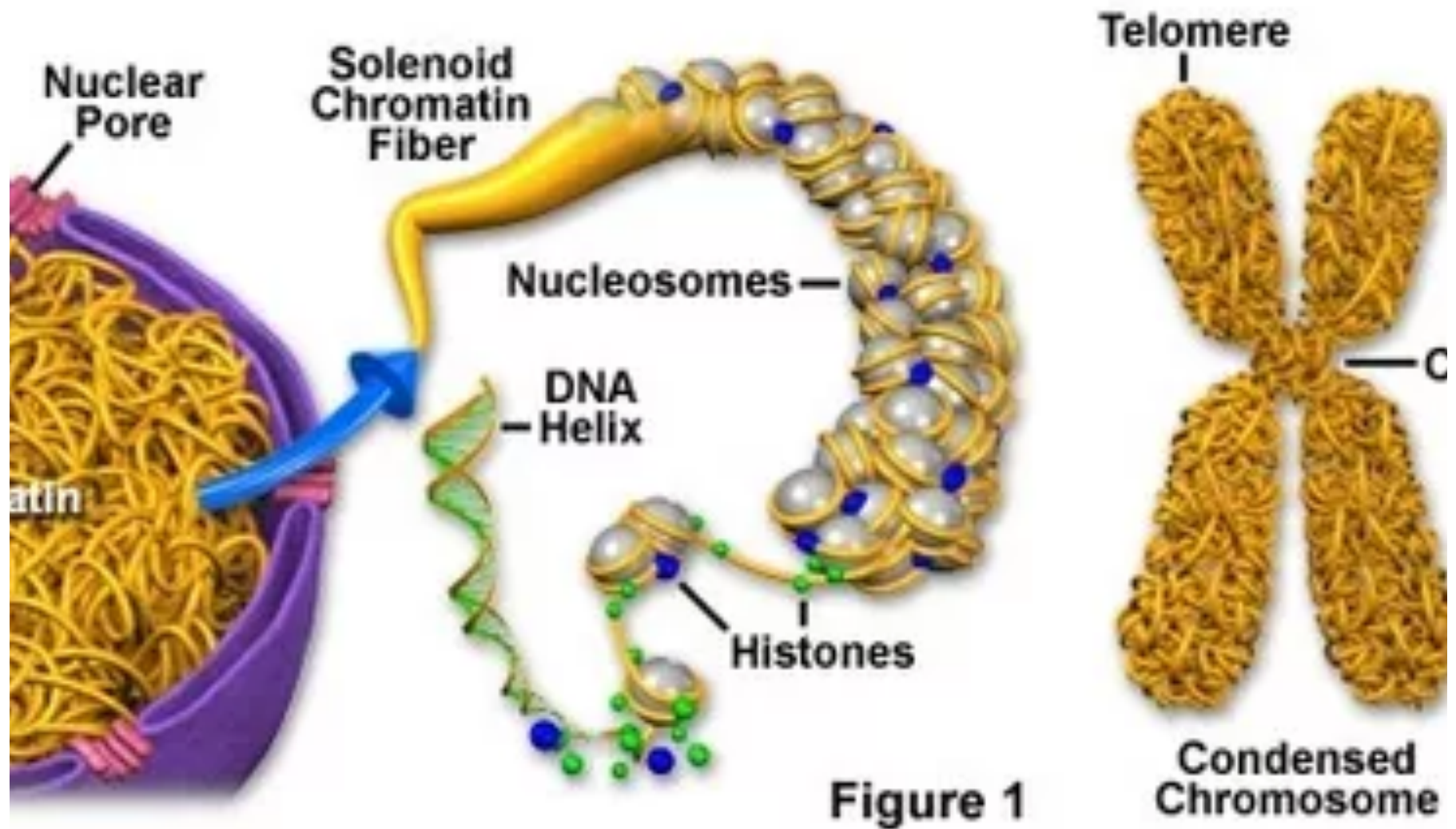
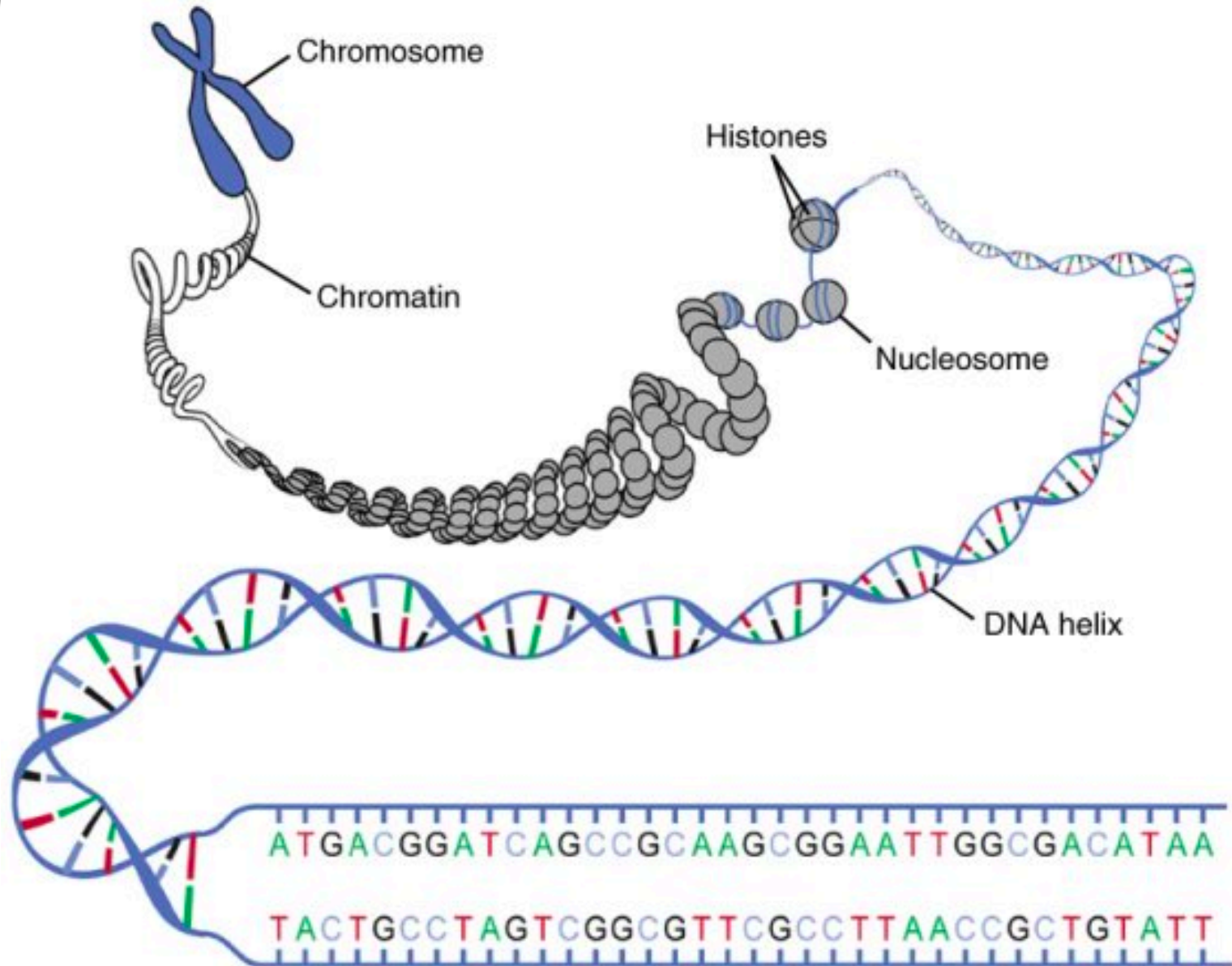


Ch25: Nucleic Acids and Protein
Synthesis

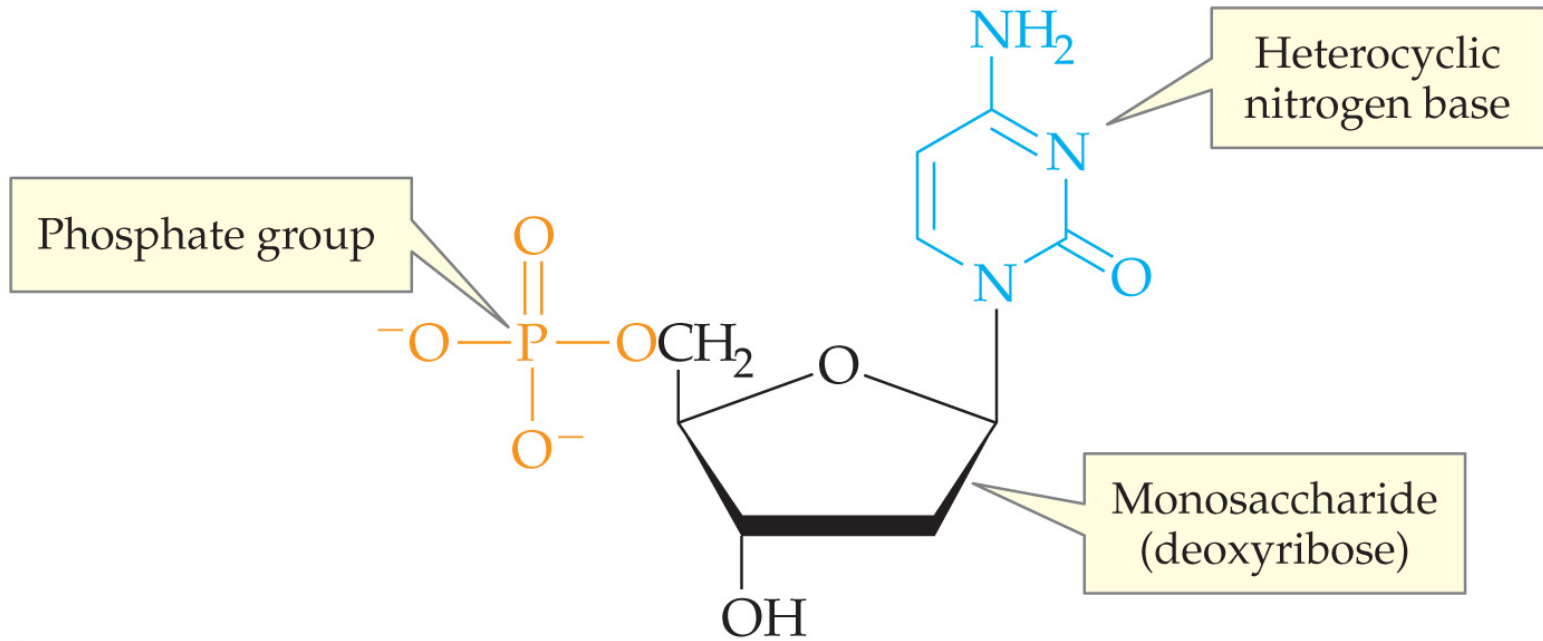
Chromatin and Condensed Chromosome



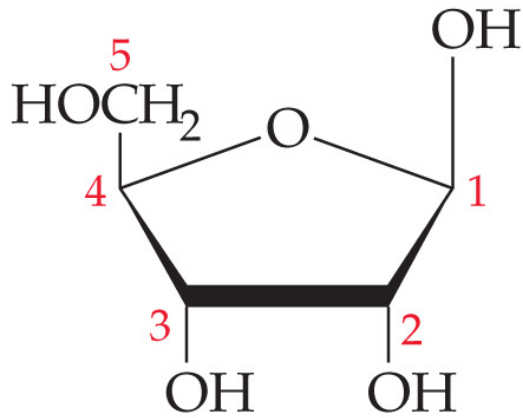
Chromosome, Chromatin, DNA, Genes



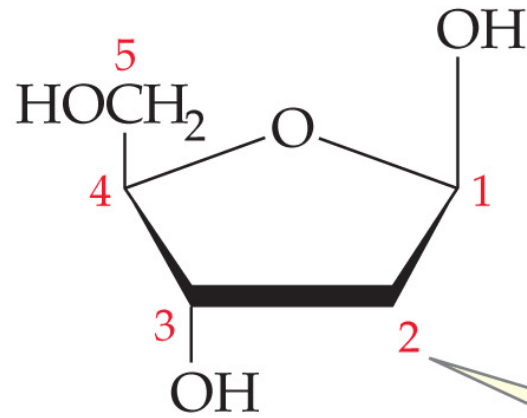
A Nucleotide



The Sugars of RNA and DNA



D-Ribose
(in RNA)



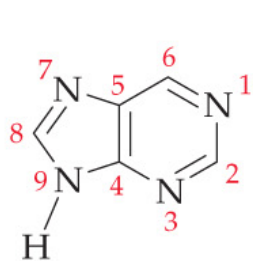
2-Deoxy-D-ribose
(in DNA)

Oxygen missing

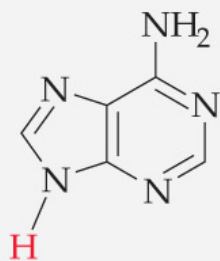
The Bases

TABLE 25.1 Bases in DNA and RNA

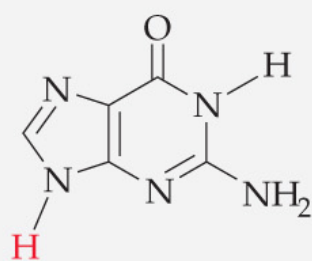
PURINE BASES IN NUCLEIC ACIDS



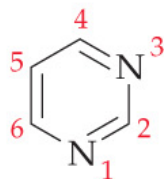
Purine
(Parent)



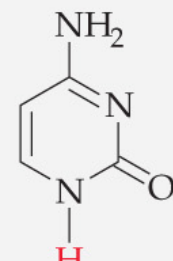
Adenine
(DNA, RNA)



Guanine
(DNA, RNA)

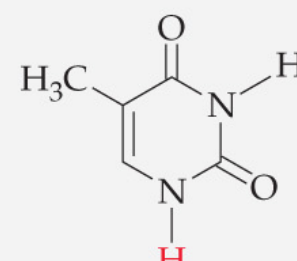


Pyrimidine
(Parent)

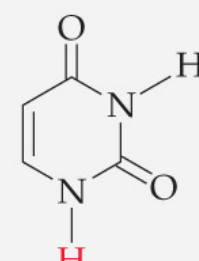


Cytosine
(DNA, RNA)

PYRIMIDINE BASES IN NUCLEIC ACIDS



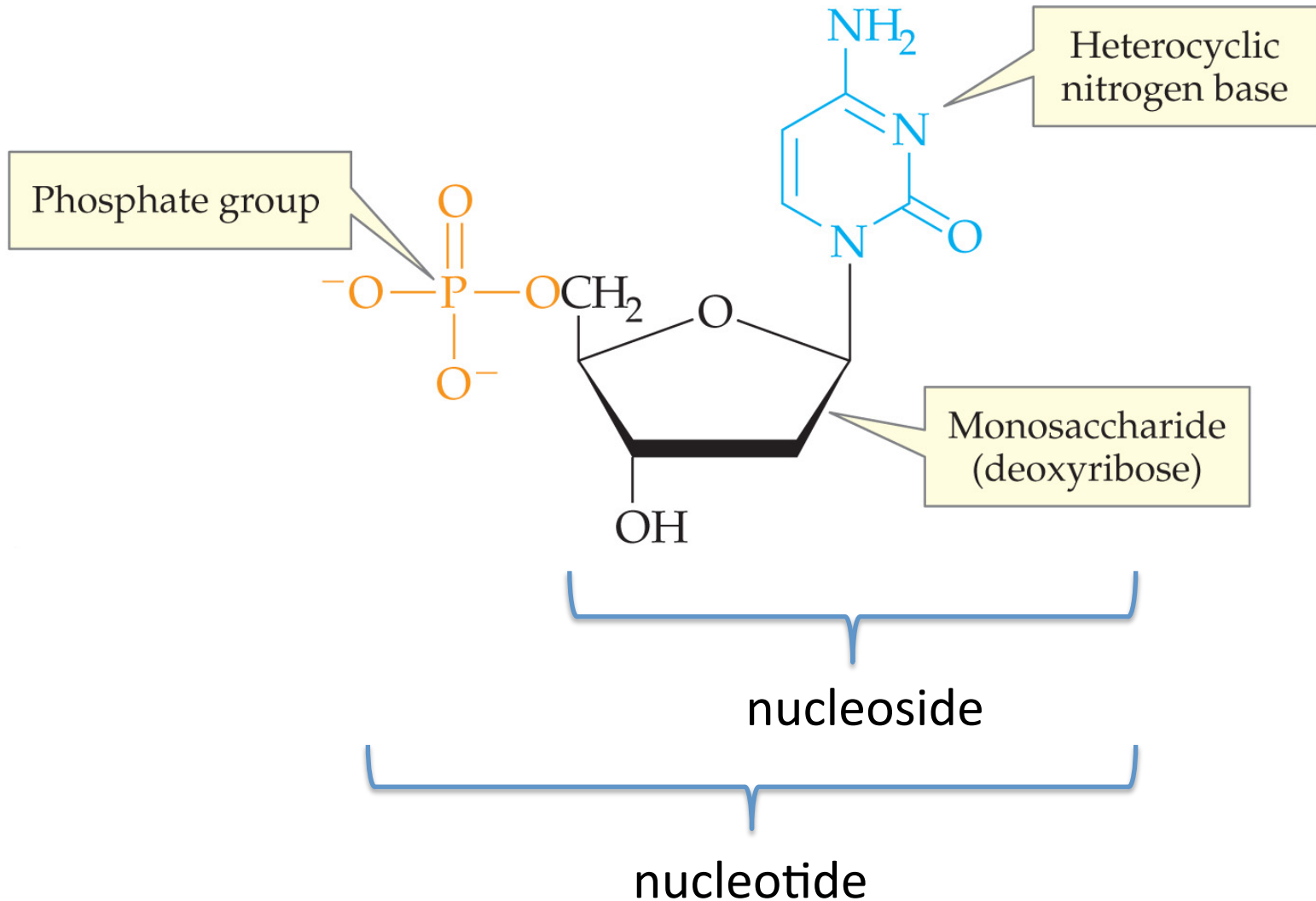
Thymine*
(DNA)



Uracil
(RNA)

*Thymine occurs in a few cases of RNA.

Nucleotide and Nucleoside



Naming

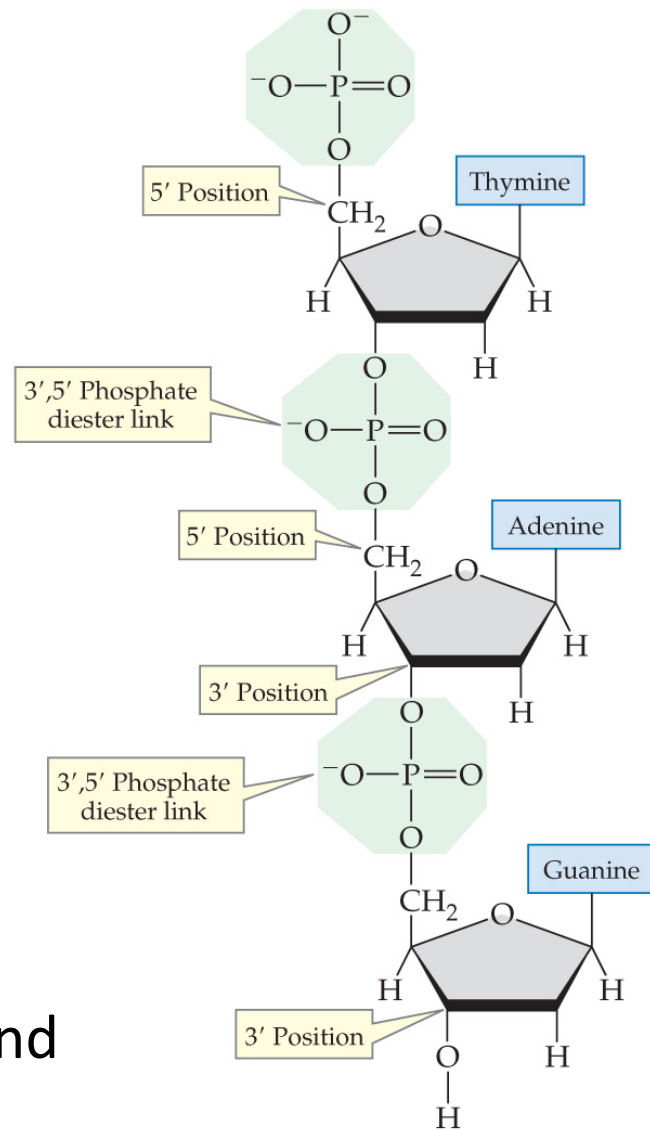
TABLE 25.2 Names of Bases, Nucleosides, and Nucleotides in DNA and RNA

Bases	Nucleosides	Nucleotides*
DNA		
	Deoxyribonucleosides	Deoxyribonucleotides
Adenine (A)	Deoxyadenosine	Deoxyadenosine 5'-monophosphate (dAMP)
Guanine (G)	Deoxyguanosine	Deoxyguanosine 5'-monophosphate (dGMP)
Cytosine (C)	Deoxycytidine	Deoxycytidine 5'-monophosphate (dCMP)
Thymine (T)	Deoxythymidine	Deoxythymidine 5'-monophosphate (dTMP)
RNA		
	Ribonucleosides	Ribonucleotides
Adenine (A)	Adenosine	Adenosine 5'-monophosphate (AMP)
Guanine (G)	Guanosine	Guanosine 5'-monophosphate (GMP)
Cytosine (C)	Cytidine	Cytidine 5'-monophosphate (CMP)
Uracil (U)	Uridine	Uridine 5'-monophosphate (UMP)

*The nucleotides are also named as, for example, deoxyadenylate and adenylate.

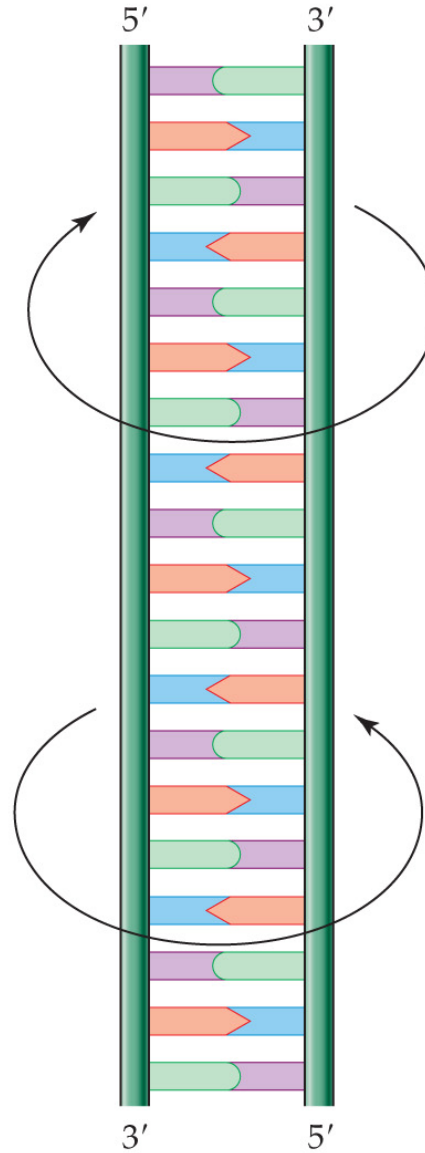
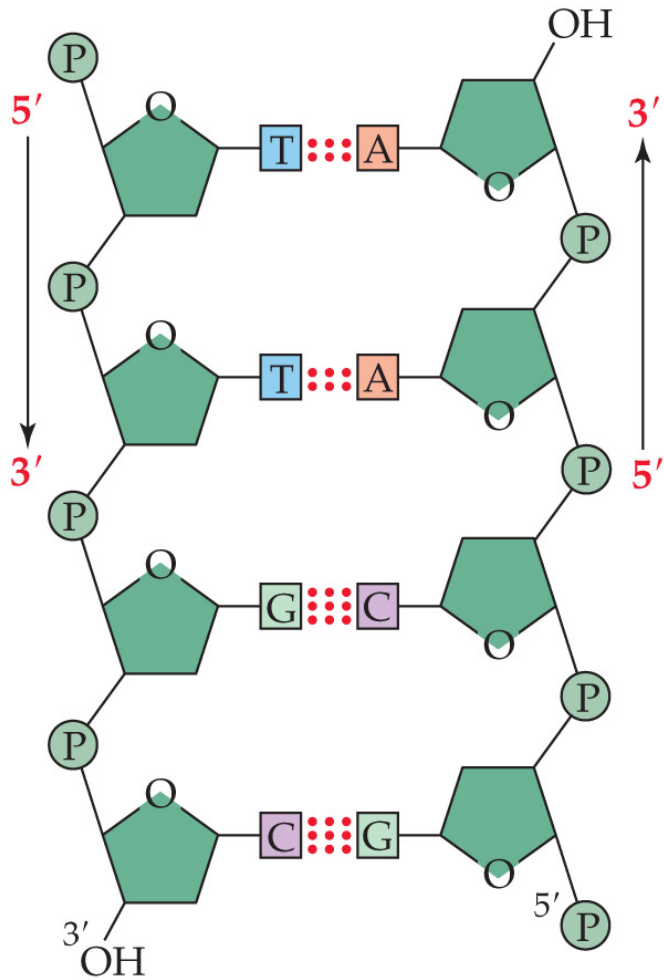
Structure of Nucleic Acid Chains

5' end



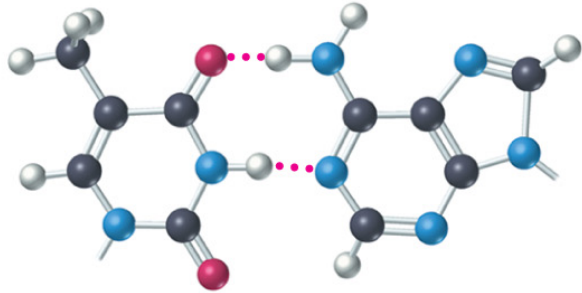
3' end

Base Pairing in DNA

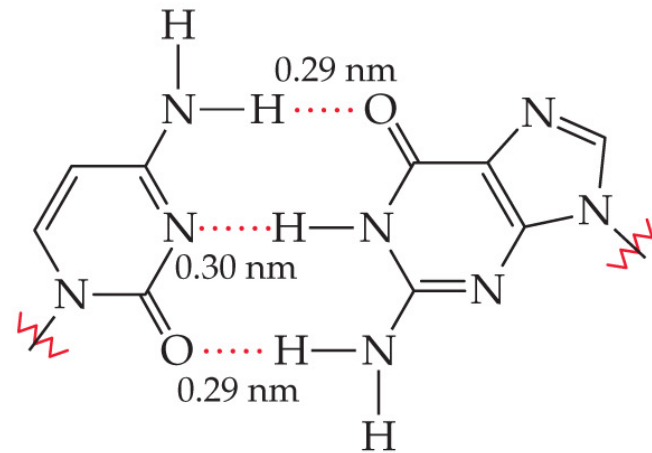
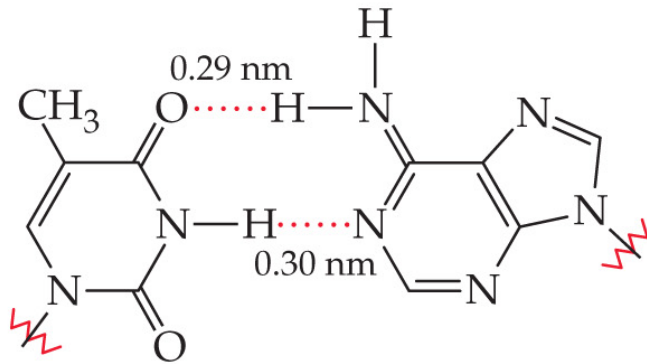
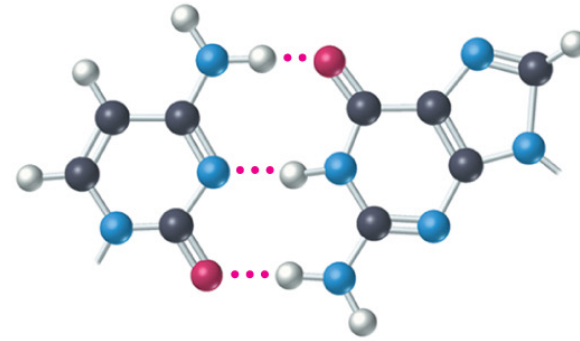


Base Pairing in DNA

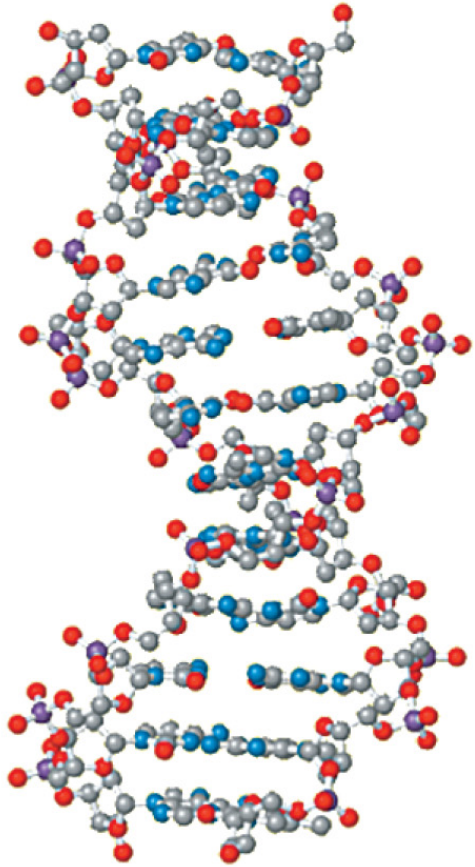
Thymine–Adenine



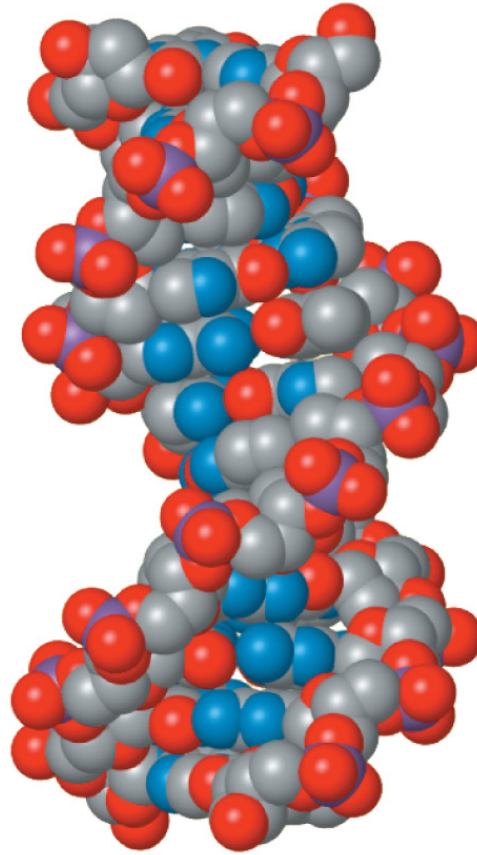
Cytosine–Guanine



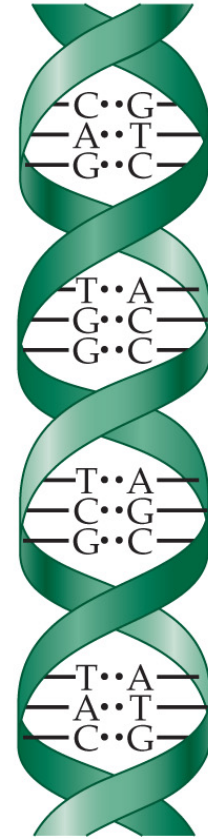
DNA Models



(a)

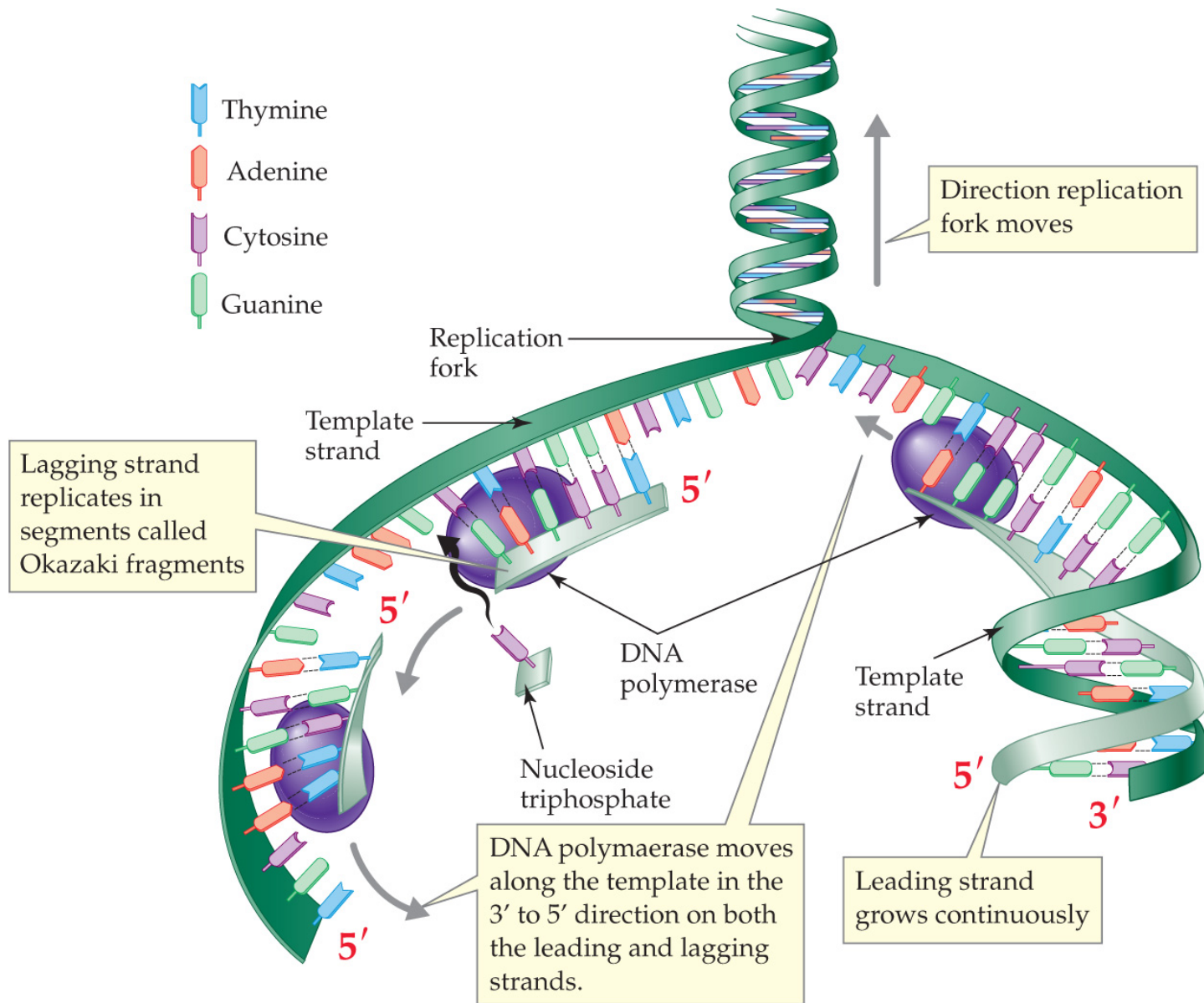


(b)

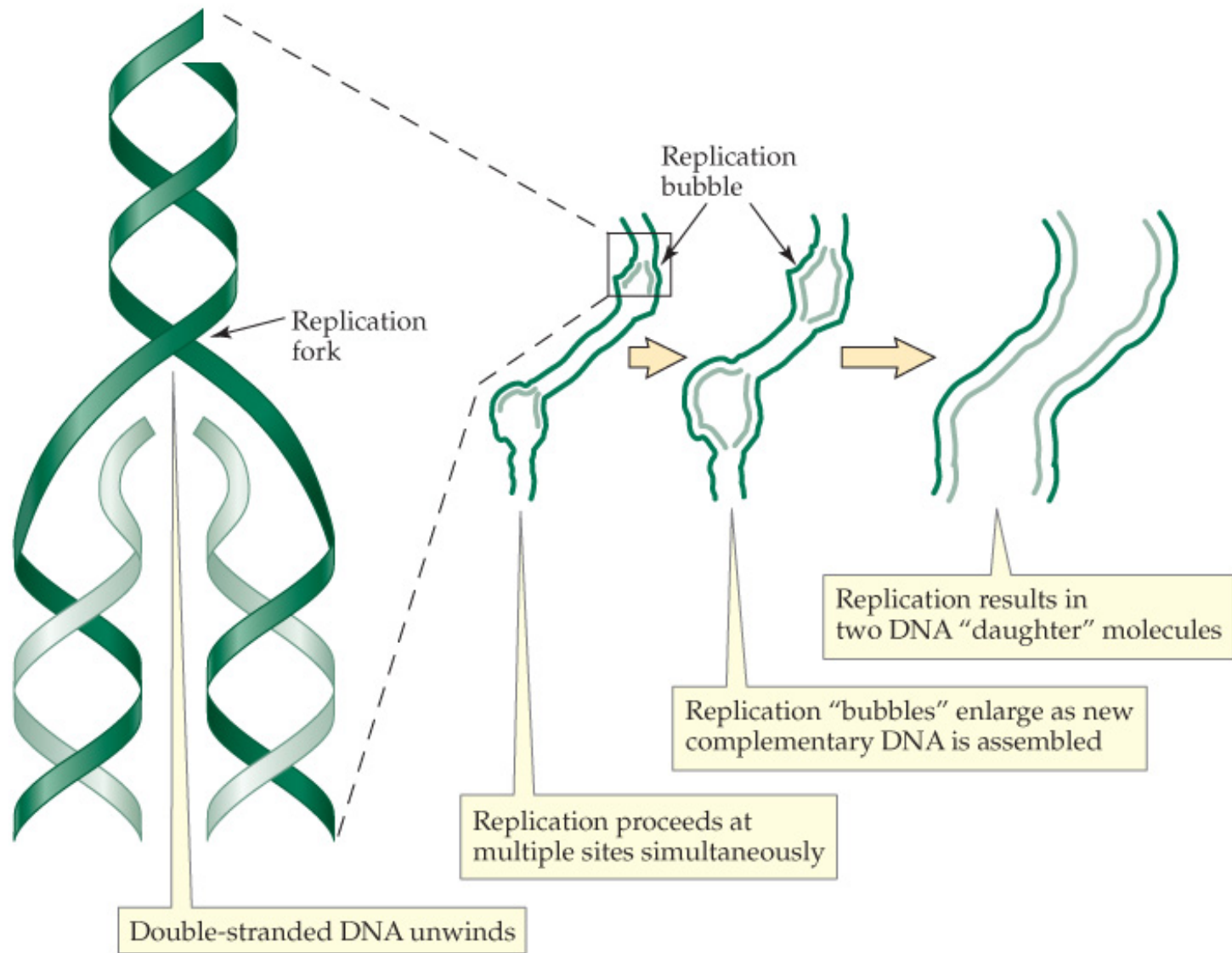


(c)

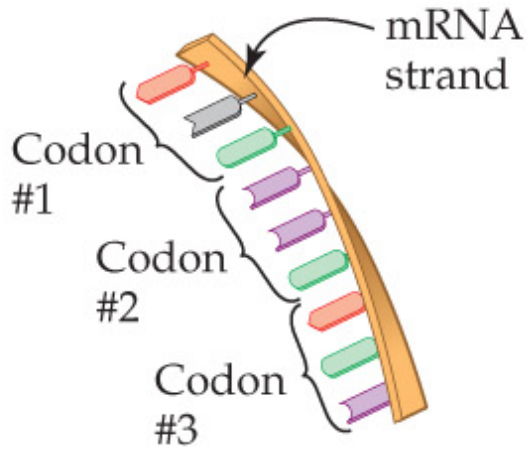
DNA Replication



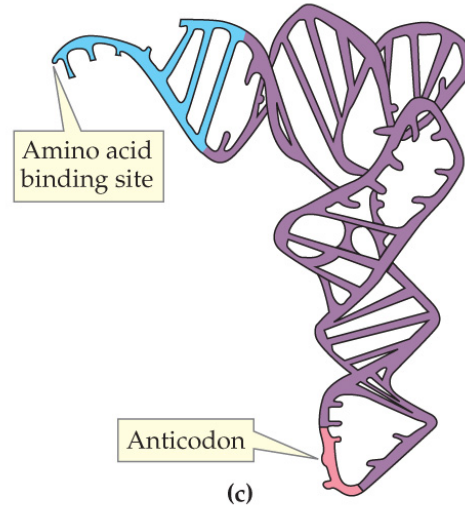
DNA Replication



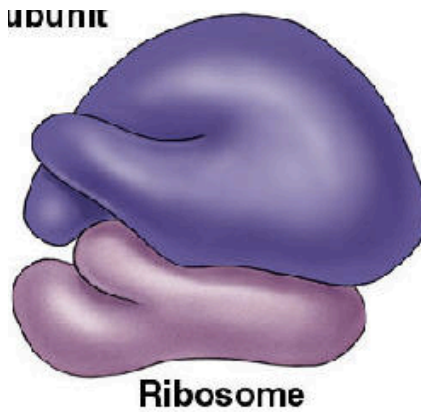
Types of RNA



mRNA

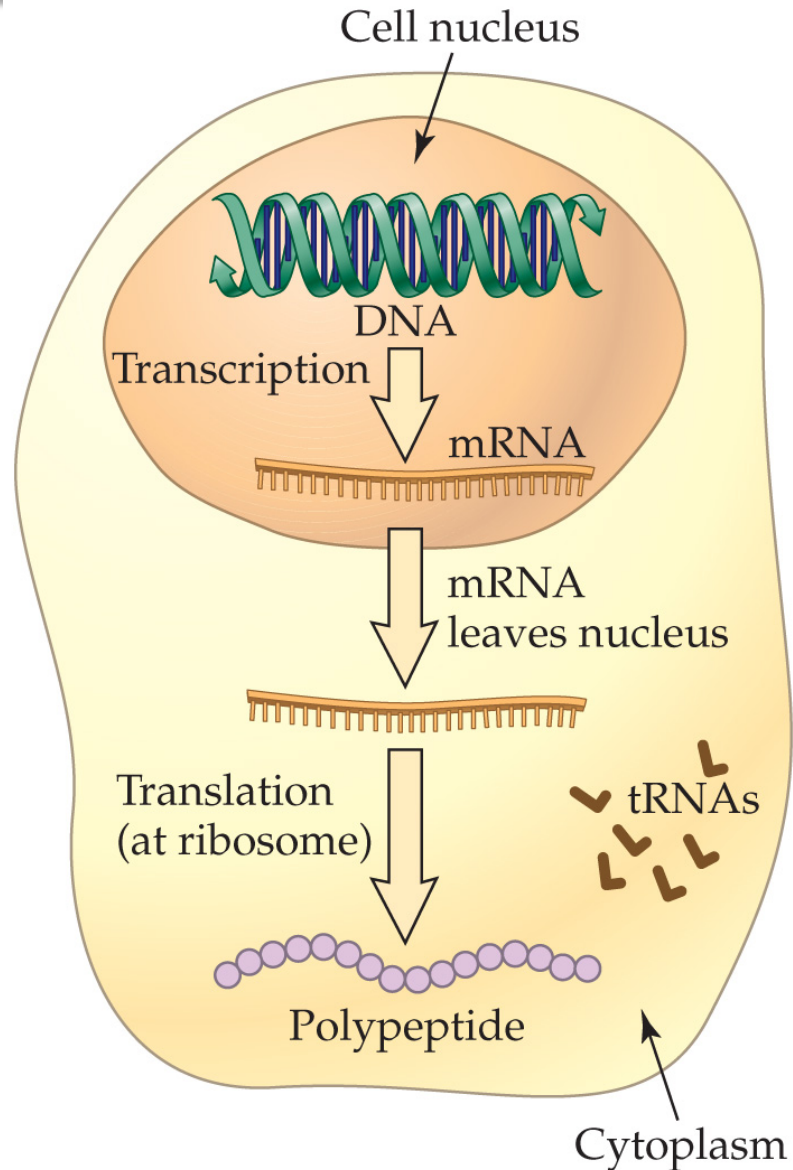


tRNA

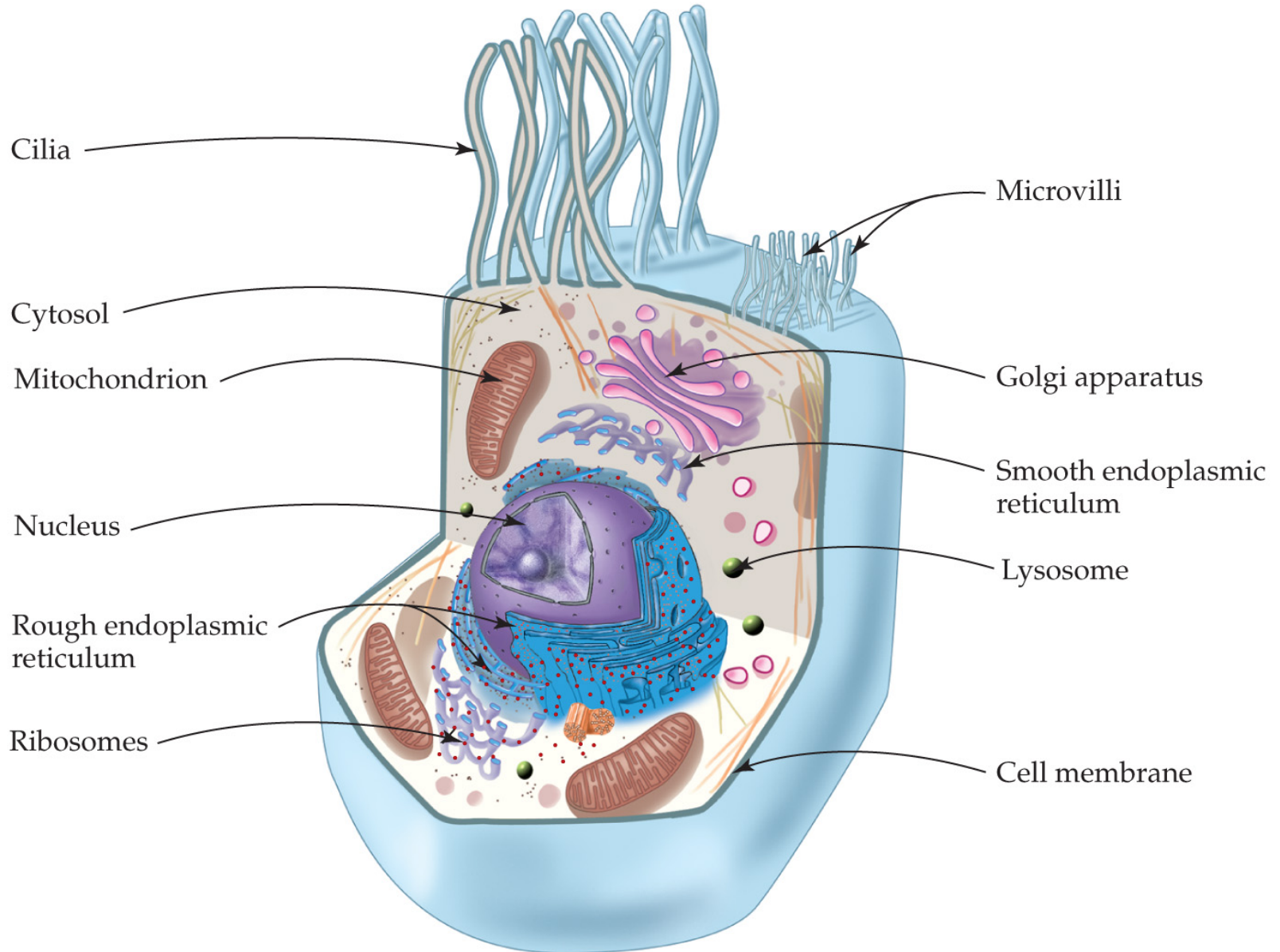


rRNA
(part of ribosome)

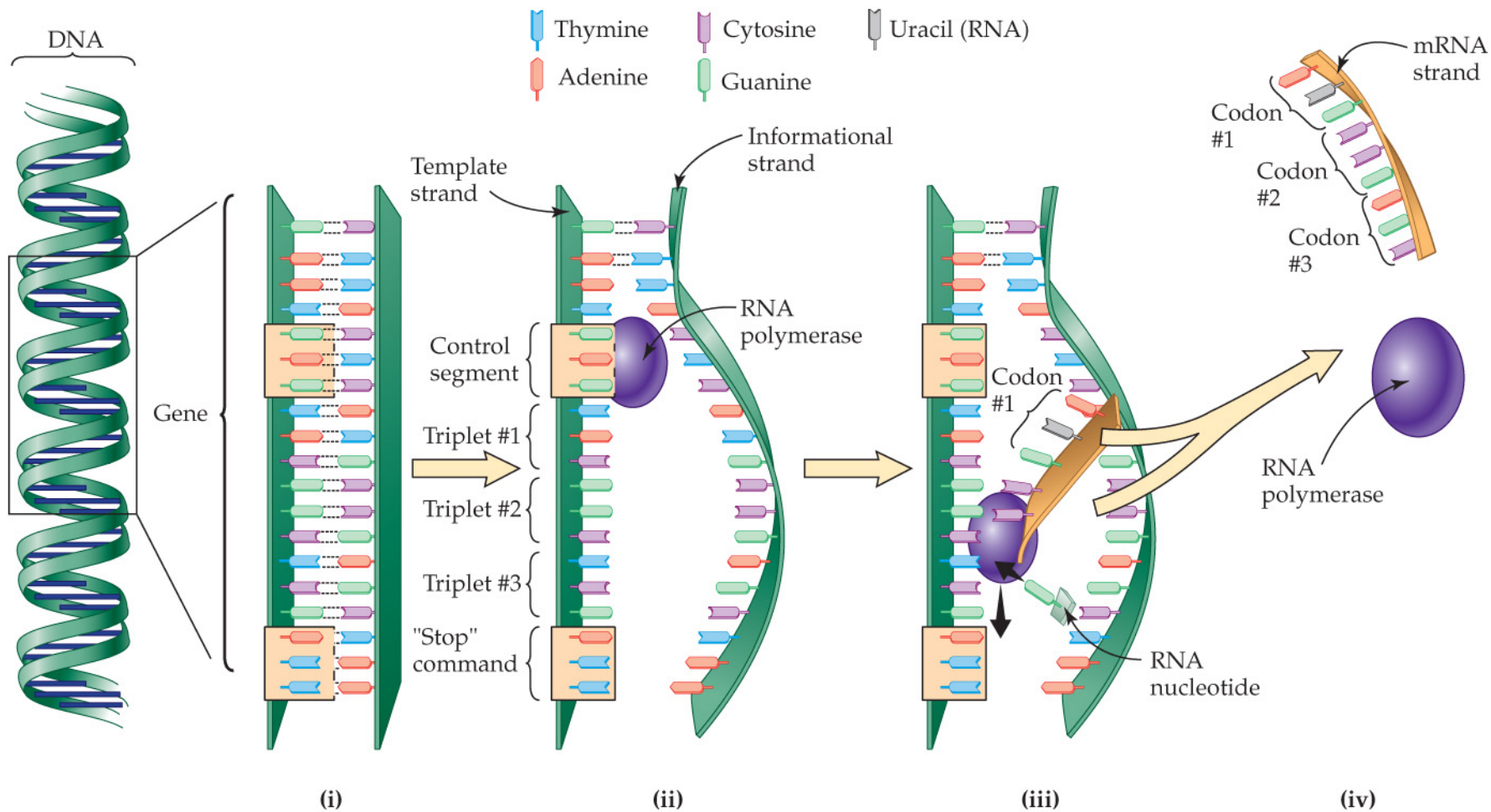
RNA: From Nucleus to Cytosol



Protein Synthesis Takes Place on Ribosomes on Rough Endoplasmic Reticulum



Transcription



Codon Assignments

TABLE 25.4 Codon Assignments of Base Triplets in mRNA

First Base (5' end)	Second Base	Third Base (3' end)			
		U	C	A	G
U	U	Phe	Phe	Leu	Leu
	C	Ser	Ser	Ser	Ser
	A	Tyr	Tyr	<i>Stop</i>	<i>Stop</i>
	G	Cys	Cys	<i>Stop</i>	Trp
C	U	Leu	Leu	Leu	Leu
	C	Pro	Pro	Pro	Pro
	A	His	His	Gln	Gln
	G	Arg	Arg	Arg	Arg
A	U	Ile	Ile	Ile	Met
	C	Thr	Thr	Thr	Thr
	A	Asn	Asn	Lys	Lys
	G	Ser	Ser	Arg	Arg
G	U	Val	Val	Val	Val
	C	Ala	Ala	Ala	Ala
	A	Asp	Asp	Glu	Glu
	G	Gly	Gly	Gly	Gly

From DNA Information to Protein

DNA informational strand:

5' ATG CCA GTA GGC CAC TTG TCA 3'

DNA template strand:

3' TAC GGT CAT CCG GTG AAC AGT 5'

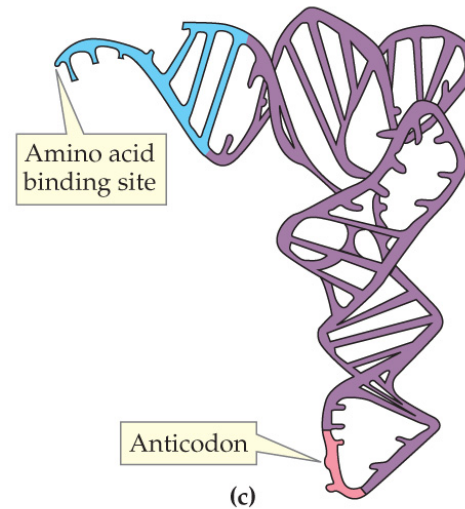
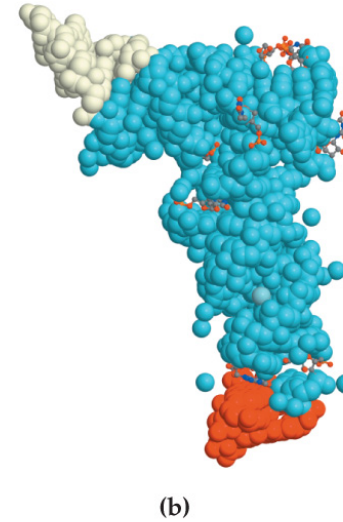
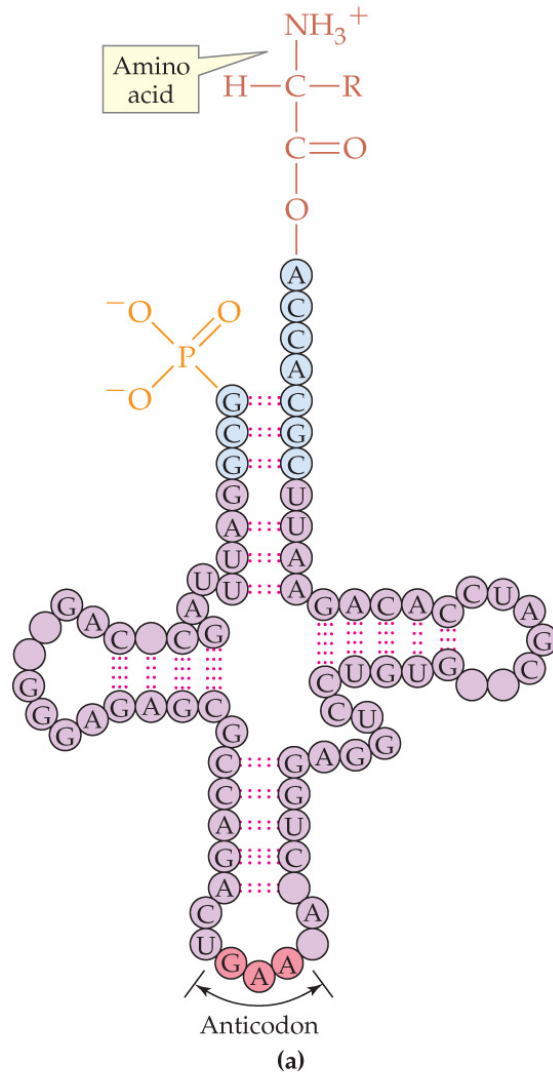
mRNA:

5' AUG CCA GUA GGC CAC UUG UCA 3'

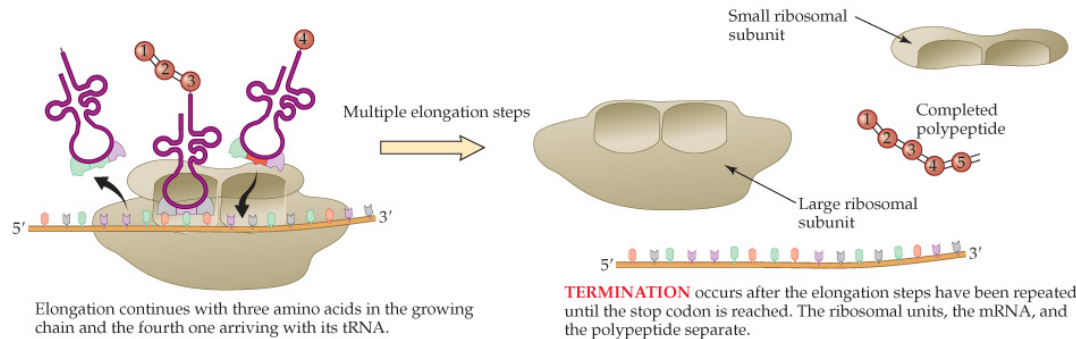
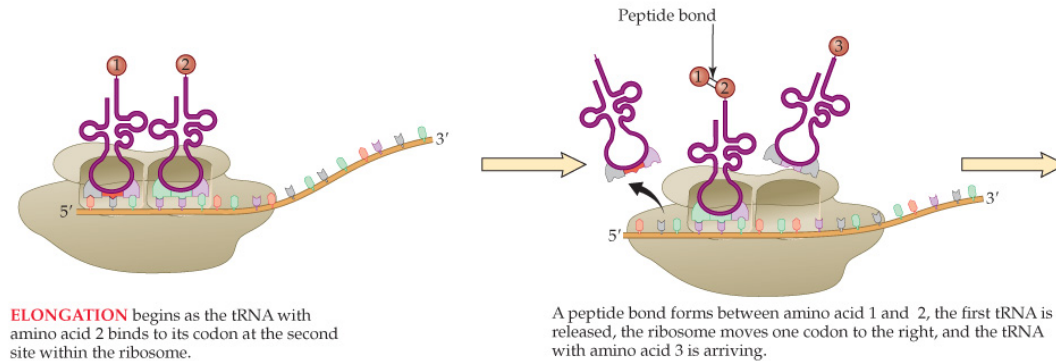
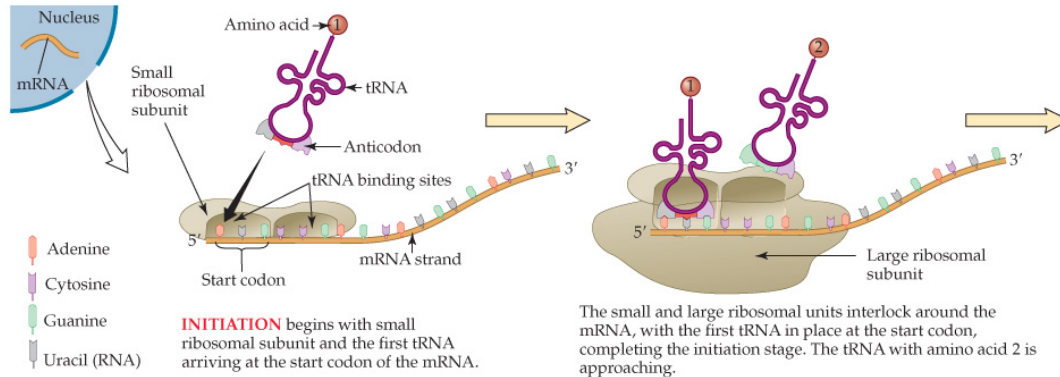
Protein:

Met Pro Val Gly His Leu Ser

Transfer RNA



Translation



- Adenine
- Cytosine
- Guanine
- Uracil (RNA)