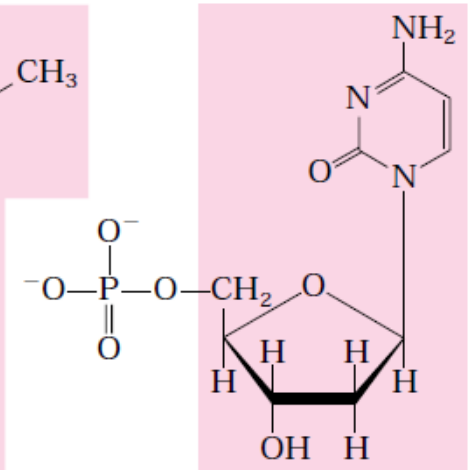
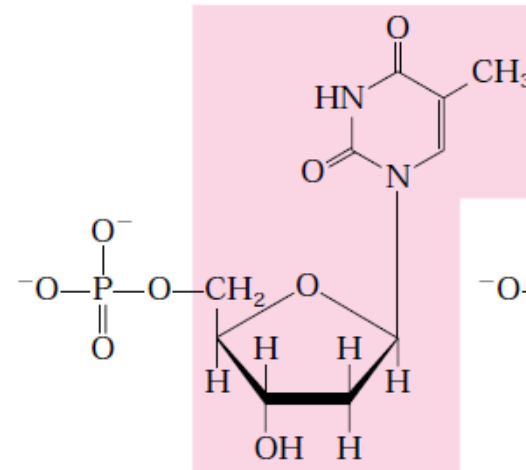
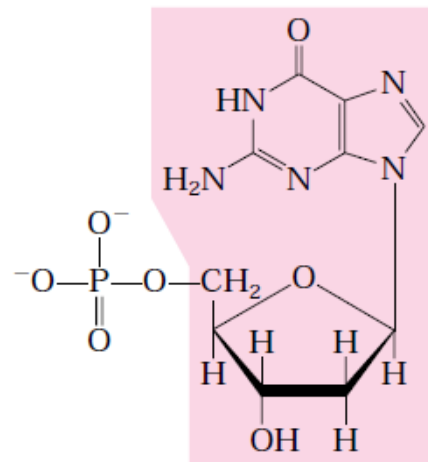
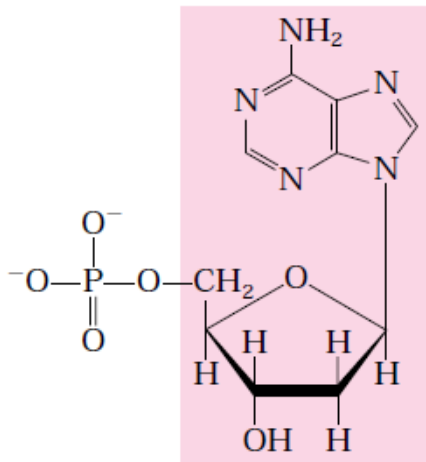


Disciplina: SLC0673

Ácidos nucleicos

Prof. Dr. Andrei Leitão

Deoxyribonucleotides



Nucleotide: Deoxyadenylate
(deoxyadenosine
5'-monophosphate)

Nucleotide: Deoxyguanylate
(deoxyguanosine
5'-monophosphate)

Nucleotide: Deoxythymidylate
(deoxythymidine
5'-monophosphate)

Nucleotide: Deoxycytidylate
(deoxycytidine
5'-monophosphate)

Symbols: A, dA, dAMP

Symbols: G, dG, dGMP

Symbols: T, dT, dTMP

Symbols: C, dC, dCMP

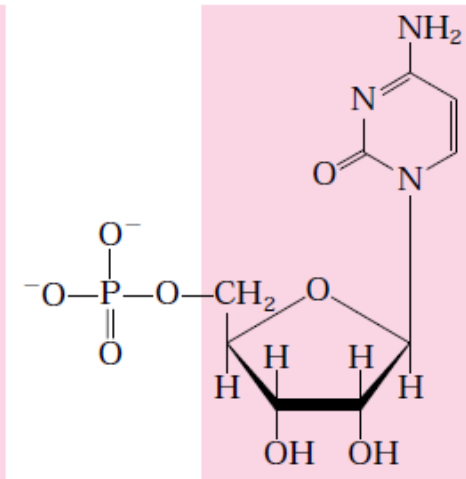
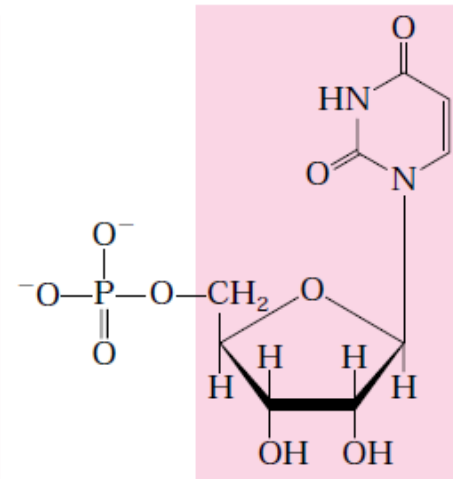
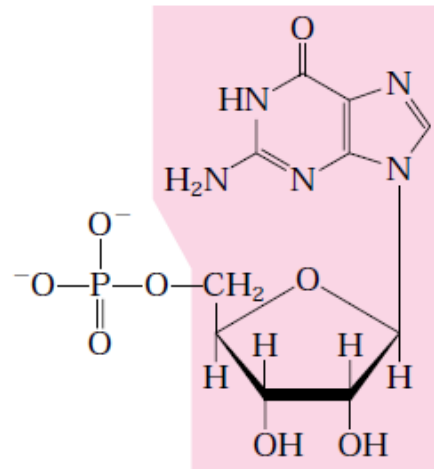
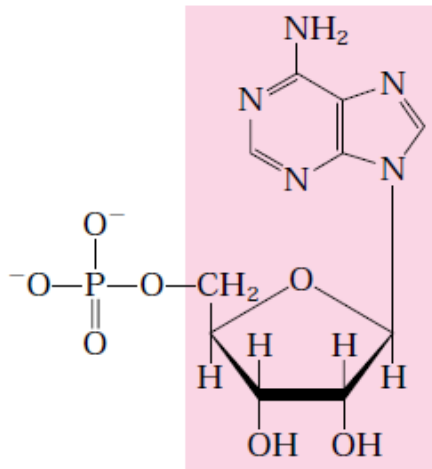
Nucleoside: Deoxyadenosine

Nucleoside: Deoxyguanosine

Nucleoside: Deoxythymidine

Nucleoside: Deoxycytidine

Ribonucleotides



Nucleotide: Adenylate (adenosine 5'-monophosphate)

Symbols: A, AMP

Nucleoside: Adenosine

Nucleotide: Guanylate (guanosine 5'-monophosphate)

Symbols: G, GMP

Nucleoside: Guanosine

Nucleotide: Uridylate (uridine 5'-monophosphate)

Symbols: U, UMP

Nucleoside: Uridine

Nucleotide: Cytidylate (cytidine 5'-monophosphate)

Symbols: C, CMP

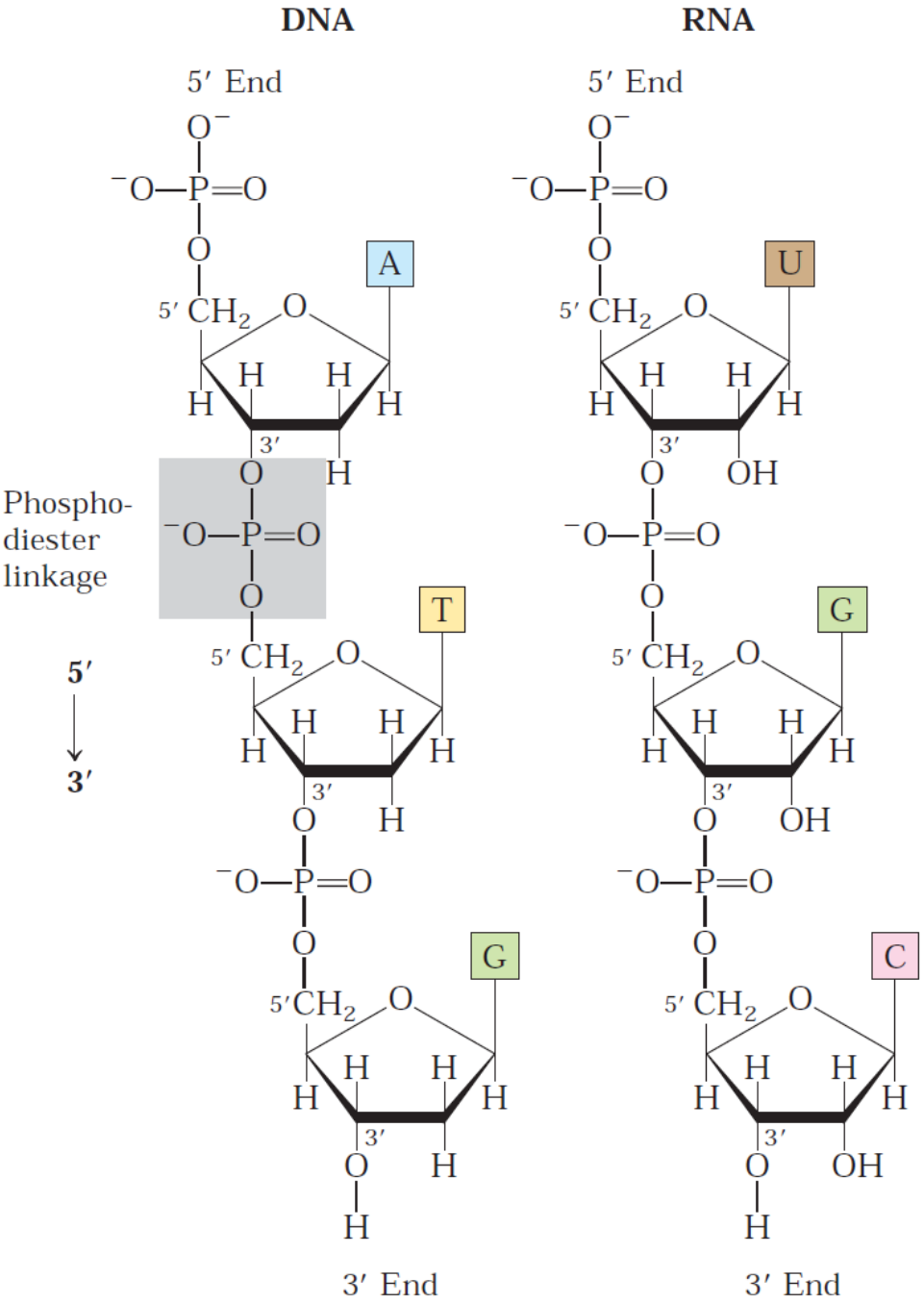
Nucleoside: Cytidine

Nomenclature

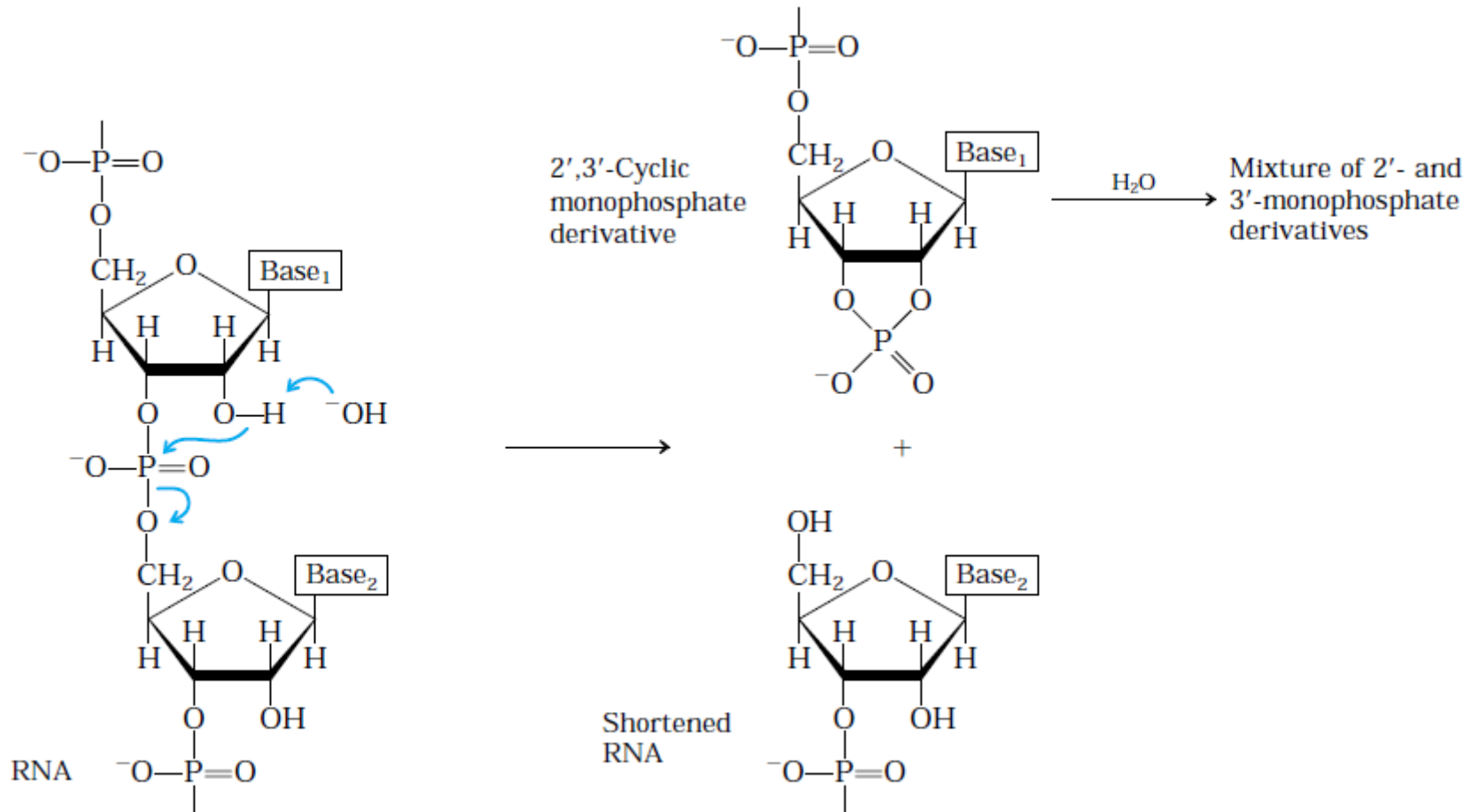
TABLE 8-1 Nucleotide and Nucleic Acid Nomenclature

<i>Base</i>	<i>Nucleoside</i>	<i>Nucleotide</i>	<i>Nucleic acid</i>
Purines			
Adenine	Adenosine	Adenylate	RNA
	Deoxyadenosine	Deoxyadenylate	DNA
Guanine	Guanosine	Guanylate	RNA
	Deoxyguanosine	Deoxyguanylate	DNA
Pyrimidines			
Cytosine	Cytidine	Cytidylate	RNA
	Deoxycytidine	Deoxycytidylate	DNA
Thymine	Thymidine or deoxythymidine	Thymidylate or deoxythymidylate	DNA
Uracil	Uridine	Uridylate	RNA

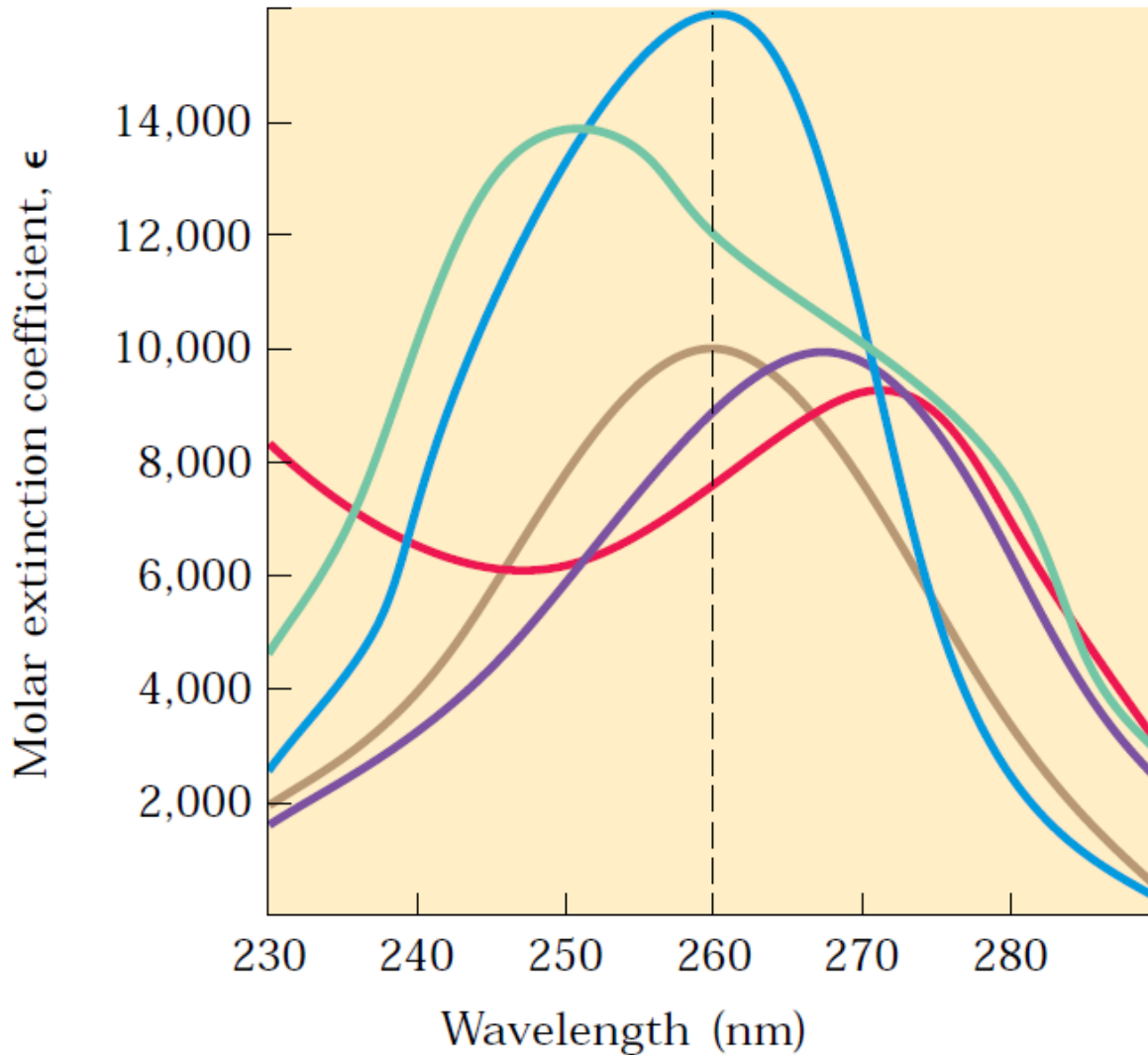
DNA & RNA



Alcaline hydrolysis

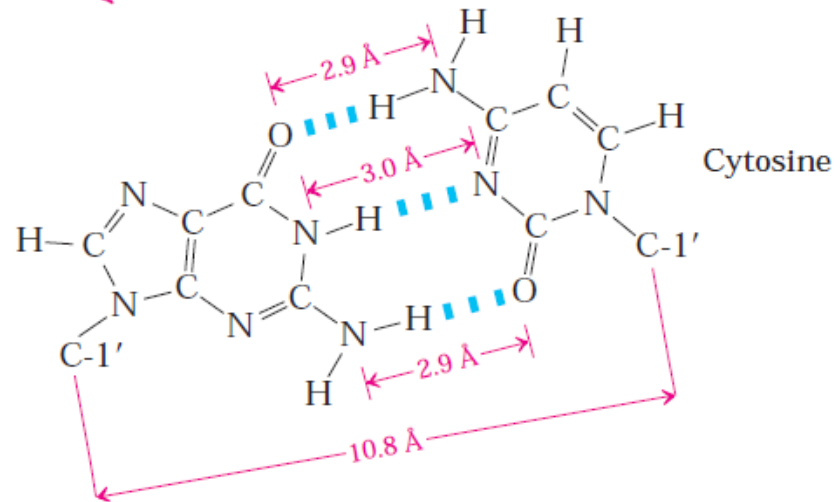
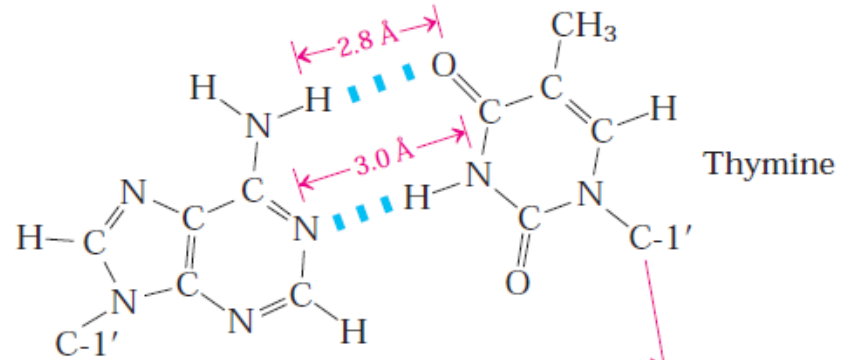
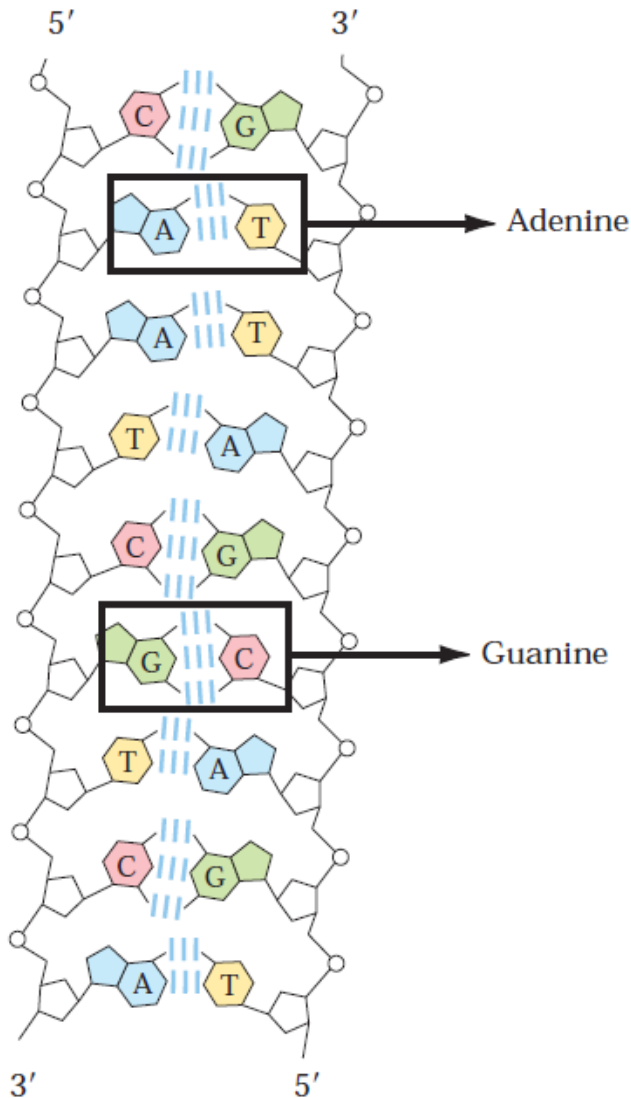


Absorption spectra



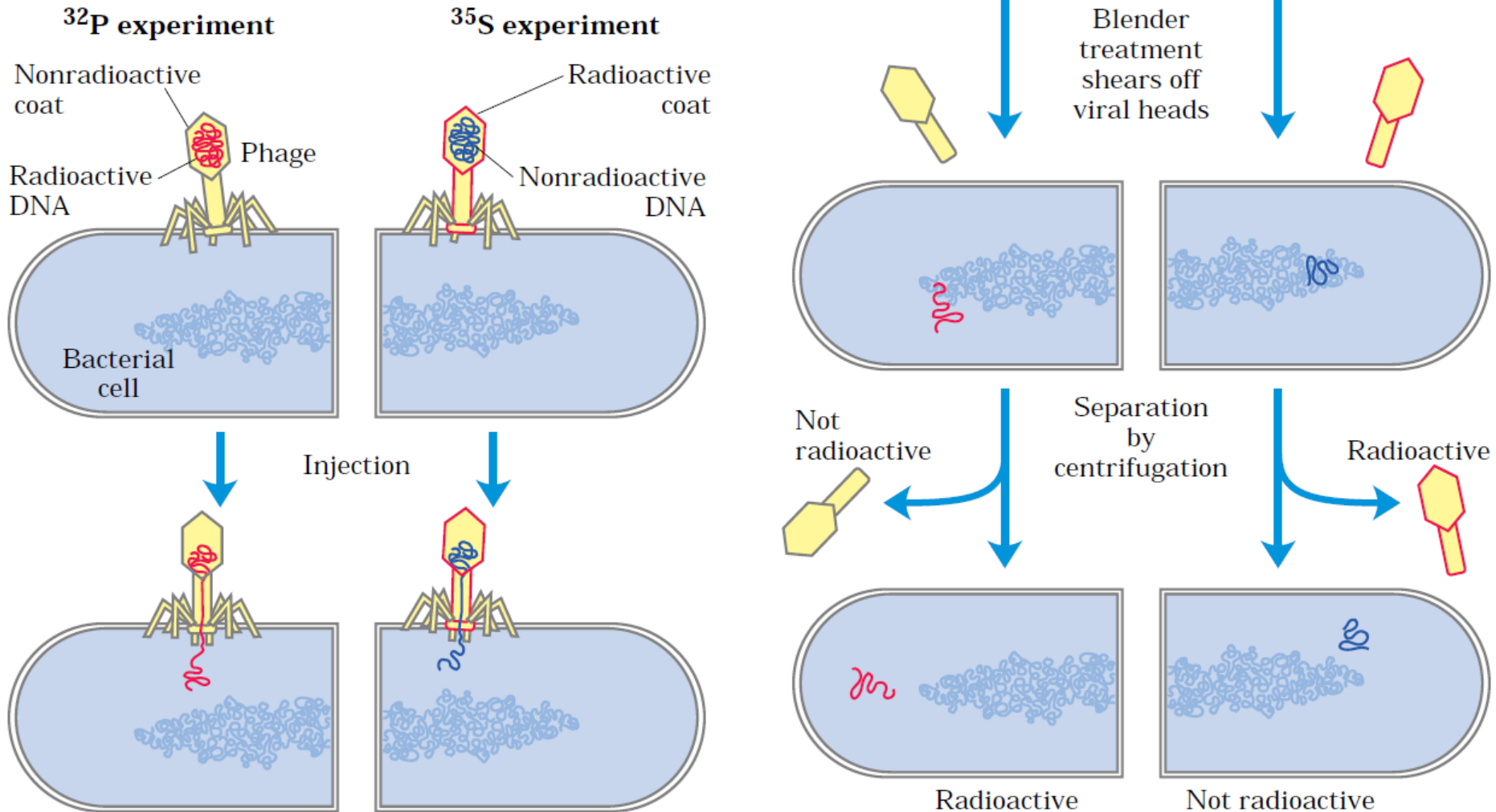
Molar extinction coefficient at 260 nm, ϵ_{260} ($M^{-1}cm^{-1}$)	
AMP	15,400
GMP	11,700
UMP	9,900
dTMP	9,200
CMP	7,500

Absorption spectra

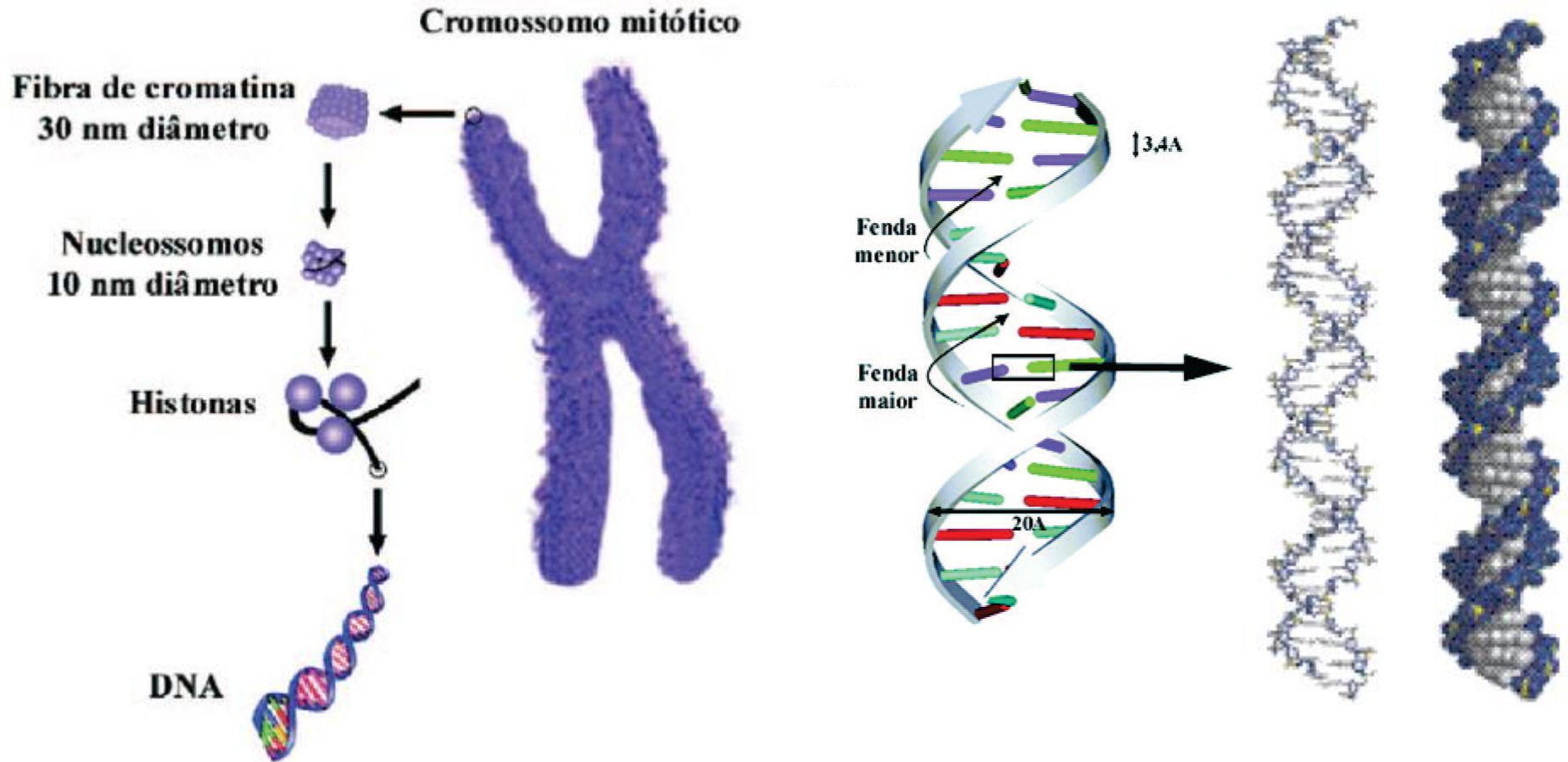


Bacteriophage experiment

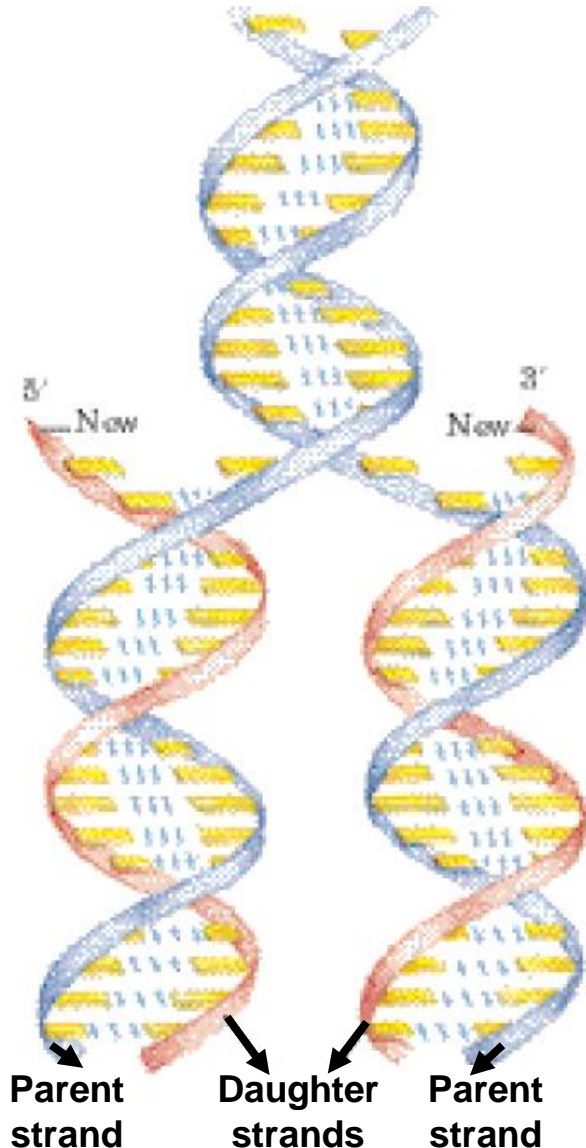
The Hershey-Chase experiment.



Chromosome & DNA



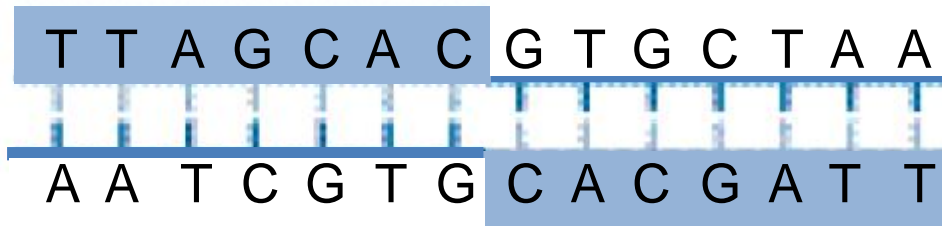
DNA replication & forms



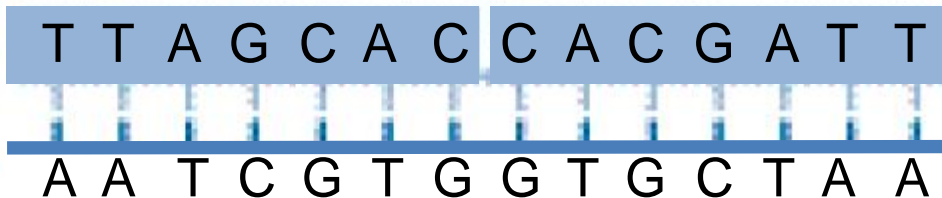
	<i>A form</i>	<i>B form</i>	<i>Z form</i>
Helical sense	Right handed	Right handed	Left handed
Diameter	~26 Å	~20 Å	~18 Å
Base pairs per helical turn	11	10.5	12
Helix rise per base pair	2.6 Å	3.4 Å	3.7 Å
Base tilt normal to the helix axis	20°	6°	7°
Sugar pucker conformation	C-3' endo	C-2' endo	C-2' endo for pyrimidines; C-3' endo for purines
Glycosyl bond conformation	Anti	Anti	Anti for pyrimidines; syn for purines

DNA sequences

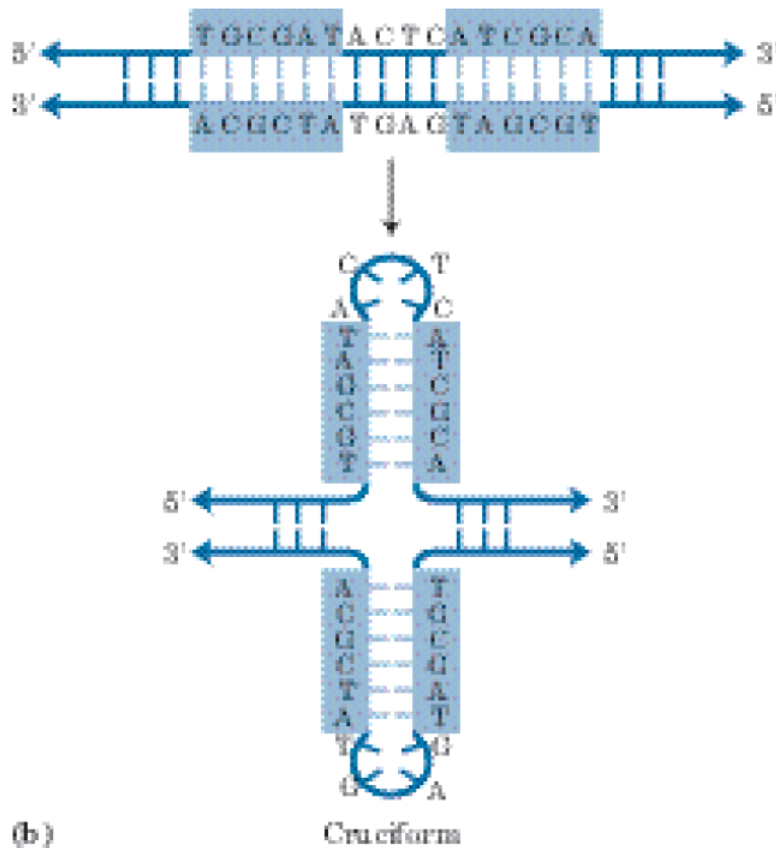
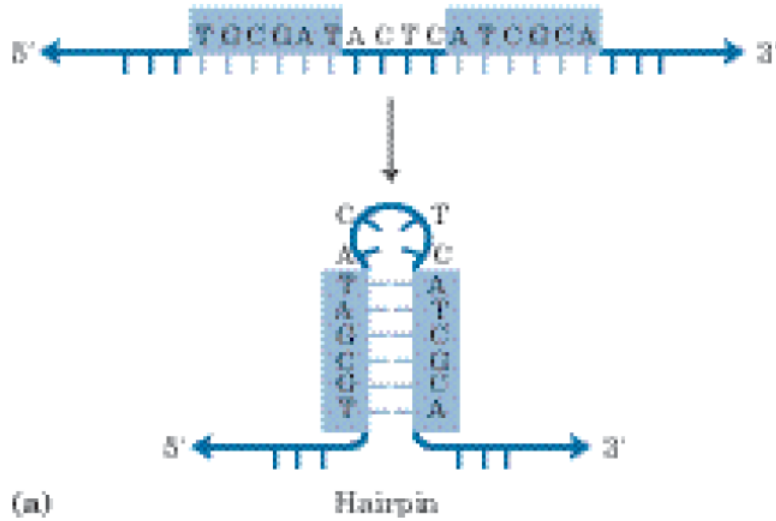
Palindrome



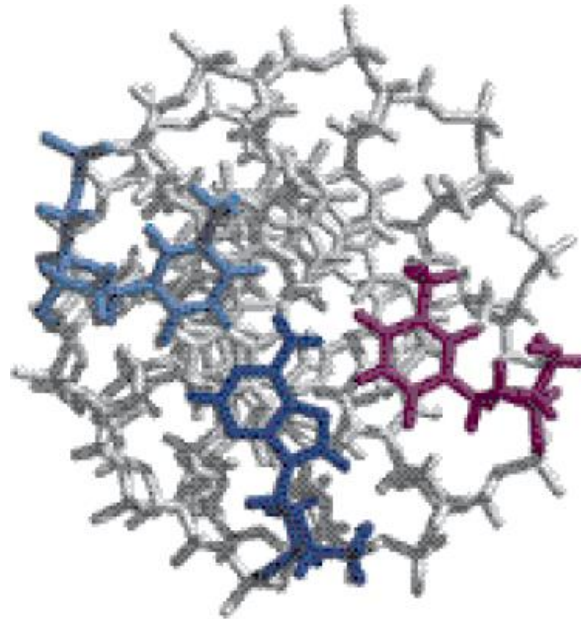
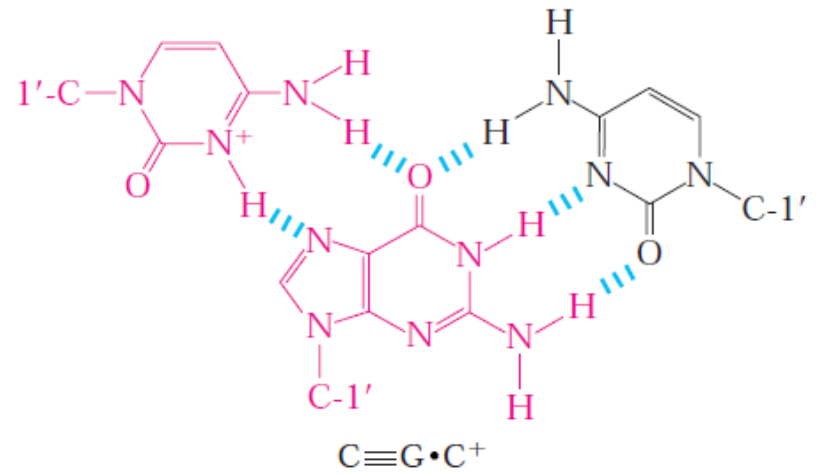
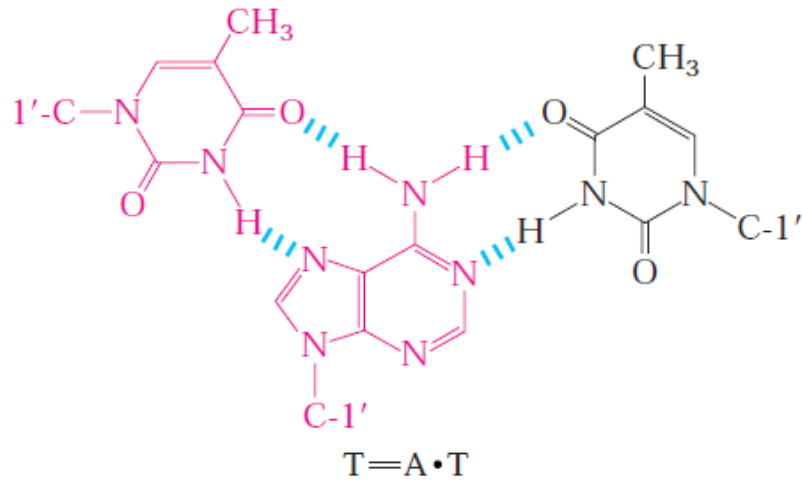
Mirror repeat



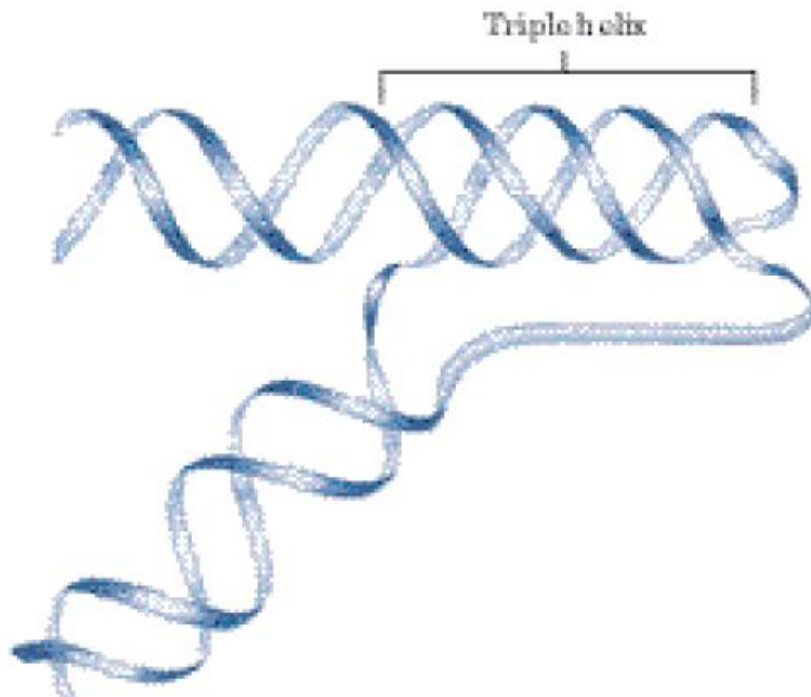
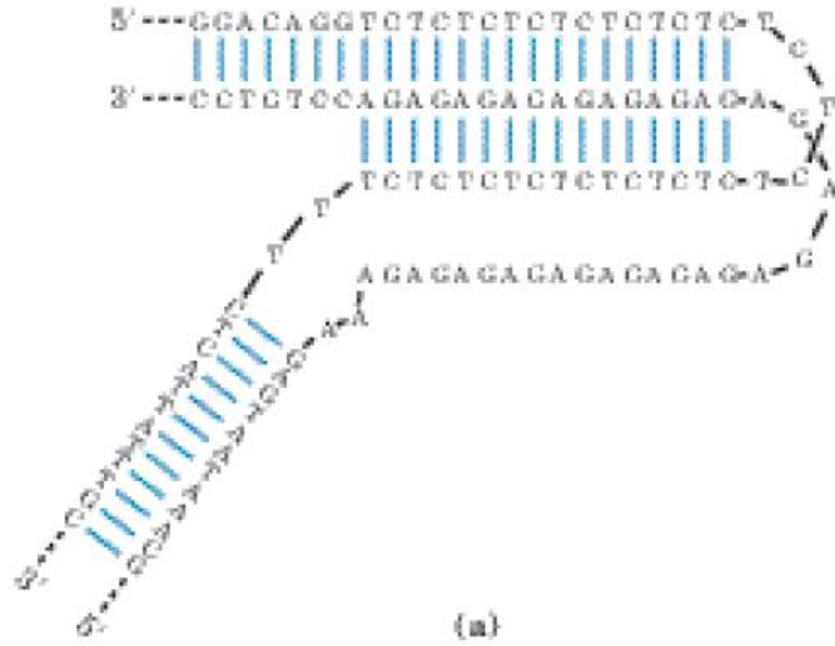
DNA folding



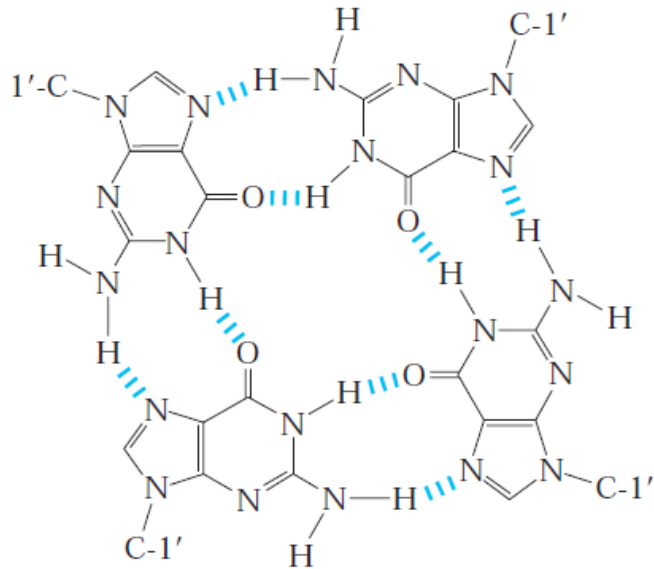
DNA triplex



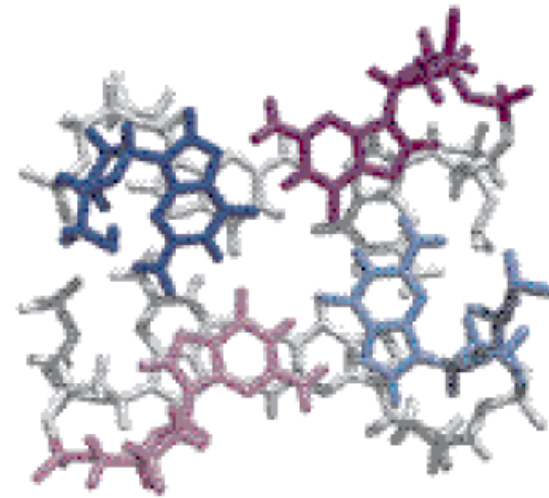
DNA triplex



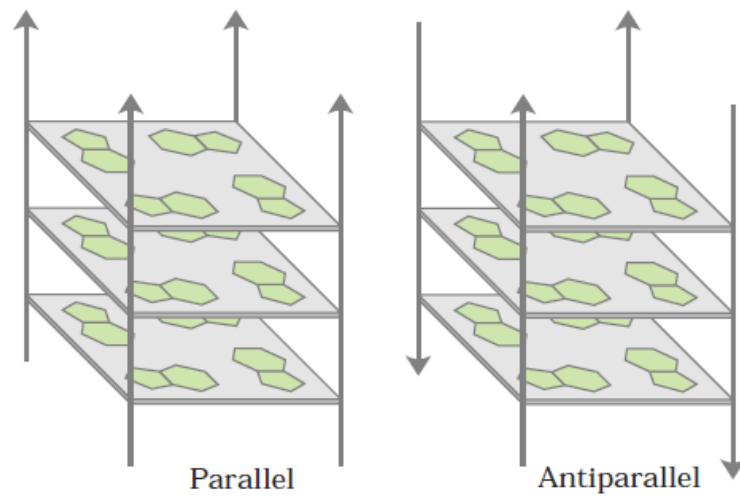
DNA quadruplex



Guanosine tetraplex
(c)



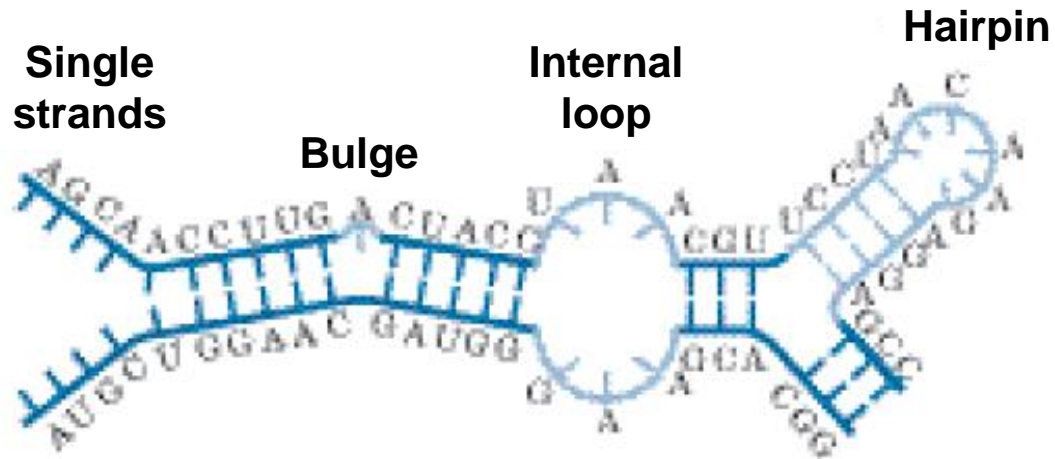
(d)



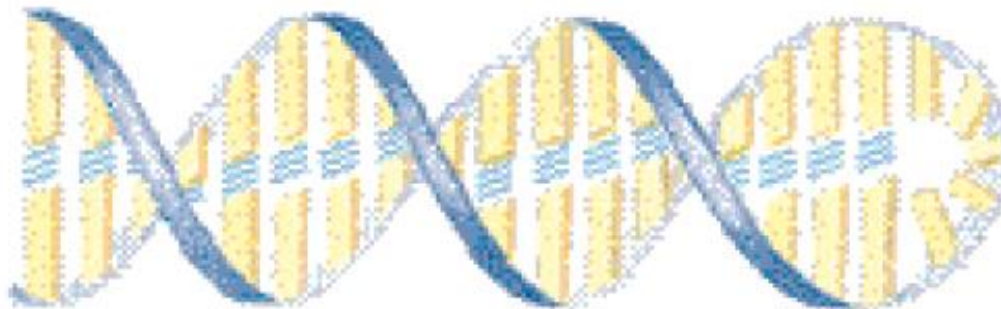
Parallel

Antiparallel

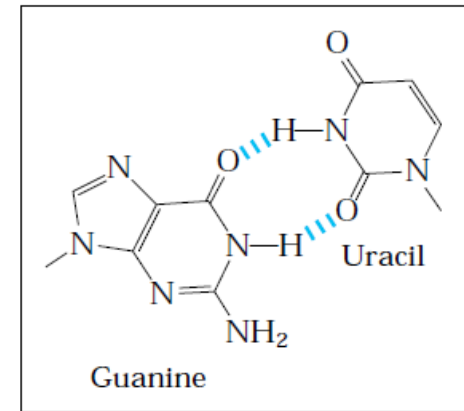
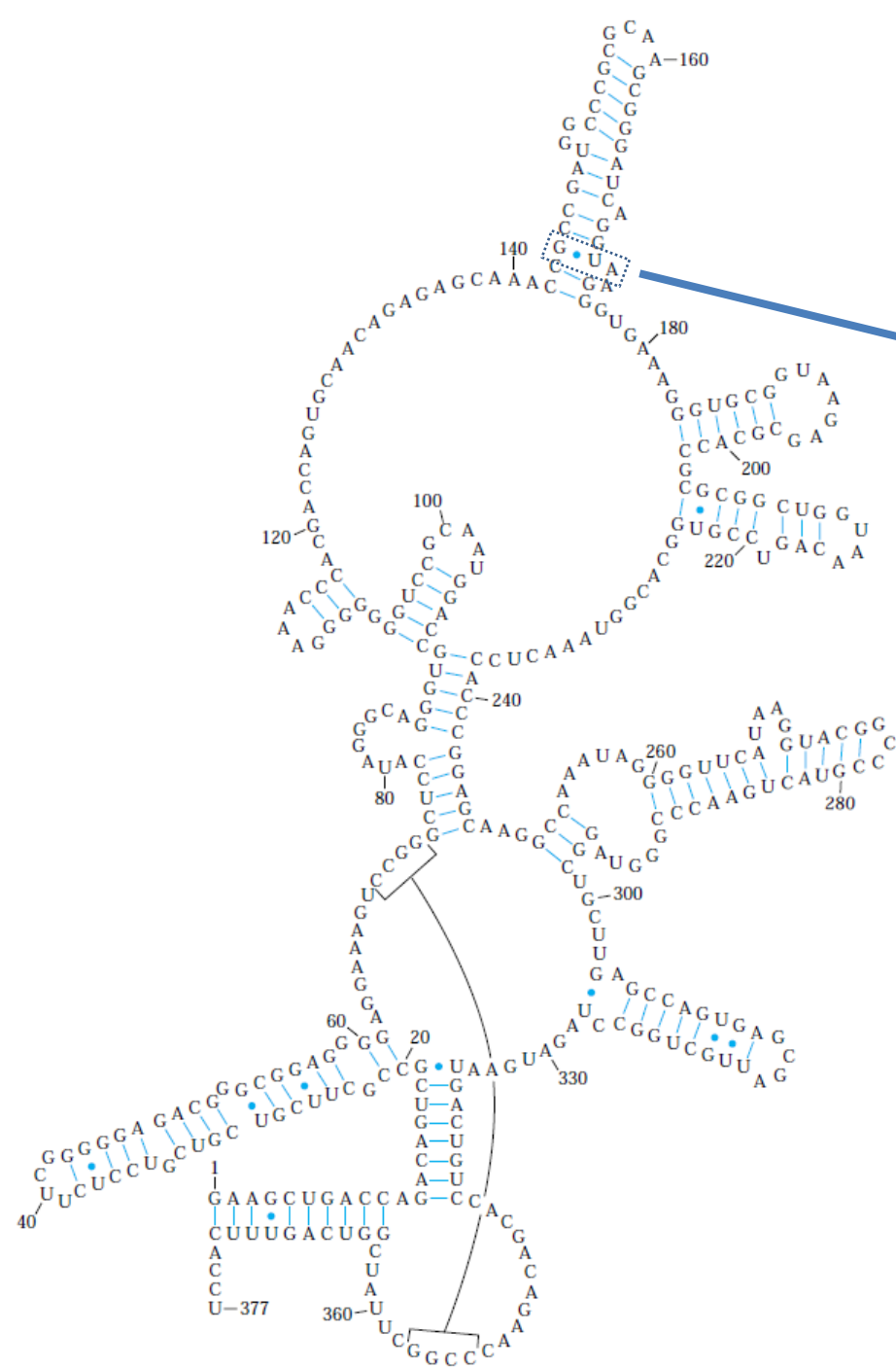
Secondary structures of RNAs



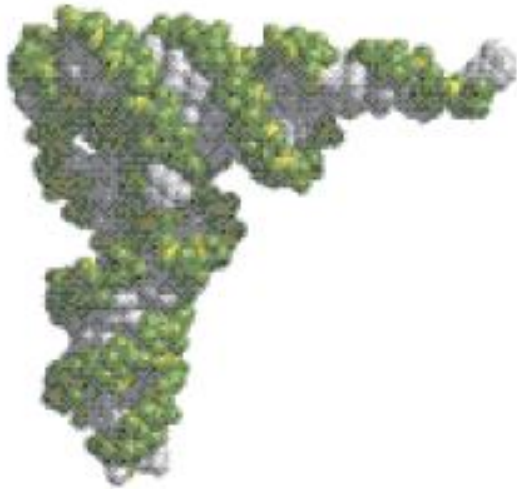
Hairpin double helix



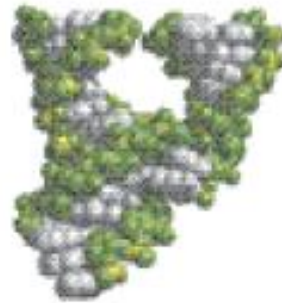
RNA folding



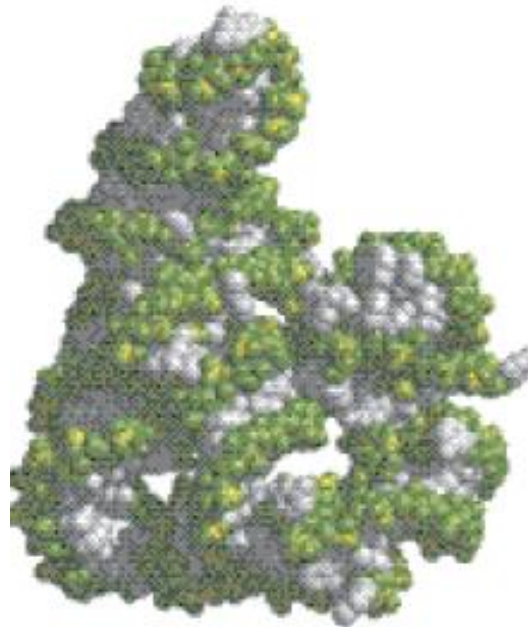
RNA 3D structures



tRNA of yeast
PDB: 1TRA

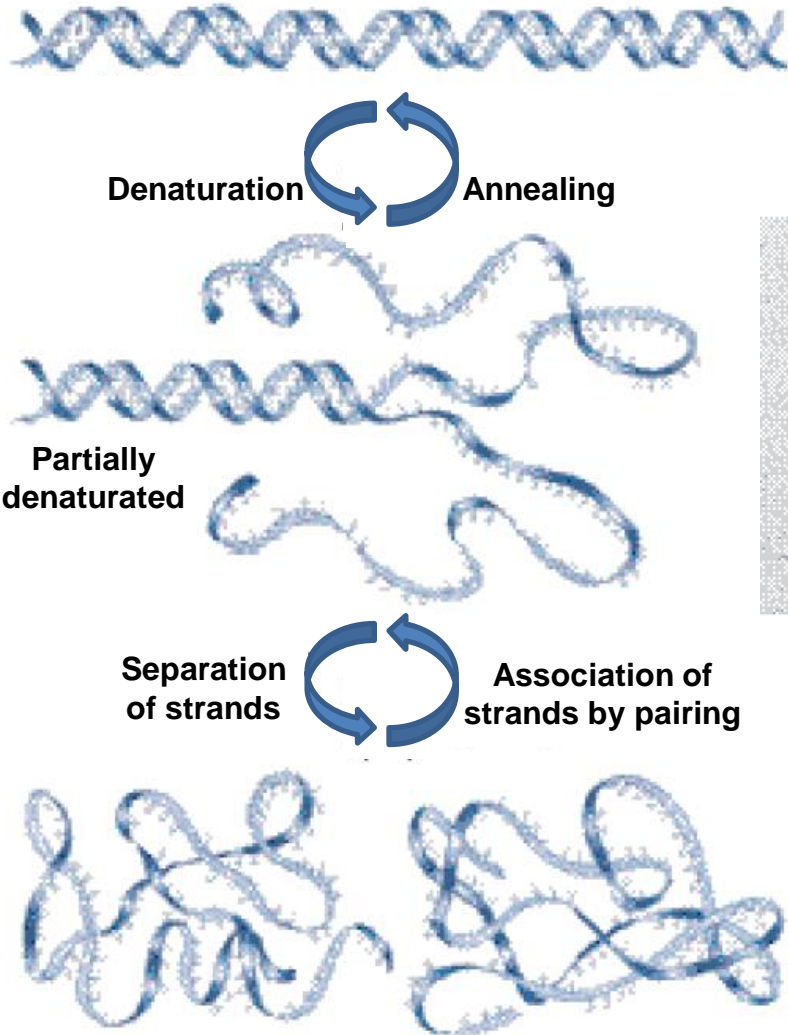


Ribozyme from
plant viruses
PDB: 1MME

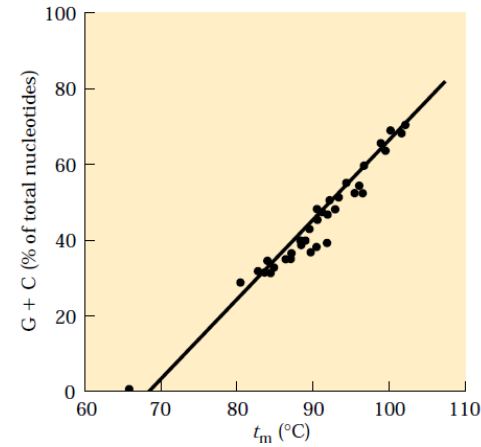
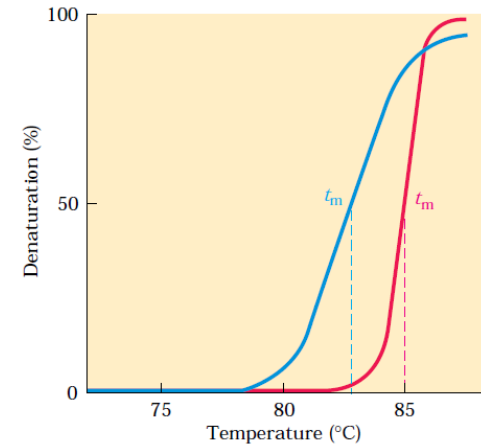


mRNA from
protozoan
PDB: 1GRZ

DNA annealing

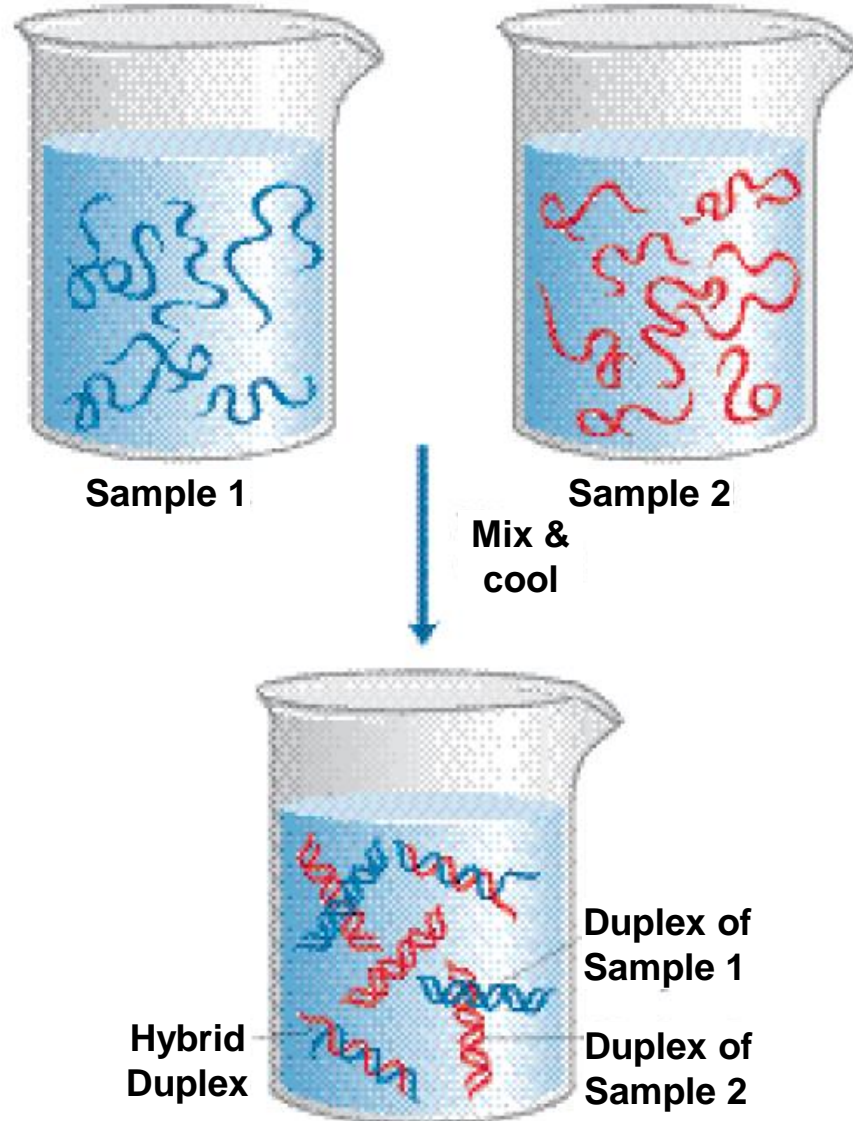


Partially denatured DNA



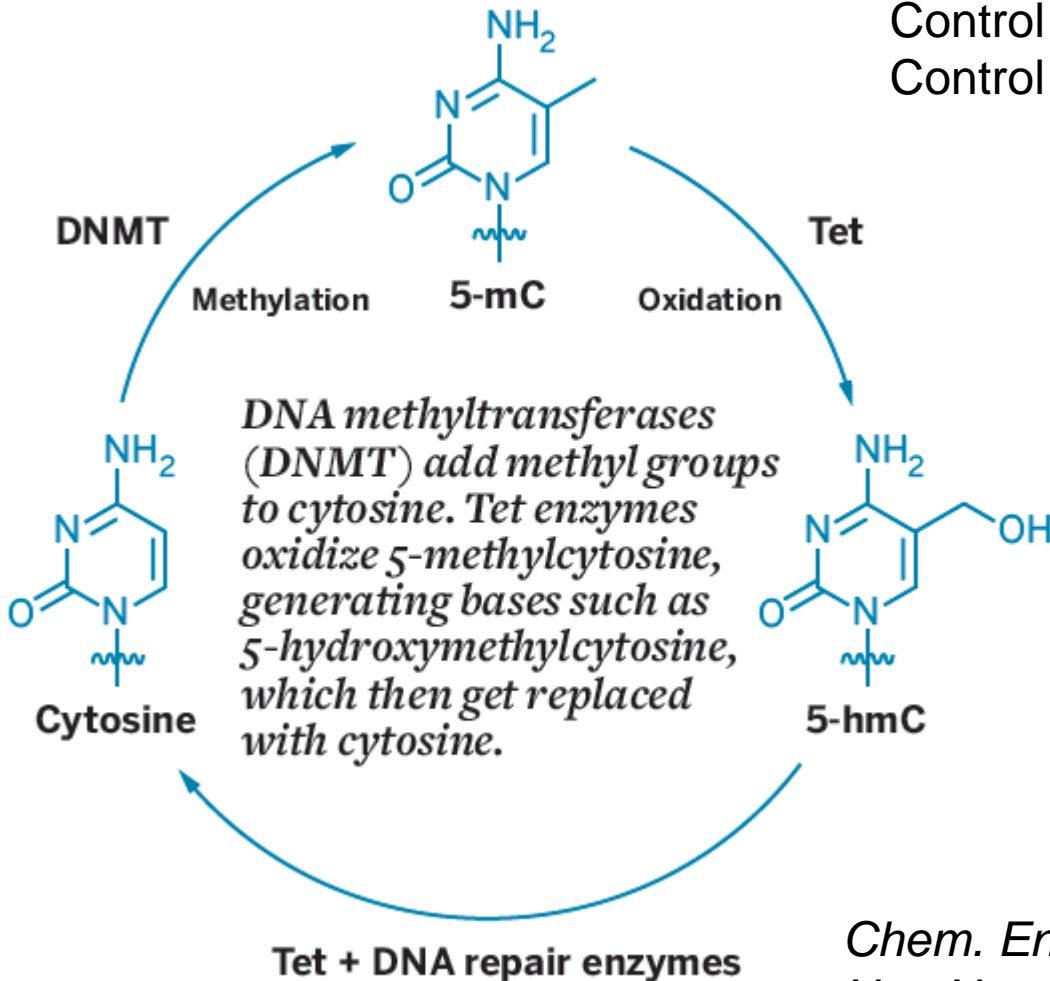
Heat denaturation of DNA

DNA hybridization



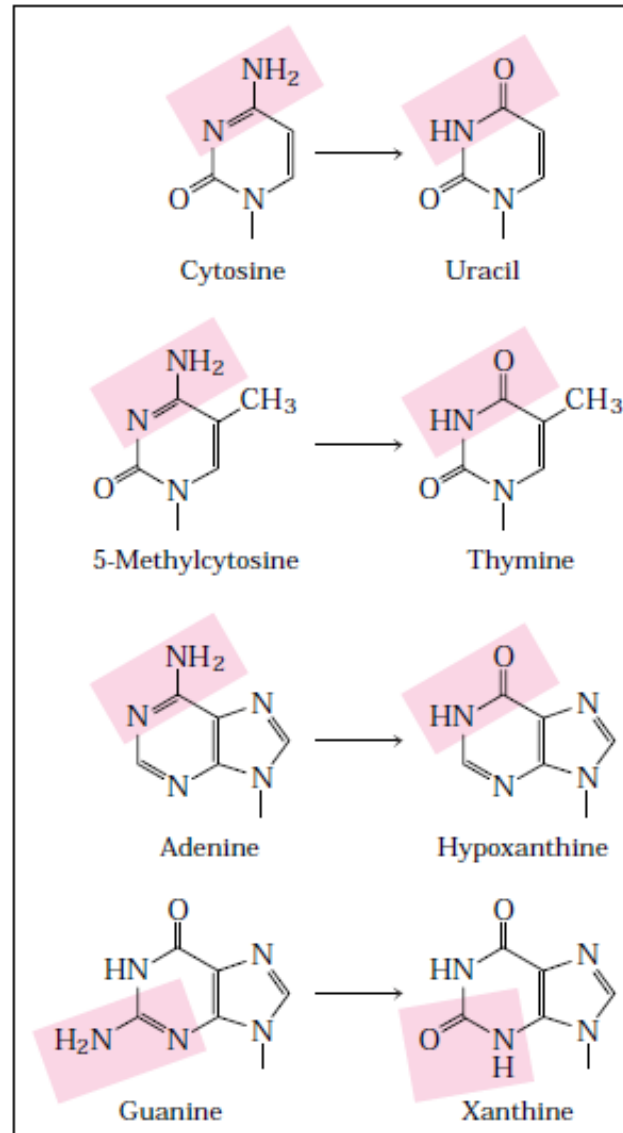
DNA - epigenetics

Control of neuronal function
Control of the neuronal communication



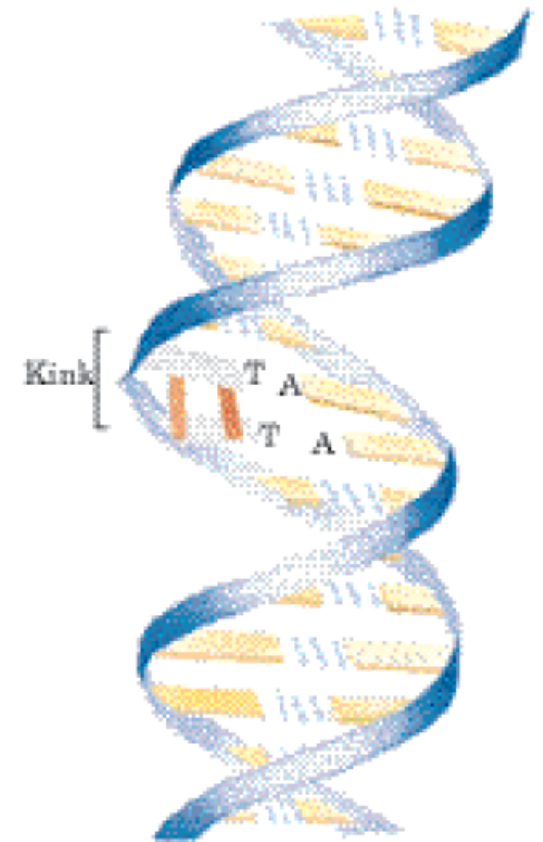
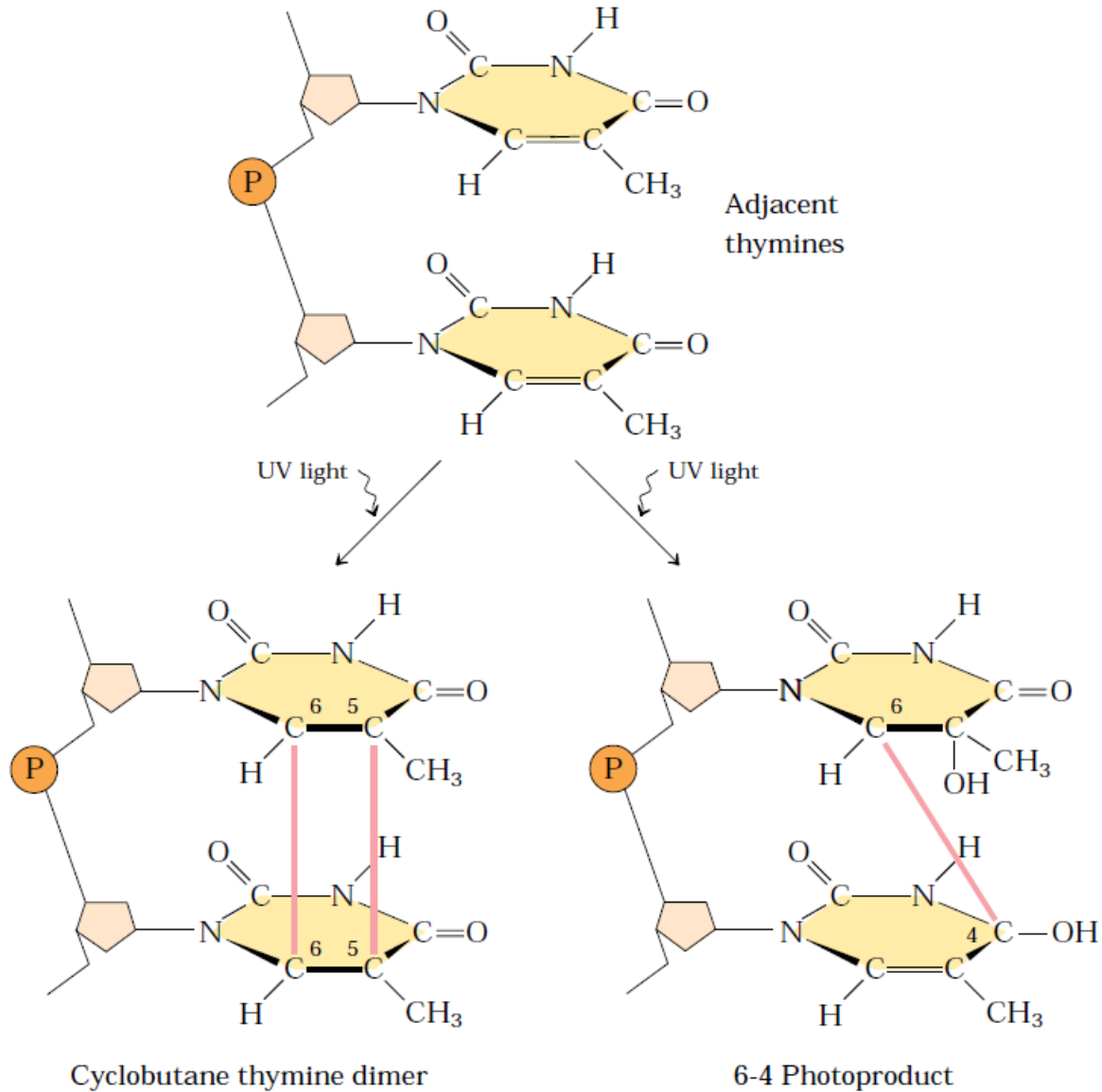
Chem. Eng. News 2015, may, 4
Nat. Neurosci. 2015, DOI: 10.1038/nn.4008

Nonenzymatic reactions of nucleotides

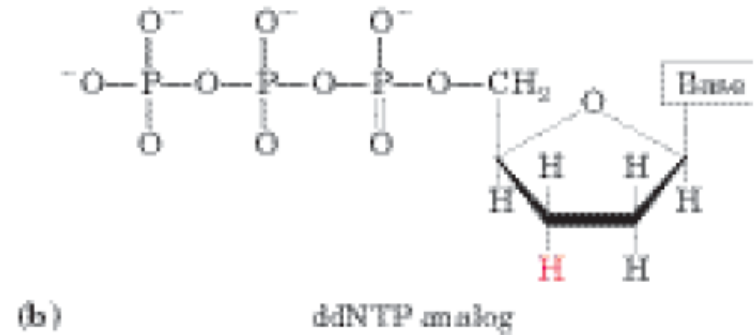
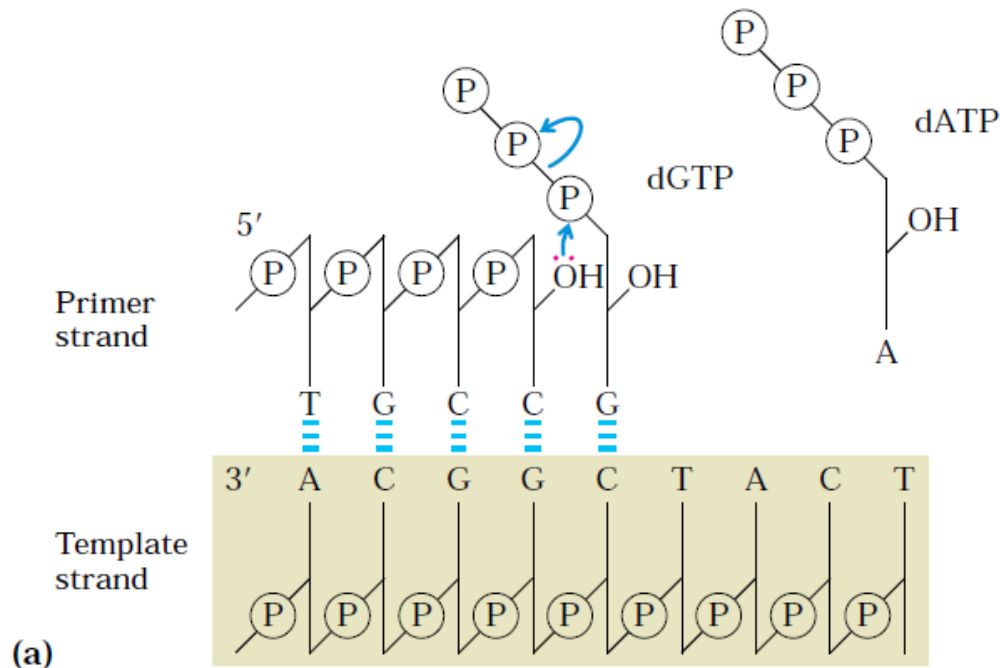


(a) Deamination

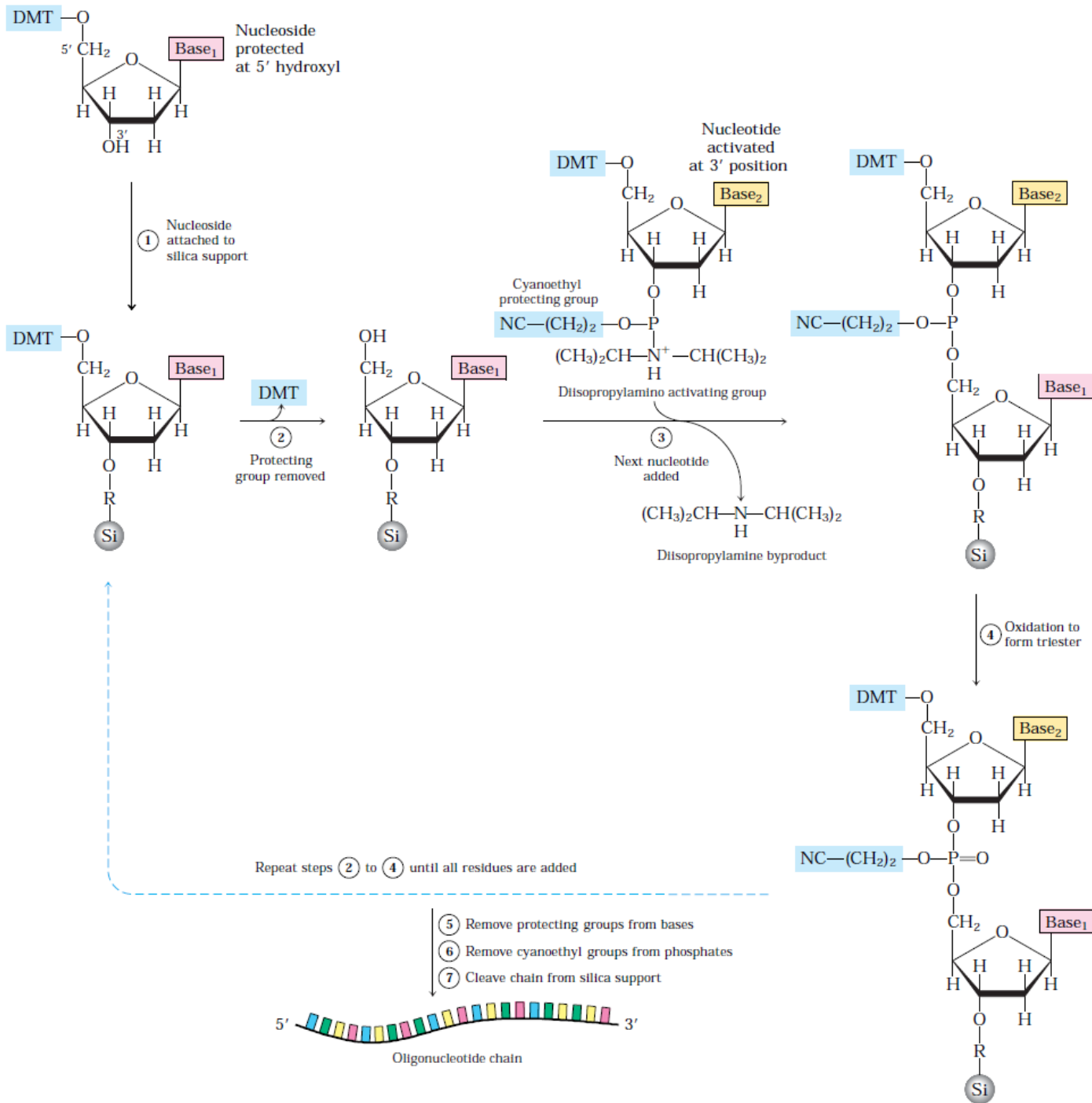
UV damage



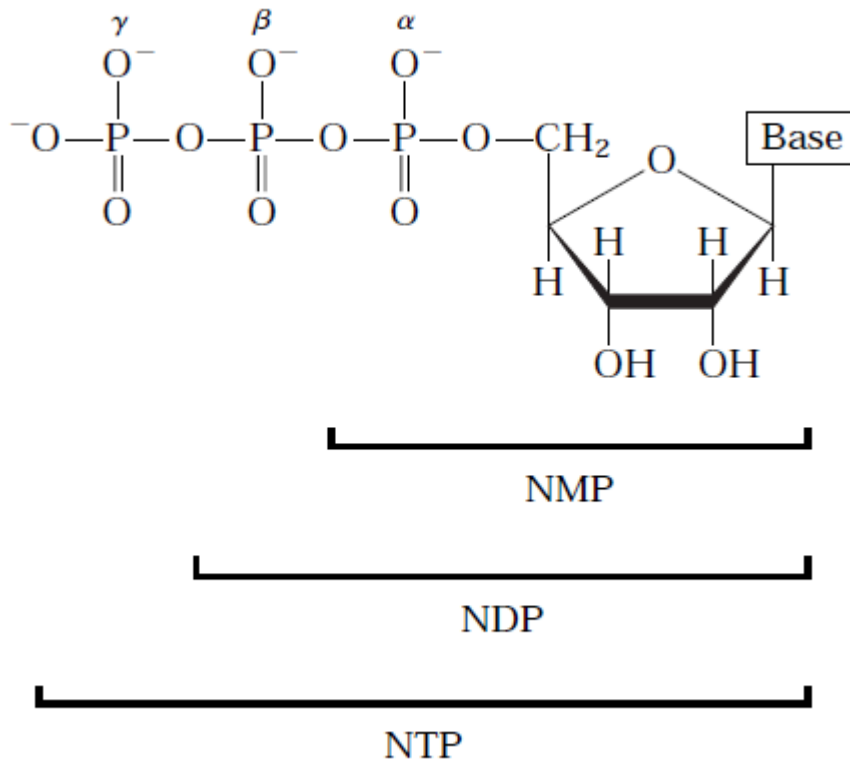
DNA sequencing



Chemical synthesis of DNA



Nucleoside phosphates



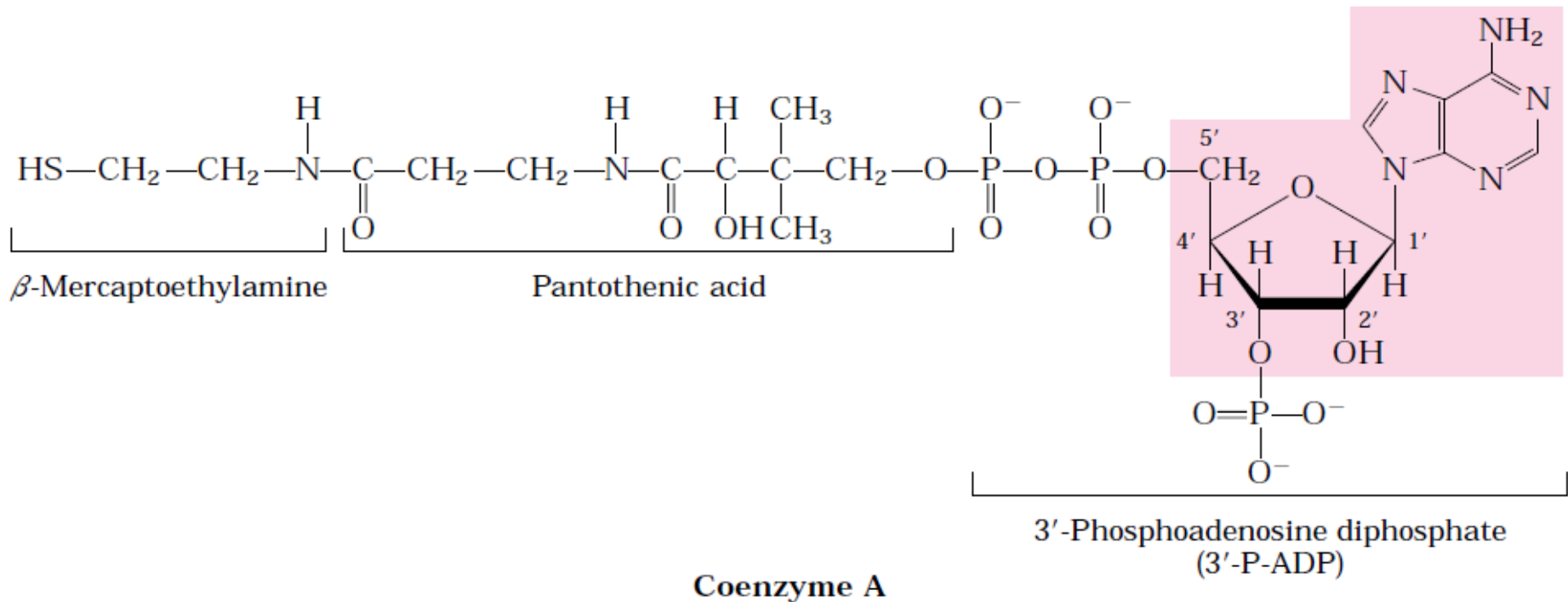
Abbreviations of ribonucleoside 5'-phosphates

Base	Mono-	Di-	Tri-
Adenine	AMP	ADP	ATP
Guanine	GMP	GDP	GTP
Cytosine	CMP	CDP	CTP
Uracil	UMP	UDP	UTP

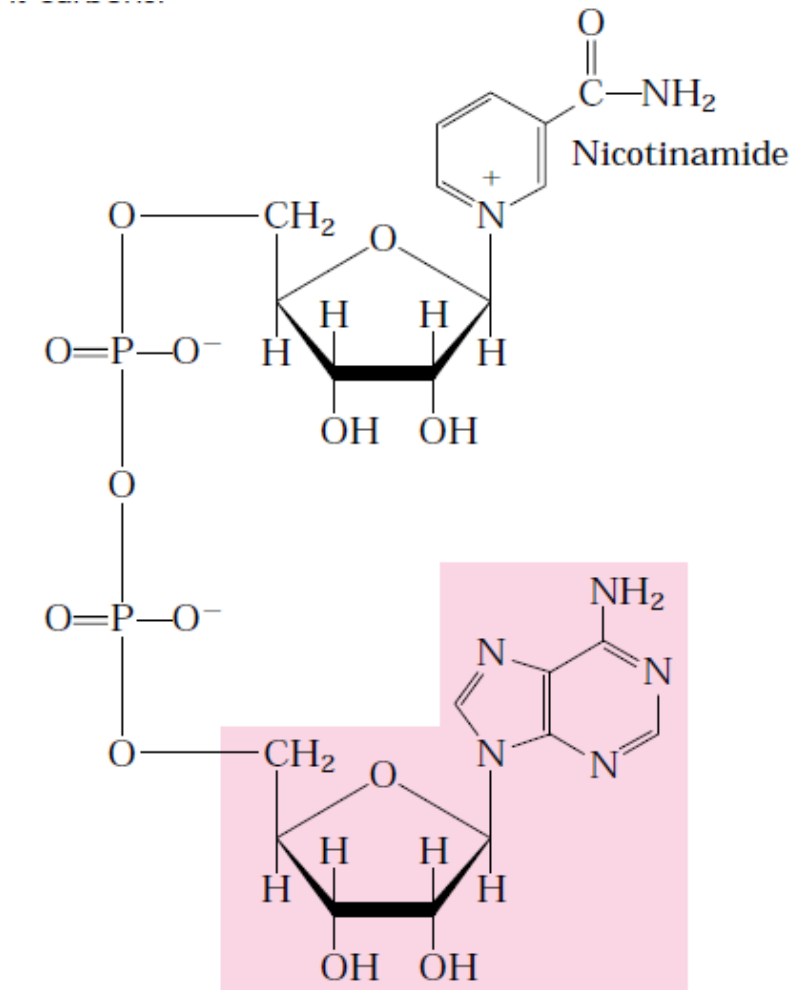
Abbreviations of deoxyribonucleoside 5'-phosphates

Base	Mono-	Di-	Tri-
Adenine	dAMP	dADP	dATP
Guanine	dGMP	dGDP	dGTP
Cytosine	dCMP	dCDP	dCTP
Thymine	dTMP	dTDP	dTTP

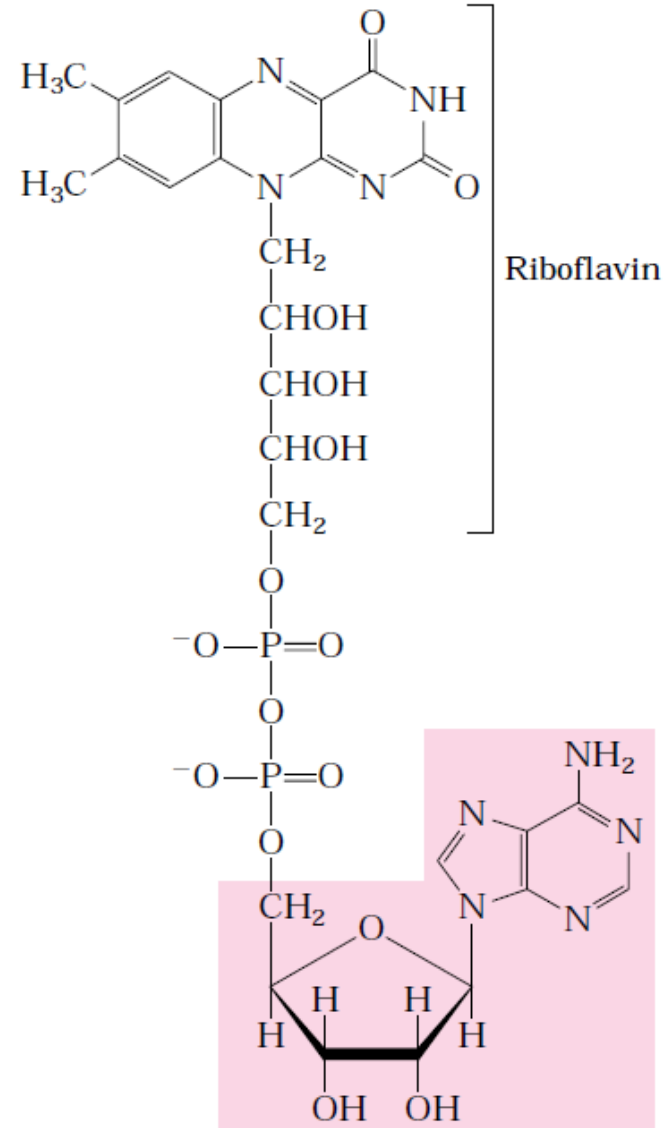
Nucleoside phosphates



Nucleoside phosphates



Nicotinamide adenine dinucleotide (NAD⁺)



Flavin adenine dinucleotide (FAD)