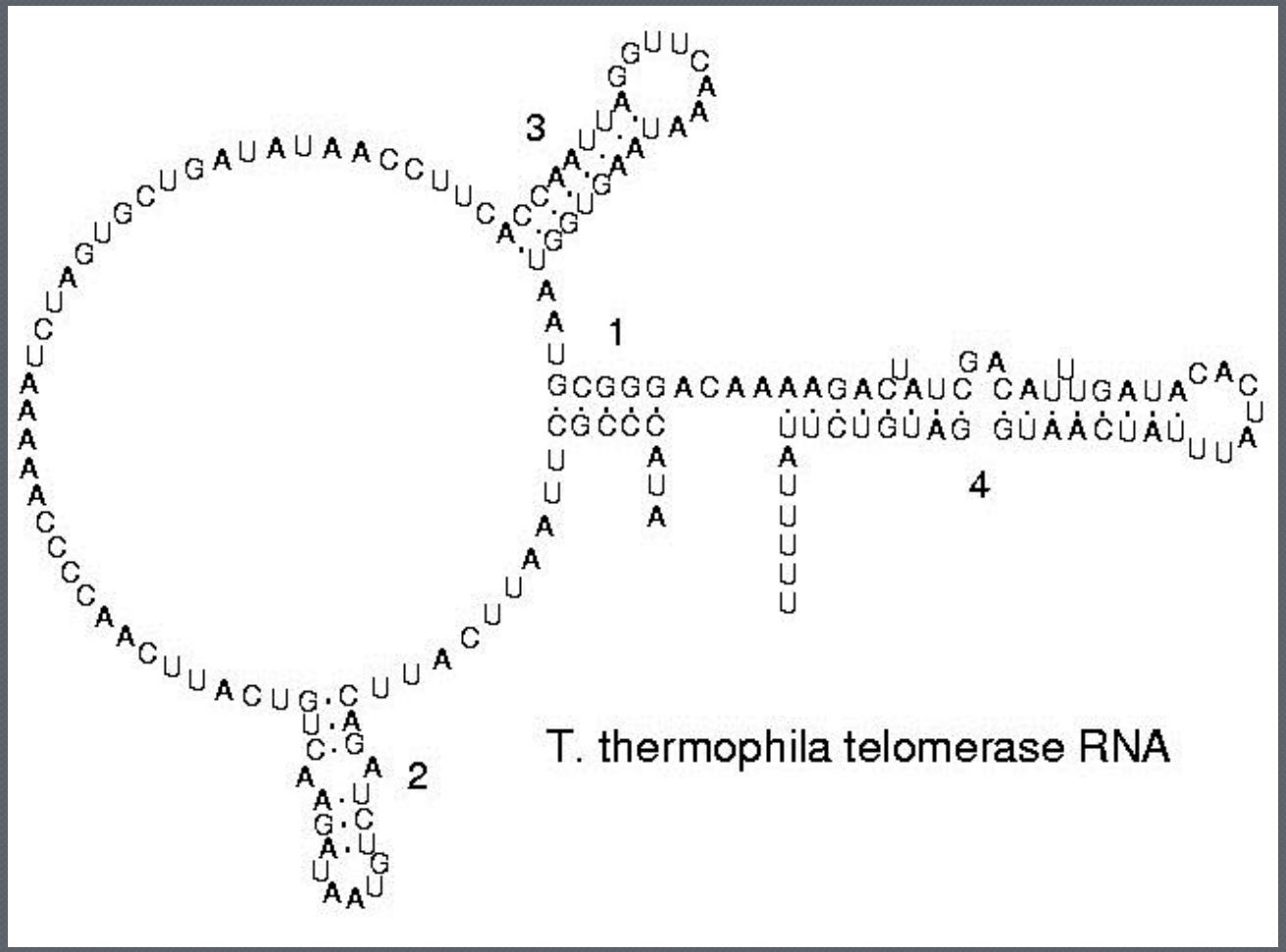

(b) 50S


(a) 70S
E
P
A

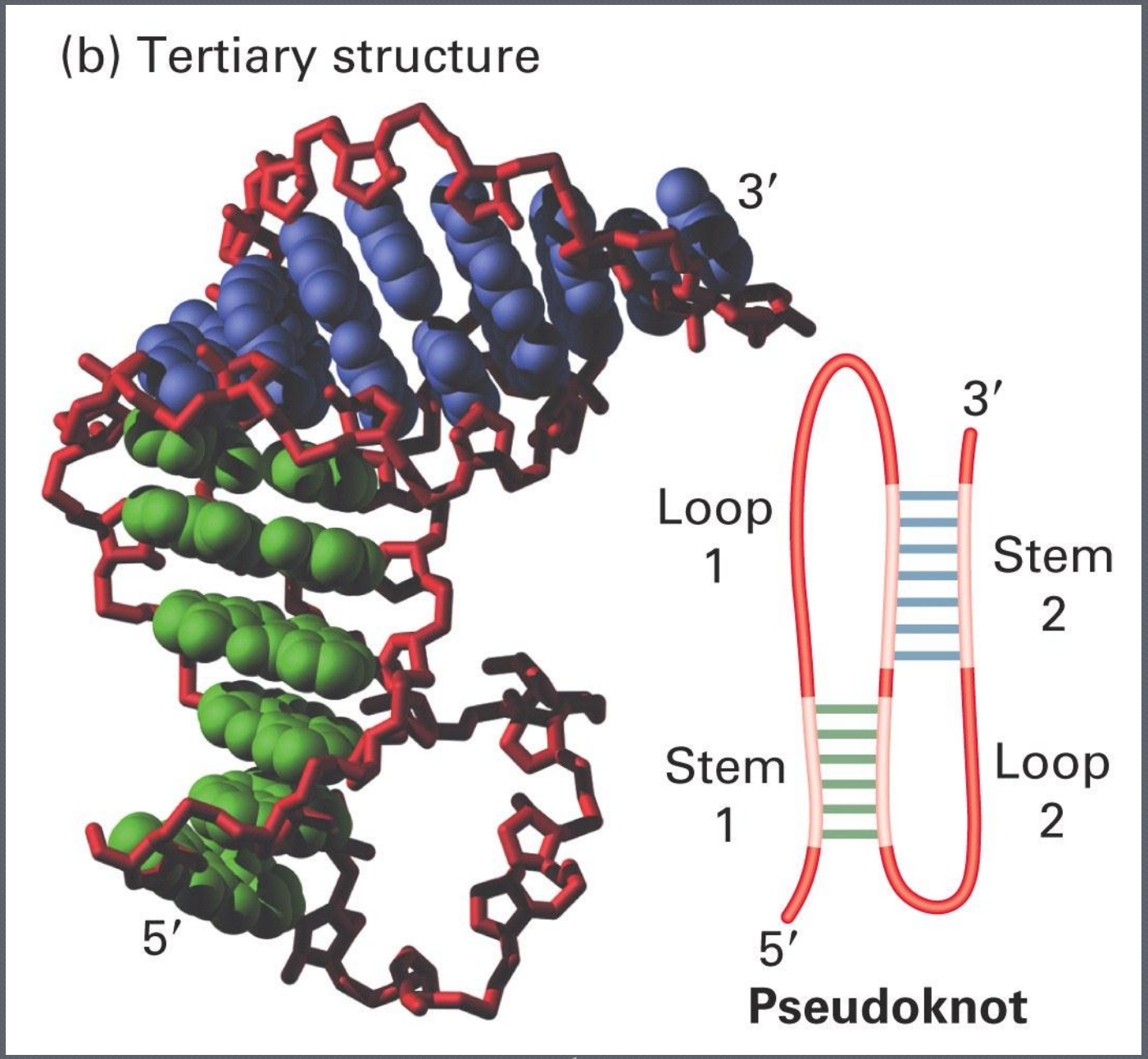


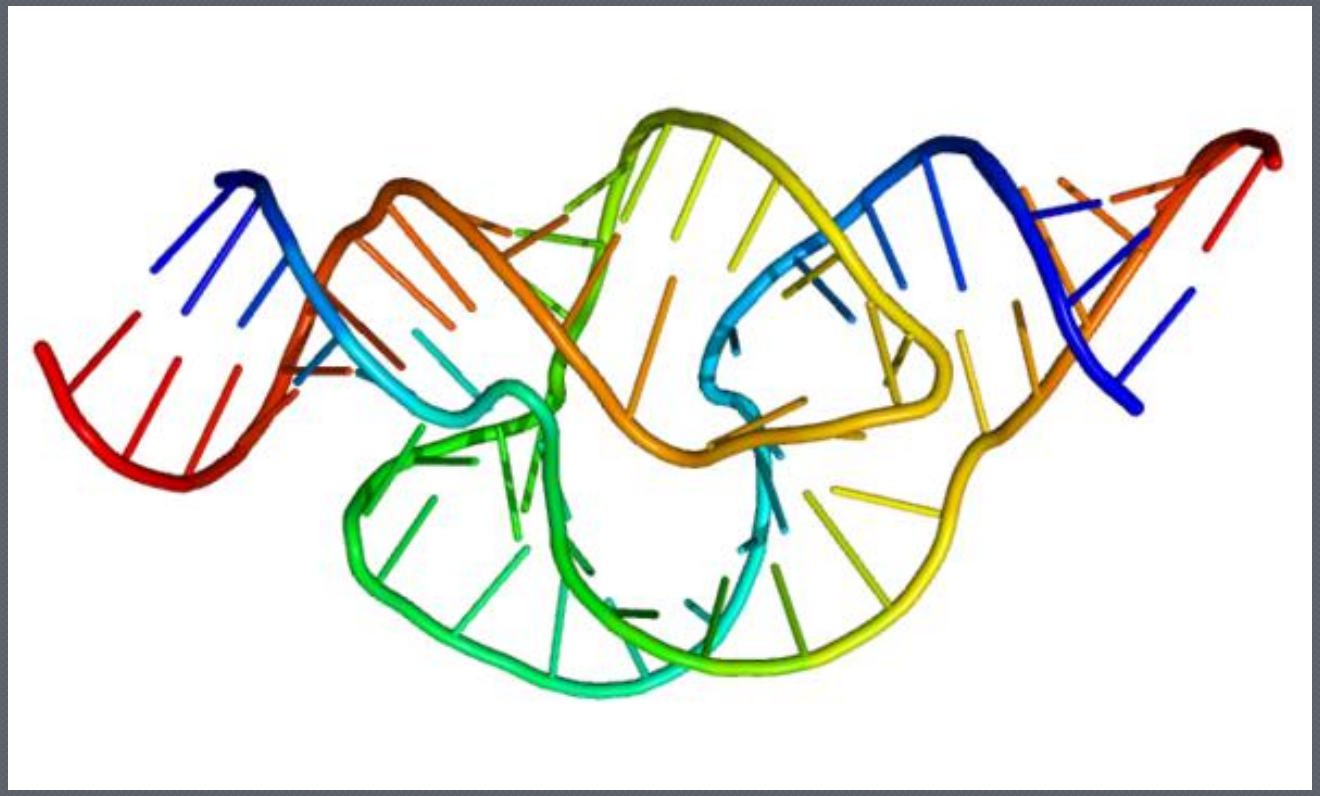
Model of the complete (70S) ribosome of *E. coli*



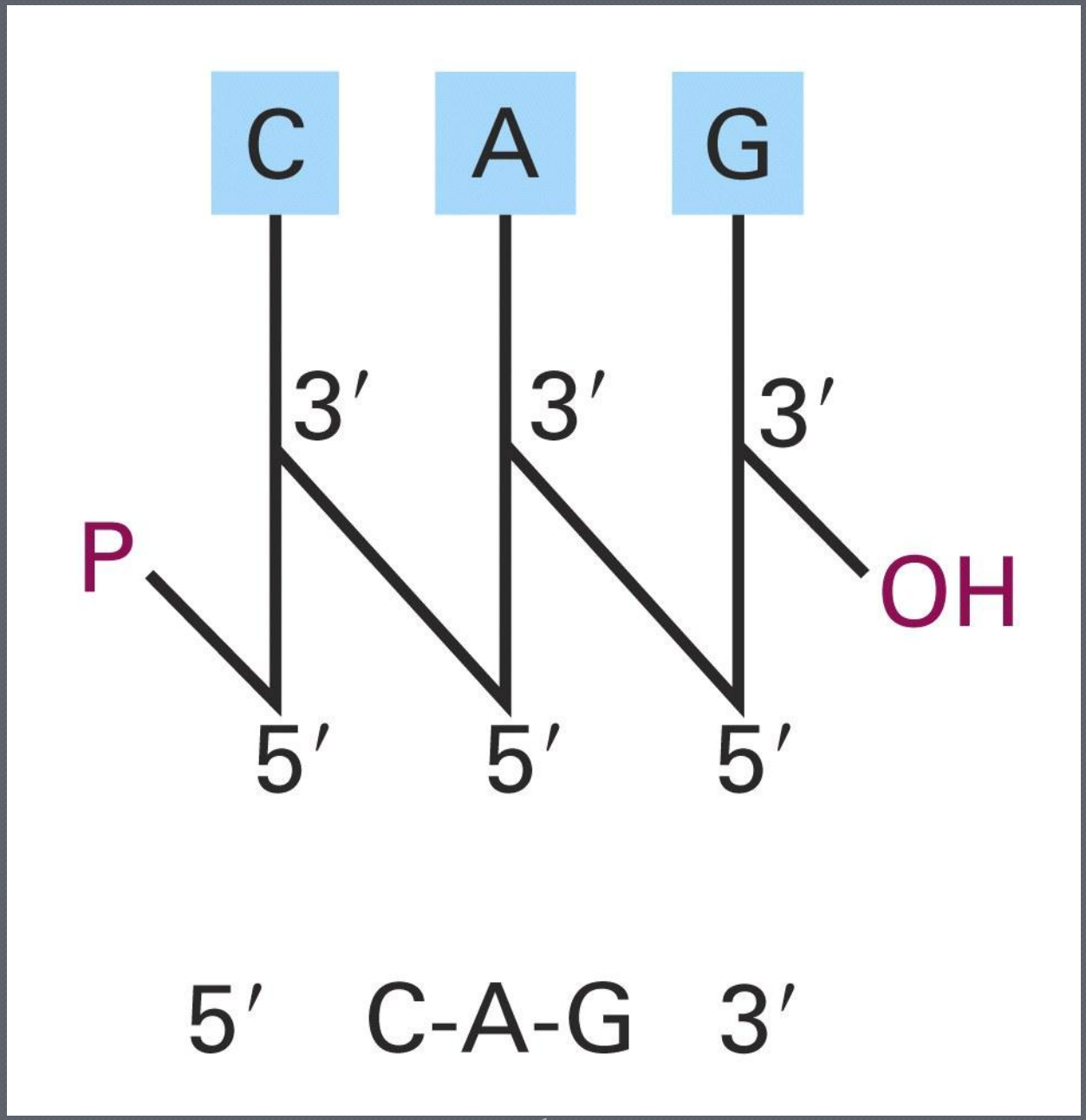


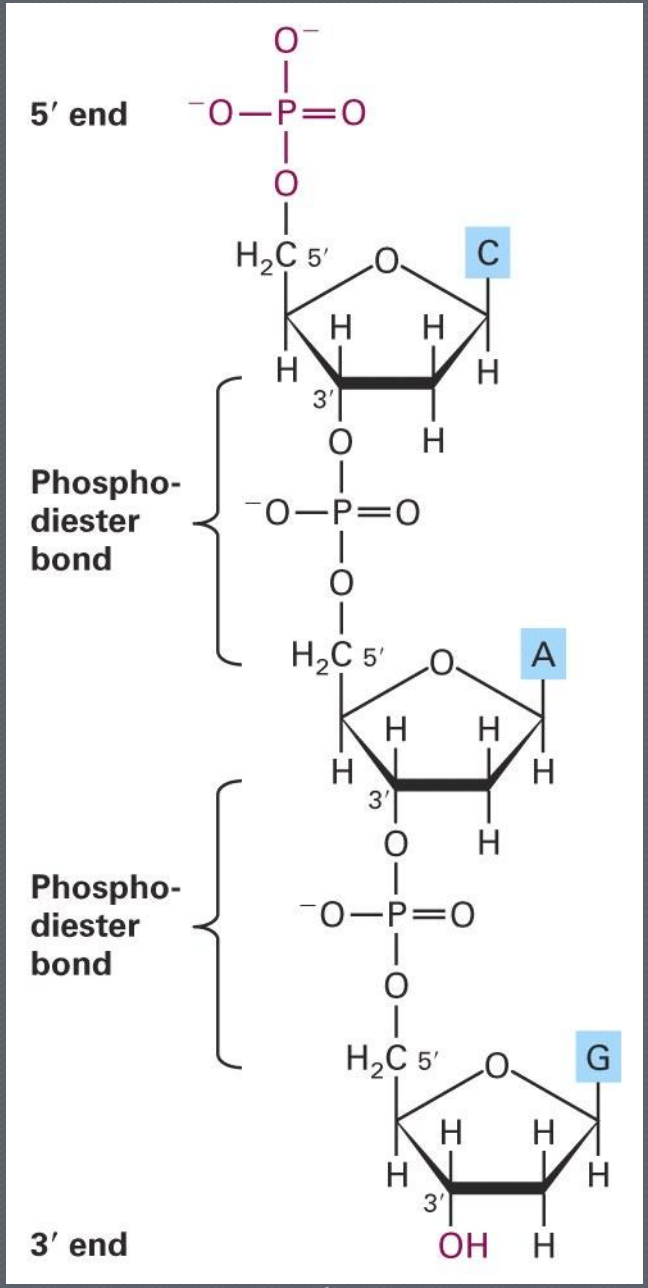
Secondary structure of a telomerase RNA.


(b) Tertiary structure
3′
5′
3′
Loop 1
Stem 2
Stem 1
Loop 2
5′
Pseudoknot



Hammerhead ribozyme is an RNA molecule that self-cleaves via a small conserved secondary structural motif termed a hammerhead because of its shape





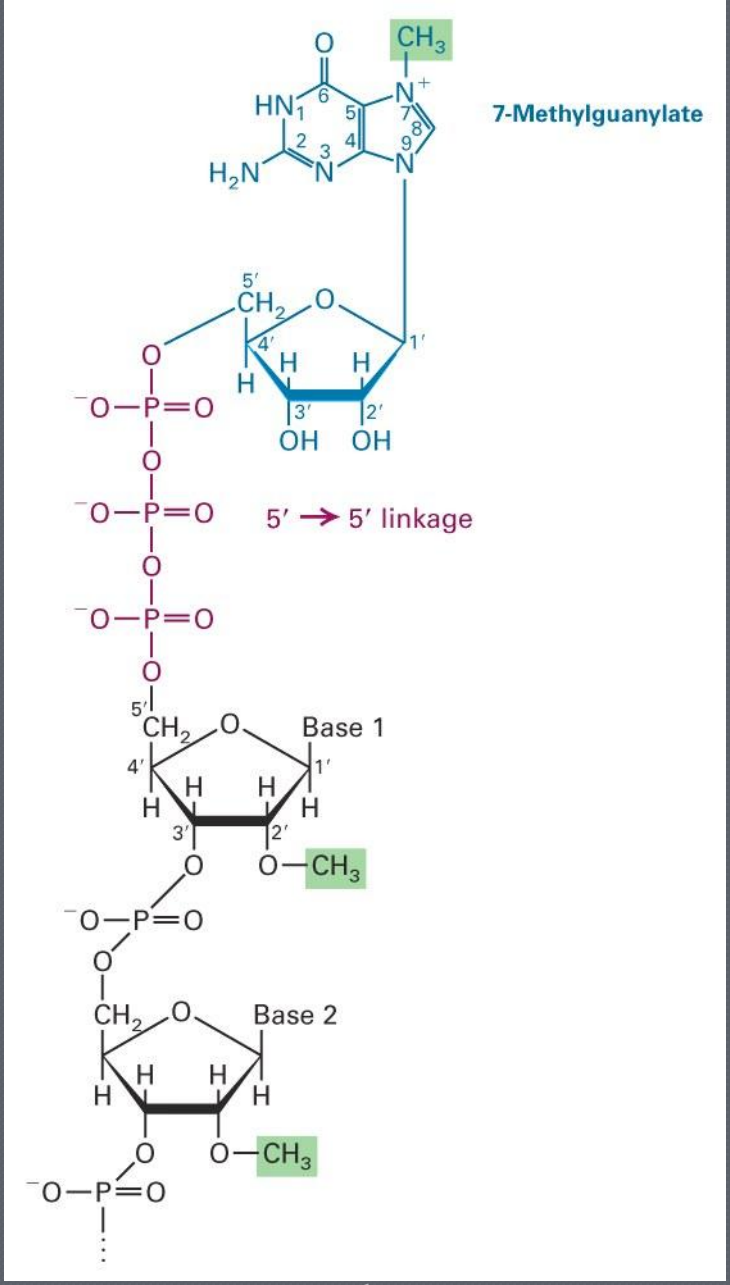
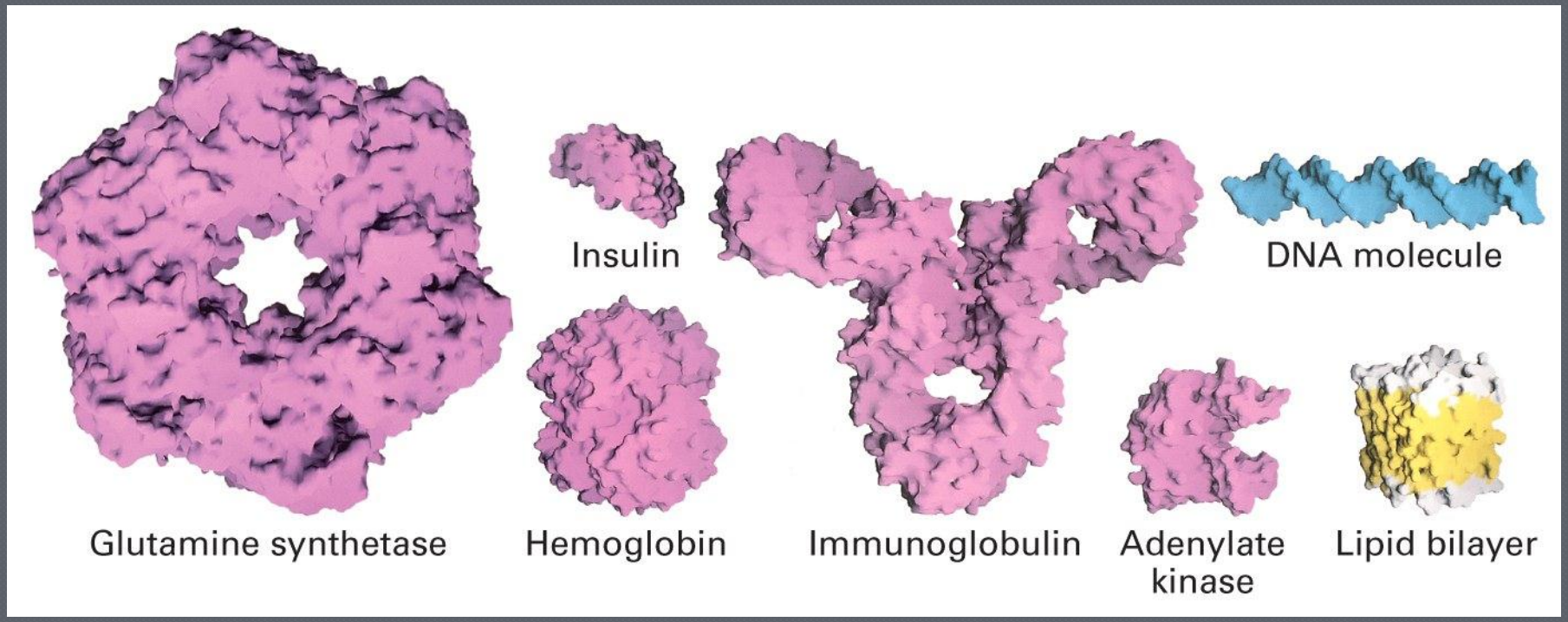


TABLE 2-2 Terminology of Nucleosides and Nucleotides

		Bases			
		Purines		Pyrimidines	
		Adenine (A)	**Guanine (G)**	**Cytosine (C)**	**Uracil (U)** **Thymine [T]**
Nucleosides	in RNA	Adenosine	Guanosine	Cytidine	Uridine
	in DNA	Deoxyadenosine	Deoxyguanosine	Deoxycytidine	Deoxythymidine
Nucleotides	in RNA	Adenylate	Guanylate	Cytidylate	Uridylate
	in DNA	Deoxyadenylate	Deoxyguanylate	Deoxycytidylate	Deoxythymidylate
Nucleoside monophosphates		AMP	GMP	CMP	UMP
Nucleoside diphosphates		ADP	GDP	CDP	UDP
Nucleoside triphosphates		ATP	GTP	CTP	UTP
Deoxynucleoside mono-, di-, and triphosphates		dAMP, etc.			


Glutamine synthetase
Insulin
Hemoglobin
Immunoglobulin
DNA molecule
Adenylate kinase
Lipid bilayer

References:

1. **Molecular Cell Biology. Fifth Edition. Harvey Lodish. Copyright © 2004 by W. H. Freeman & Company**

2. **Biochemistry. Lehninger. 4th Edition, 2005.**

3. **Wikipedia**