

DNA: structure & replication

From Chapter 13

Watson and Crick



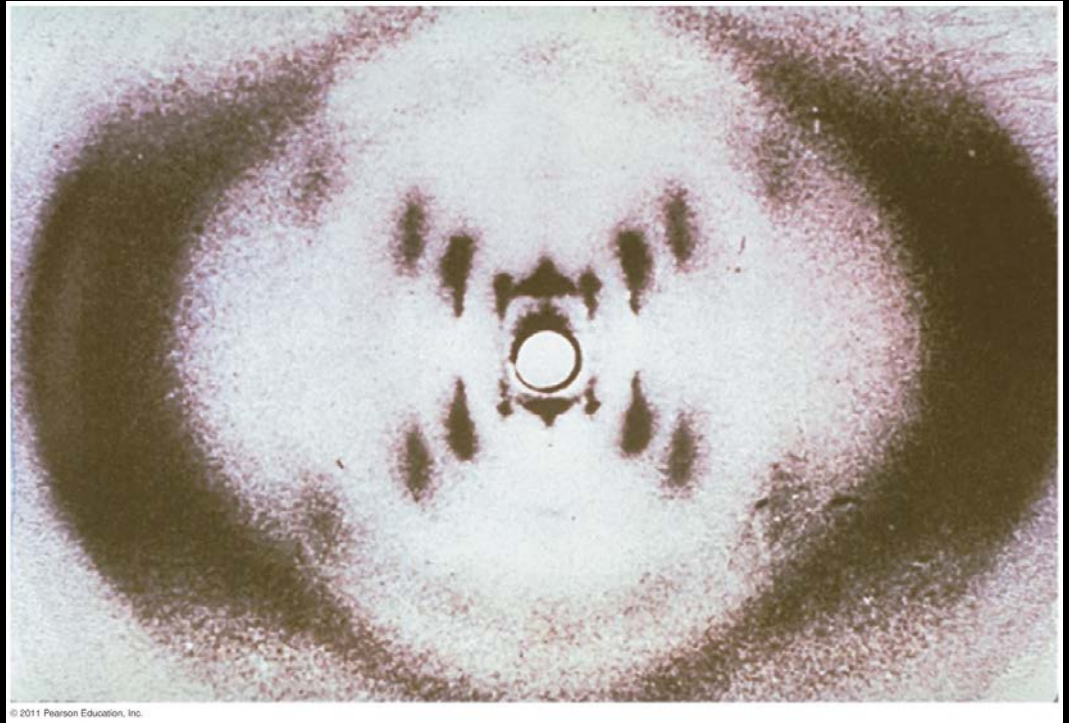
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Figure 13.1

Rosalind Franklin

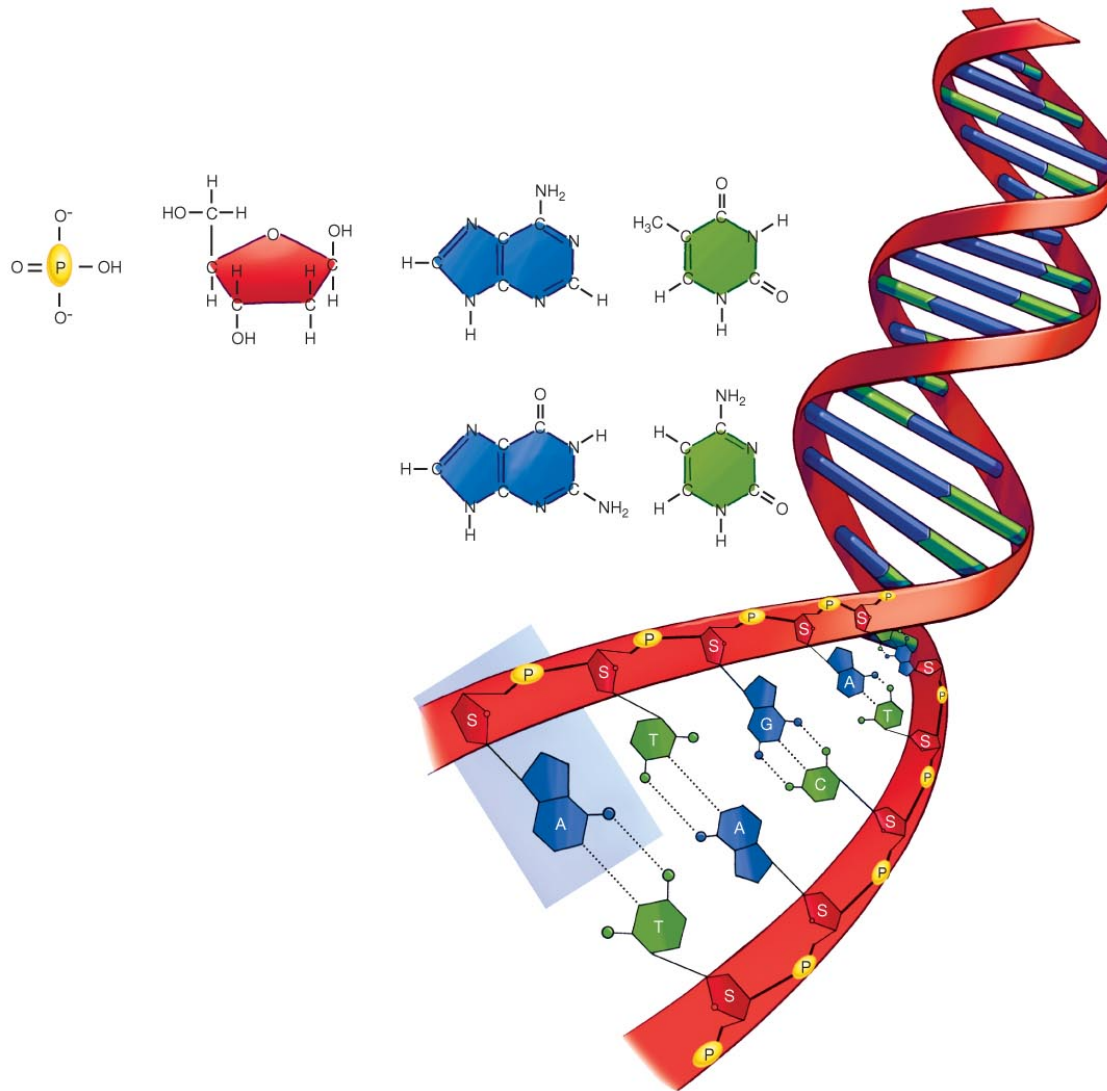


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The Structure of DNA



DNA Replication

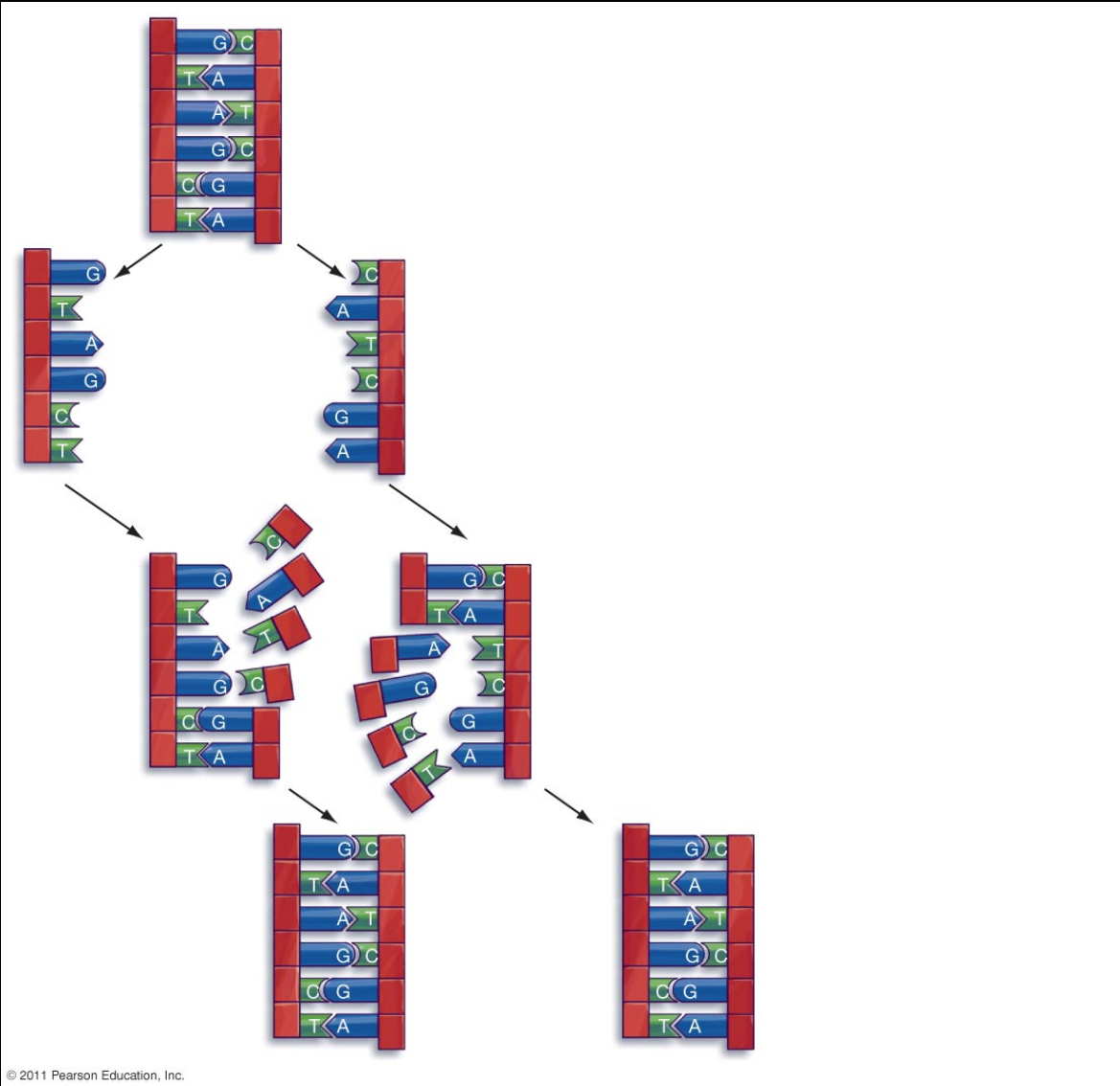


Figure 13.6

DNA Replication



Figure 13.7

Mutations

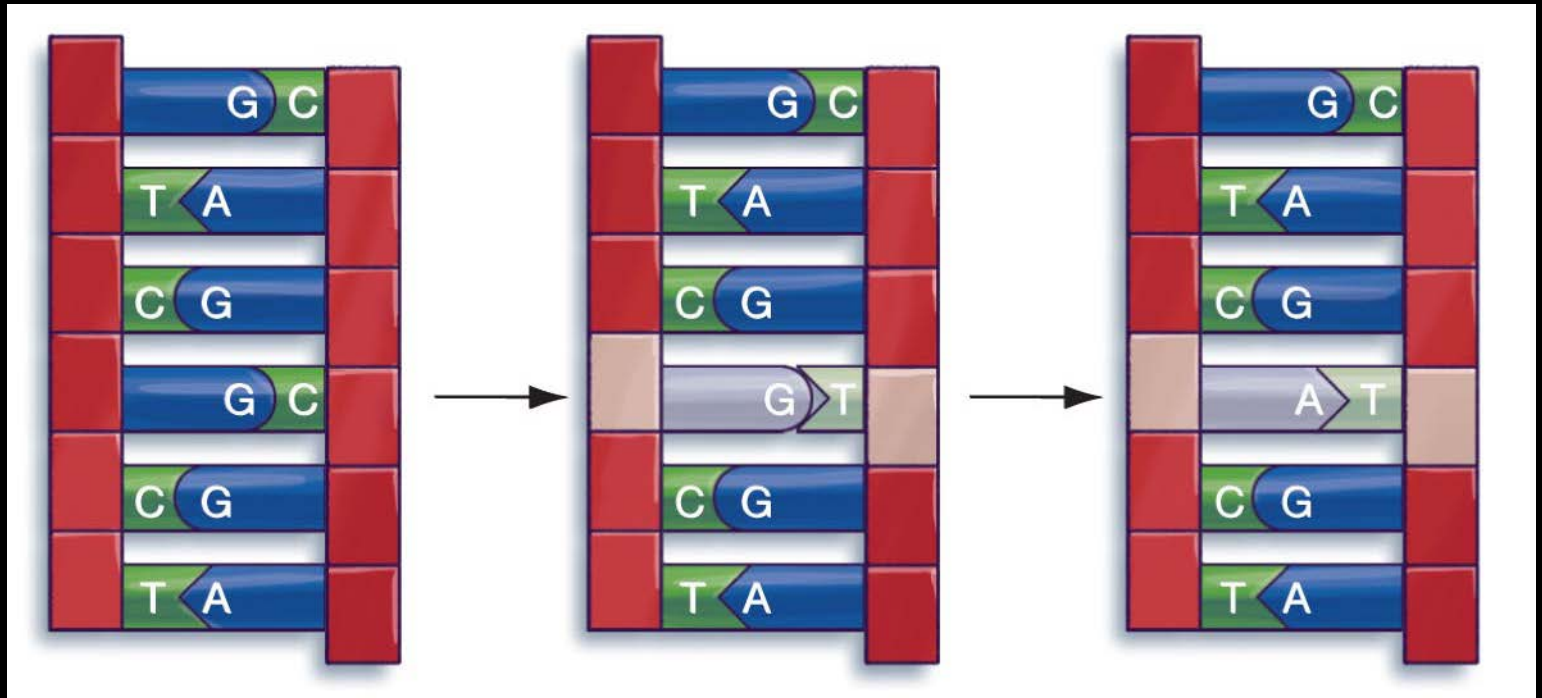


Figure 13.8

Protein Synthesis

From Chapter 14

Protein structure

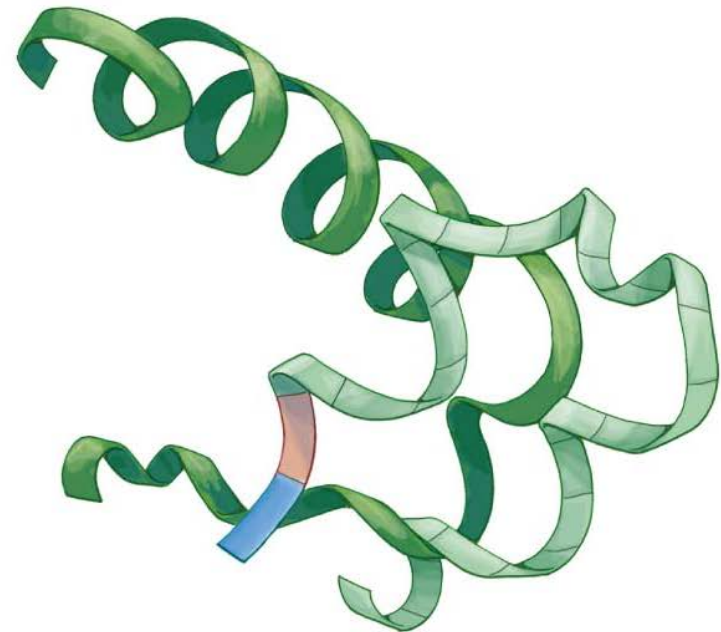
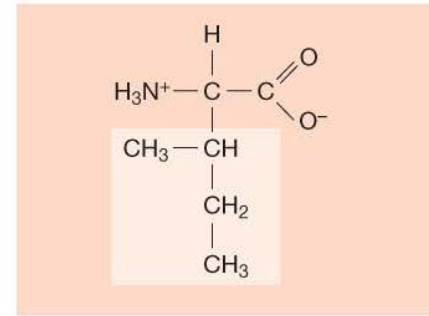
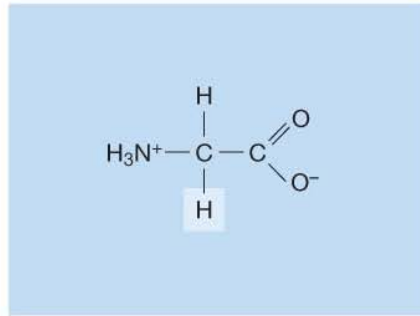


Figure 14.1

Overview of synthesis

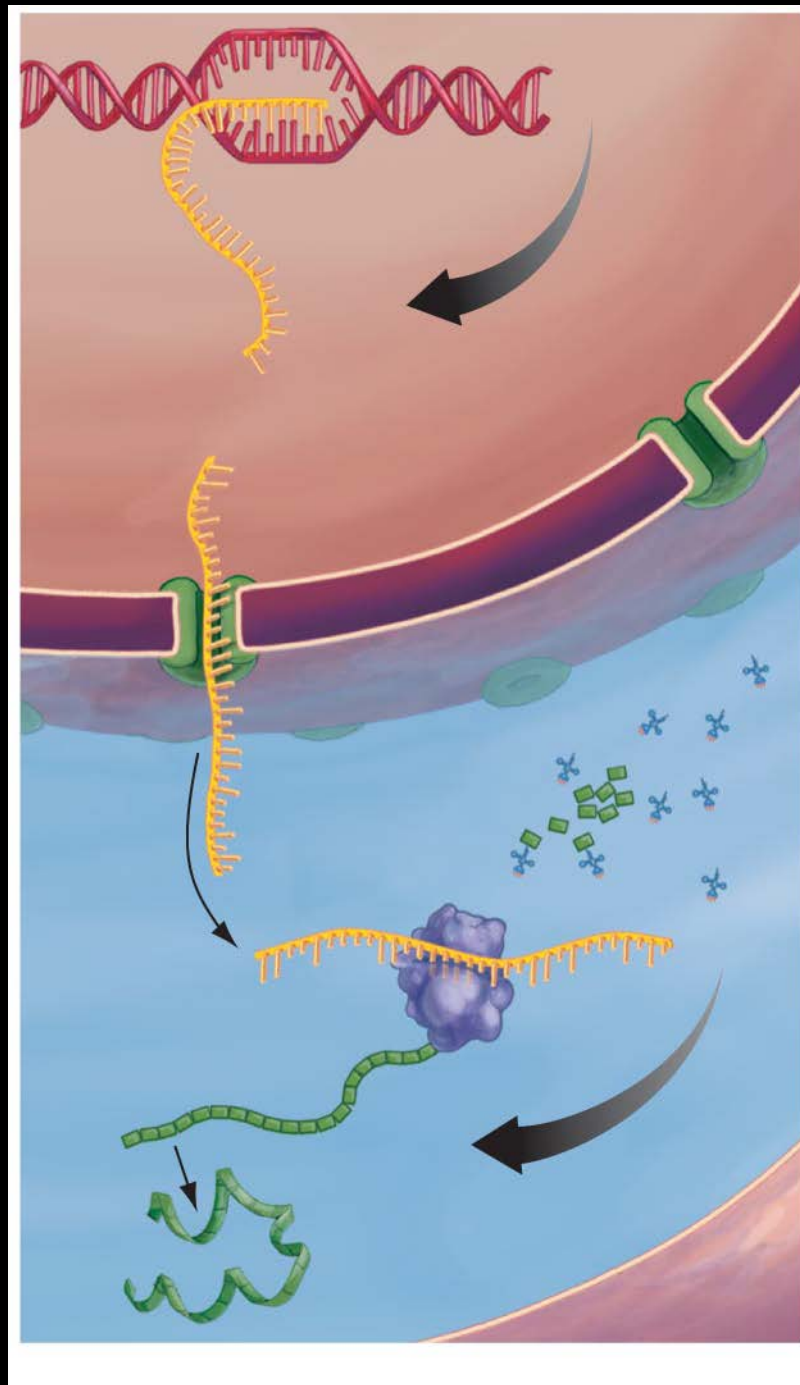


Figure 14.2

Transcription

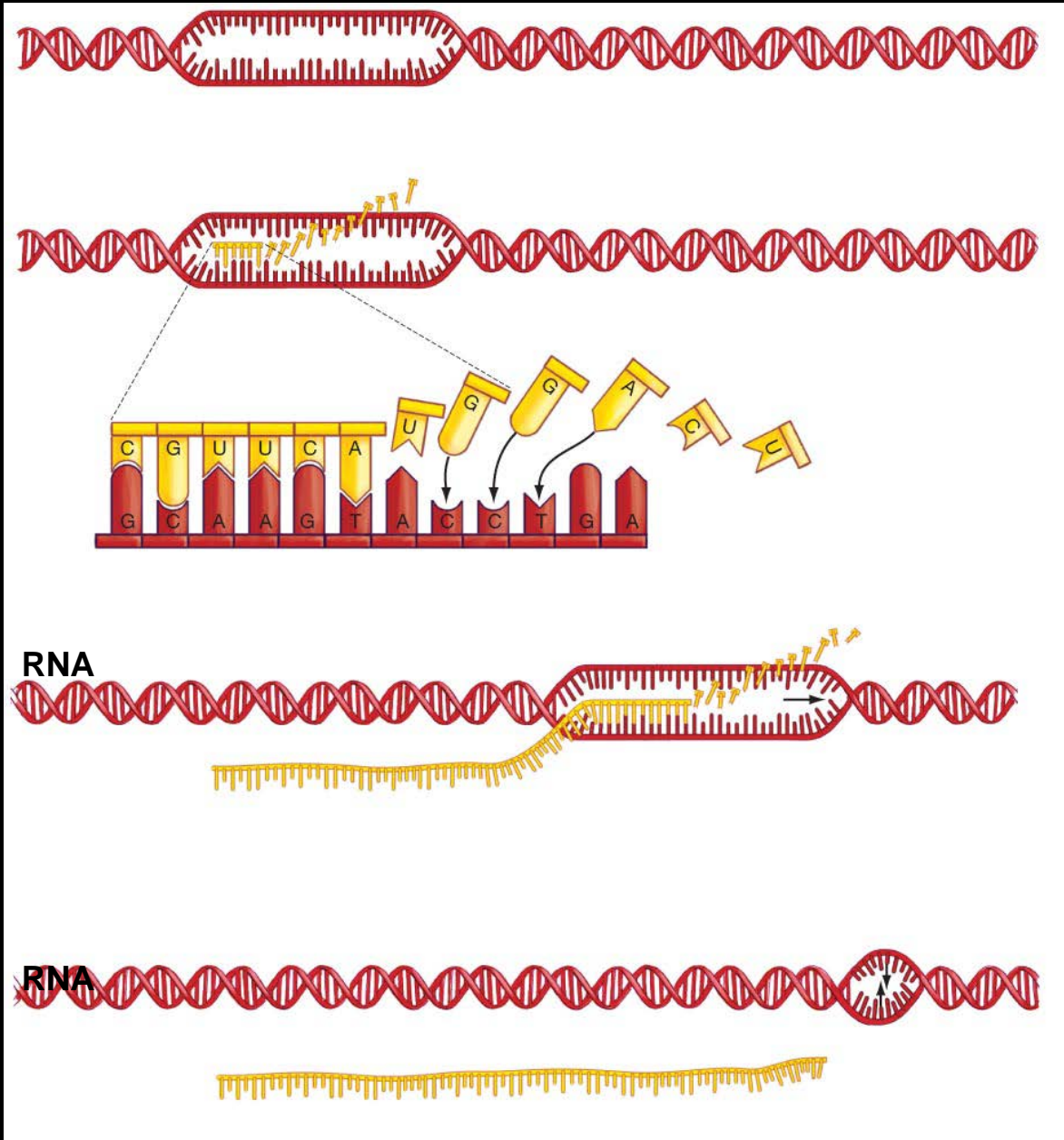
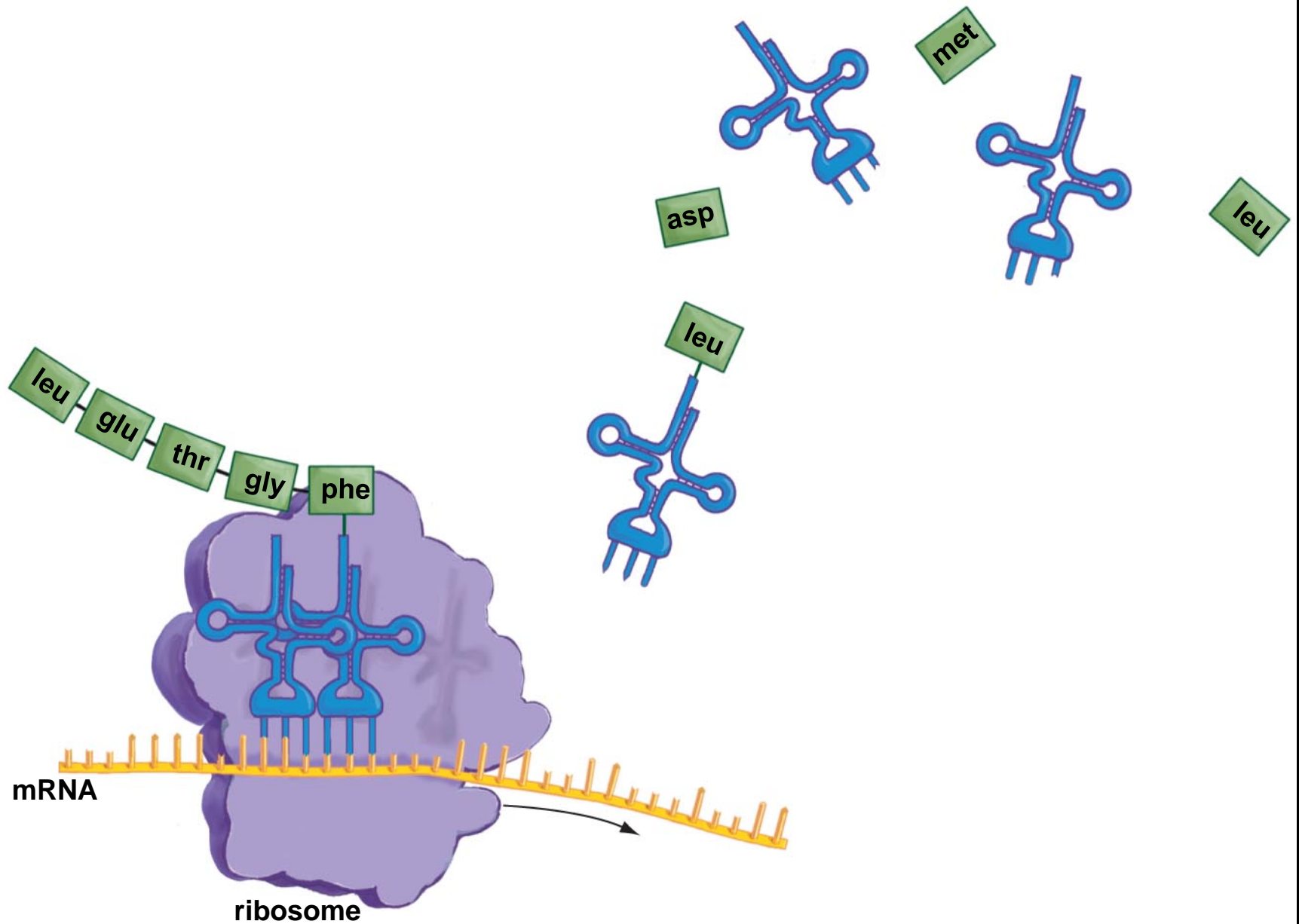


Figure 14.4

Transfer RNA



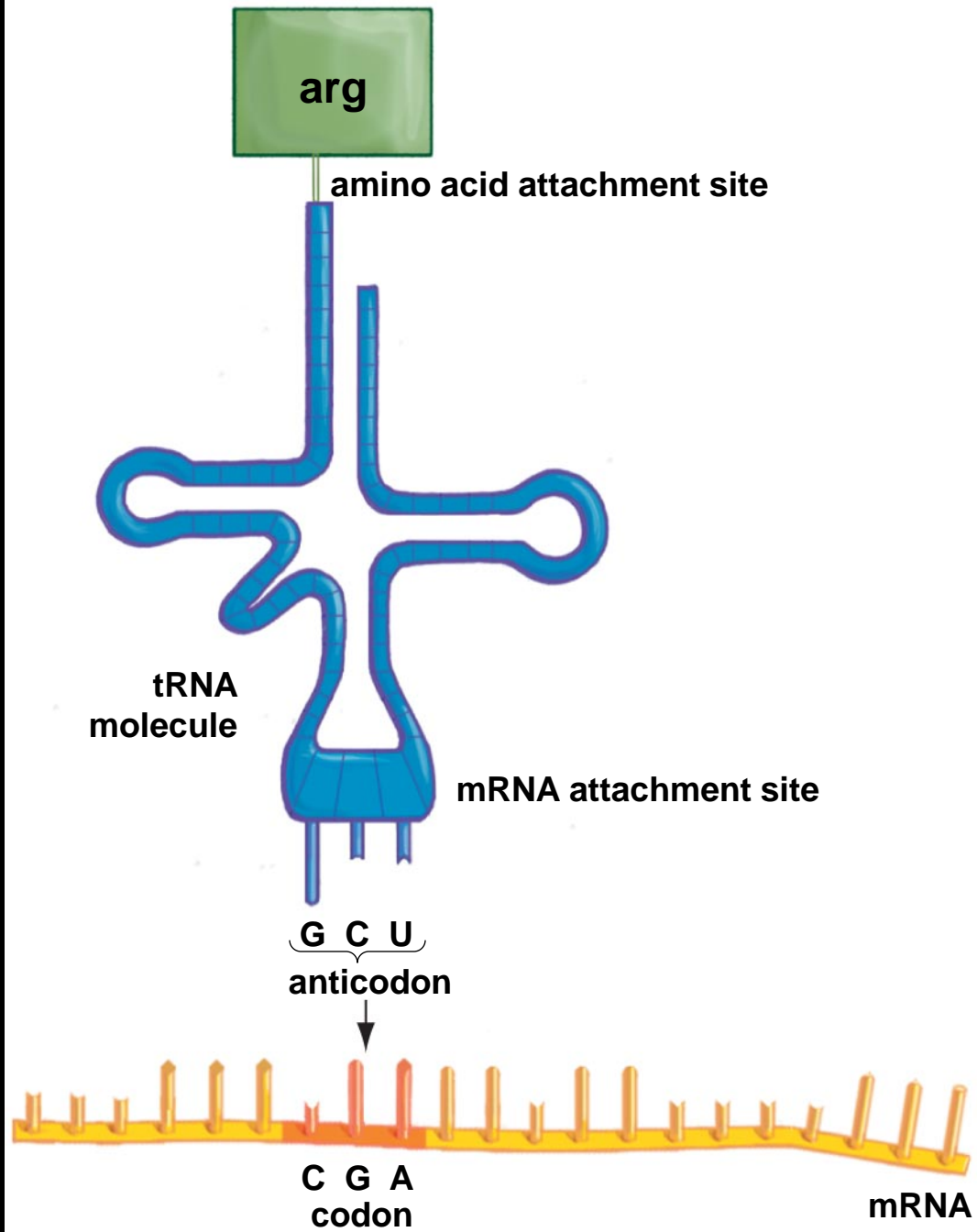


Figure 14.7

Translation

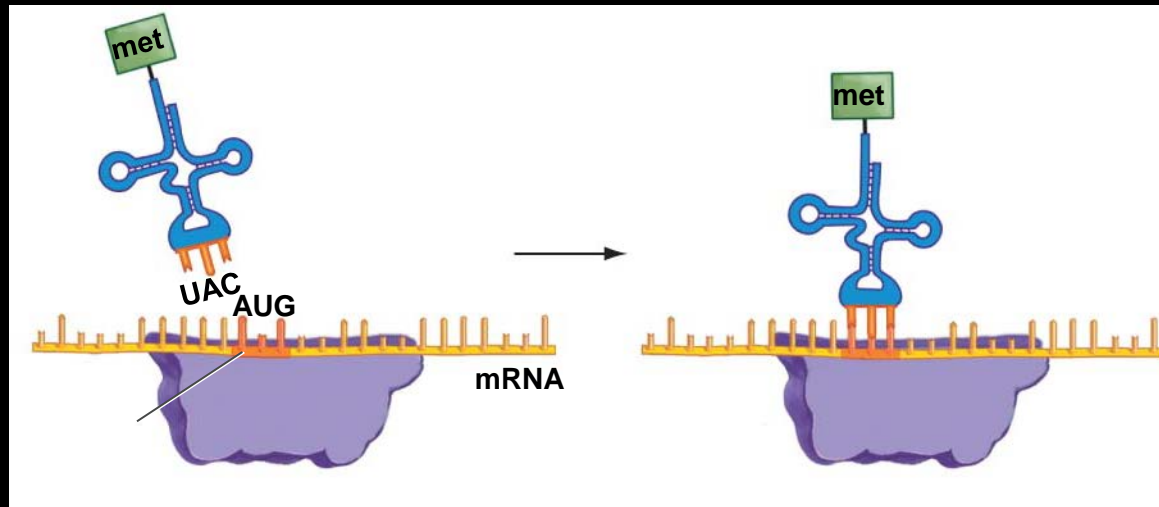


Figure 14.9

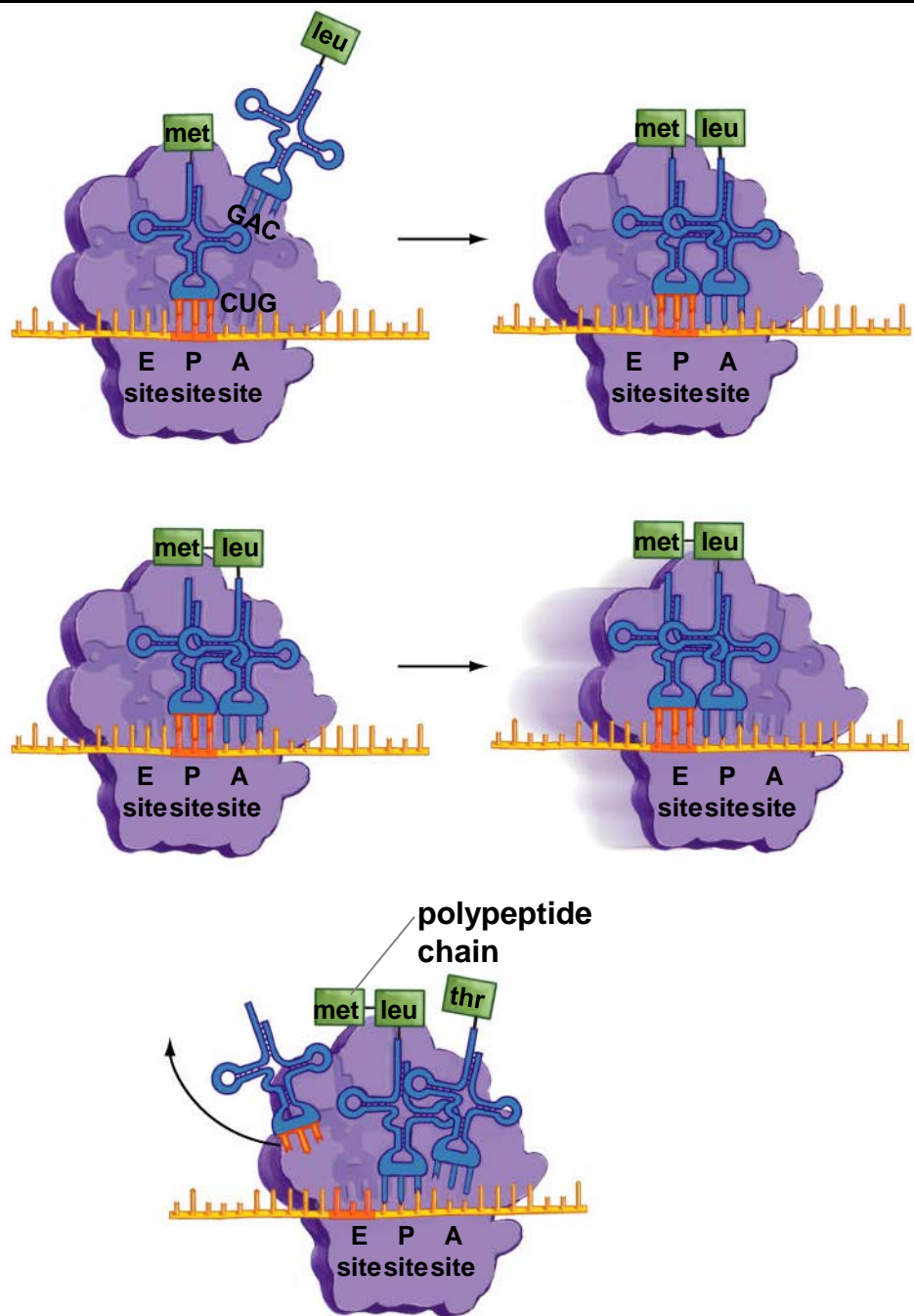
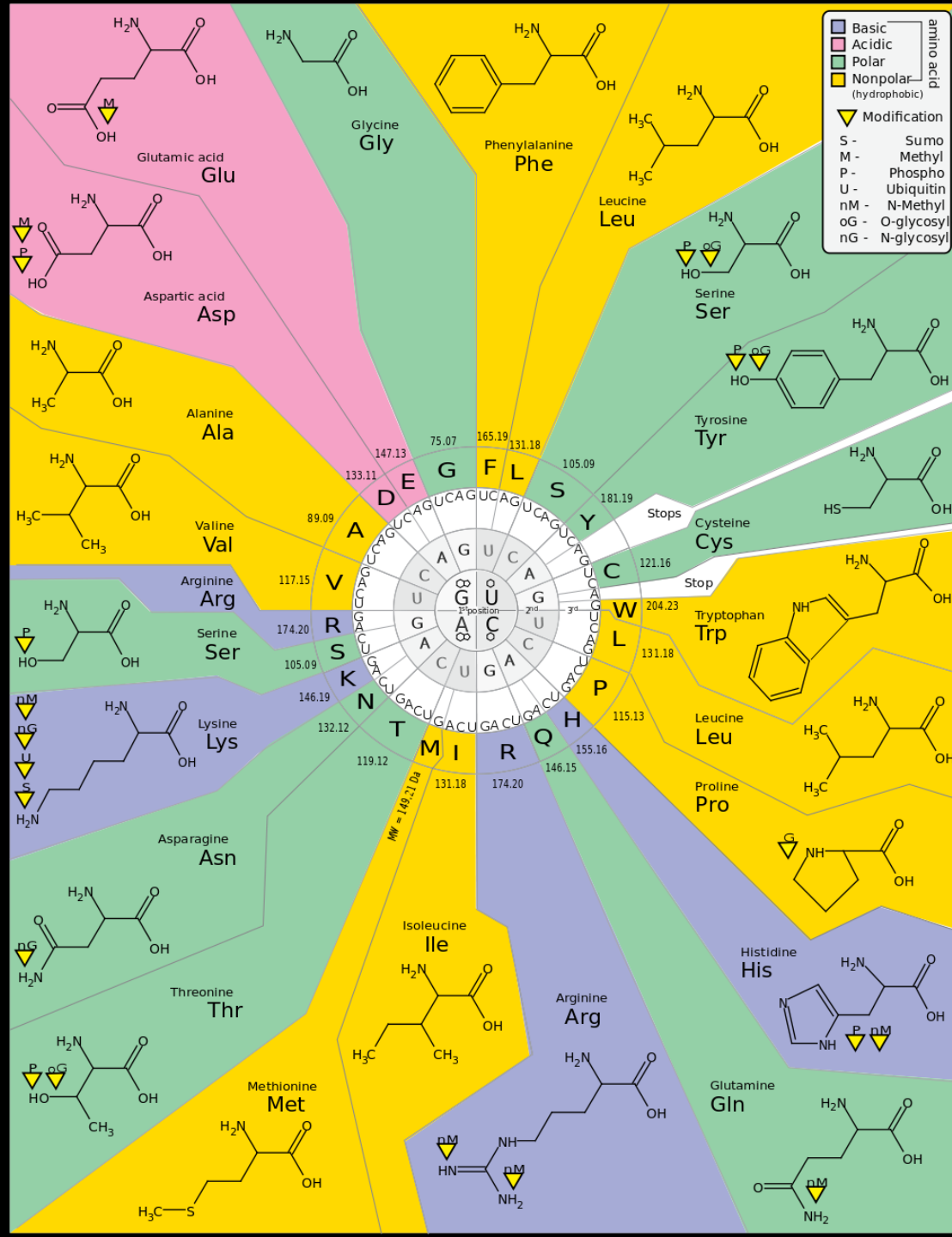


Figure 14.10



Genetic Code/Amino Acid Codons

First Base	Second Base				Third Base
	U	C	A	G	
U	phenylalanine	serine	tyrosine	cysteine	U
	phenylalanine	serine	tyrosine	cysteine	C
	leucine	serine	STOP	STOP	A
	leucine	serine	STOP	tryptophan	G
C	leucine	proline	histidine	arginine	U
	leucine	proline	histidine	arginine	C
	leucine	proline	glutamine	arginine	A
	leucine	proline	glutamine	arginine	G
A	isoleucine	threonine	asparagine	serine	U
	isoleucine	threonine	asparagine	serine	C
	isoleucine	threonine	lysine	arginine	A
	(start) methionine	threonine	lysine	arginine	G
G	valine	alanine	aspartate	glycine	U
	valine	alanine	aspartate	glycine	C
	valine	alanine	glutamate	glycine	A
	valine	alanine	glutamate	glycine	G

ΔF508 deletion in cystic fibrosis

Selection of notable mutations, ordered in a standard table of the genetic code of amino acids.

Clinically important missense mutations generally change the properties of the coded amino acid residue between being basic, acidic, polar or nonpolar, while nonsense mutations result in a stop codon.

Amino acids

- Basic
- Acidic
- Polar
- Nonpolar (hydrophobic)

UUU (Phe/F) Phenylalanine	UCU (Ser/S) Serine	UAU (Tyr/Y) Tyrosine	UGU (Cys/C) Cysteine
UUC (Phe/F) Phenylalanine	UCC (Ser/S) Serine	UAC (Tyr/Y) Tyrosine	UGC (Cys/C) Cysteine
UUA (Leu/L) Leucine	UCA (Ser/S) Serine	UAA Ochre (Stop)	UGA Opal (Stop)
UUG (Leu/L) Leucine	UCG (Ser/S) Serine	UAG Amber (Stop)	UGG (Trp/W) Tryptophan
CUU (Leu/L) Leucine	CCU (Pro/P) Proline	CAU (His/H) Histidine	CGU (Arg/R) Arginine
CUC (Leu/L) Leucine	CCC (Pro/P) Proline	CAC (His/H) Histidine	CGC (Arg/R) Arginine
CUA (Leu/L) Leucine	CCA (Pro/P) Proline	CAA (Gln/Q) Glutamine	CGA (Arg/R) Arginine
CUG (Leu/L) Leucine	CCG (Pro/P) Proline	CAG (Gln/Q) Glutamine	CGG (Arg/R) Arginine
AUU (Ile/I) Isoleucine	ACU (Thr/T) Threonine	AAU (Asn/N) Asparagine	AGU (Ser/S) Serine
AUC (Ile/I) Isoleucine	ACC (Thr/T) Threonine	AAC (Asn/N) Asparagine	AGC (Ser/S) Serine
AUA (Ile/I) Isoleucine	ACA (Thr/T) Threonine	AAA (Lys/K) Lysine	AGA (Arg/R) Arginine
AUG (Met/M) Methionine	ACG (Thr/T) Threonine	AAG (Lys/K) Lysine	AGG (Arg/R) Arginine
GUU (Val/V) Valine	GCU (Ala/A) Alanine	GAU (Asp/D) Aspartic acid	GGU (Gly/G) Glycine
GUC (Val/V) Valine	GCC (Ala/A) Alanine	GAC (Asp/D) Aspartic acid	GGC (Gly/G) Glycine
GUA (Val/V) Valine	GCA (Ala/A) Alanine	GAA (Glu/E) Glutamic acid	GGA (Gly/G) Glycine
GUG (Val/V) Valine	GCG (Ala/A) Alanine	GAG (Glu/E) Glutamic acid	GGG (Gly/G) Glycine

Fragile X Syndrome

Polyglutamine (PolyQ) Diseases

- Huntington's disease
- Spinocerebellar ataxia (SCA) (most types)
- Spinobulbar muscular atrophy (Kennedy disease)
- Dentatorubral-pallidolulysian atrophy

Mutation type

- = Trinucleotide repeat
- = Deletion
- = Missense
- = Nonsense

- Myotonic dystrophy
- SCA 8

β-Thalassemia

McArdle's disease

β-Thalassemia

Prostate cancer

Colorectal cancer

Sickle-cell disease

Friedreich's ataxia

Top six causes of all cancers in men and women

Risk factors of the 158,700 cancers diagnosed in men and 155,600 cancers diagnosed in women each year



Ranking

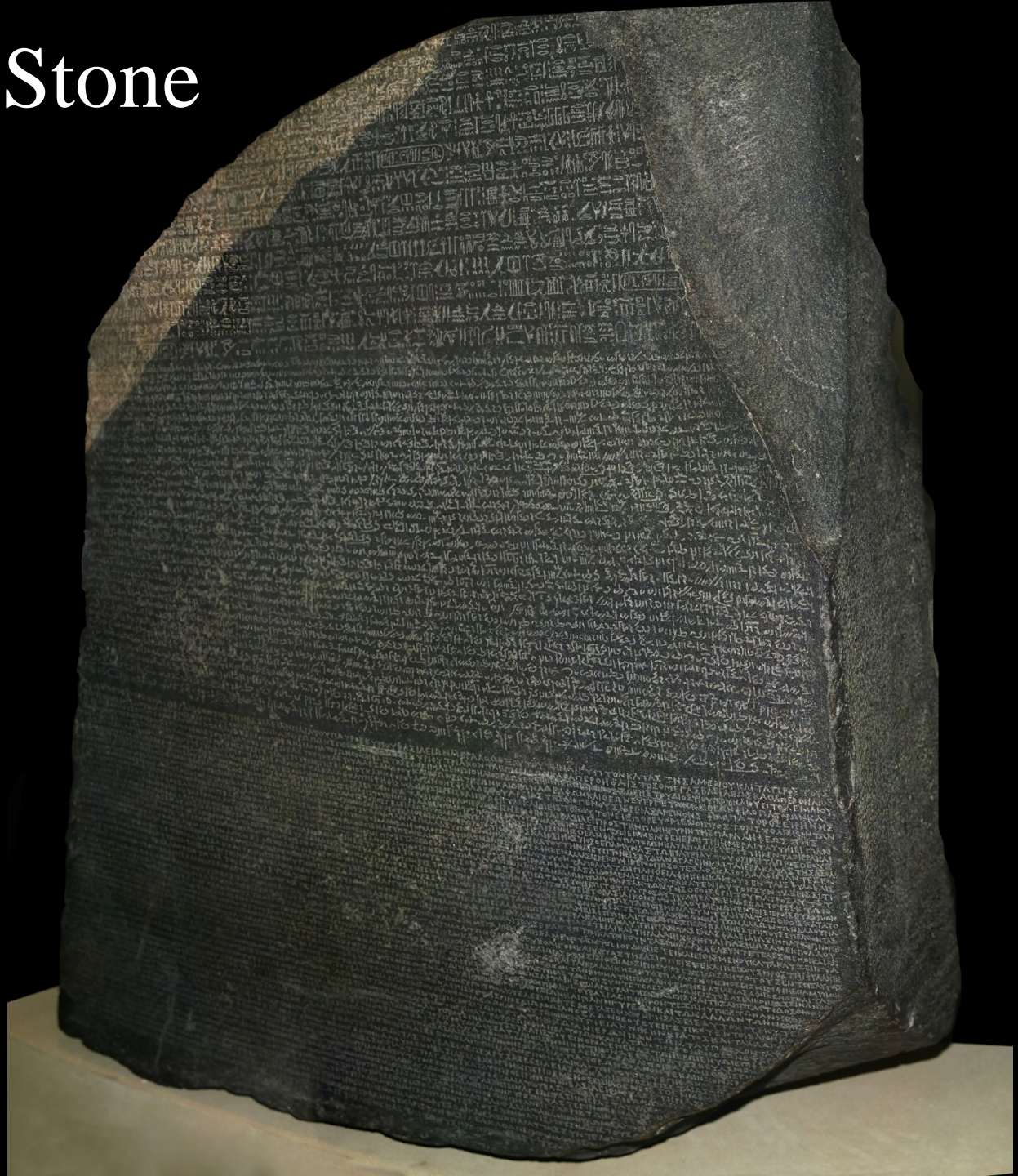
Risk factor %

Risk factor %

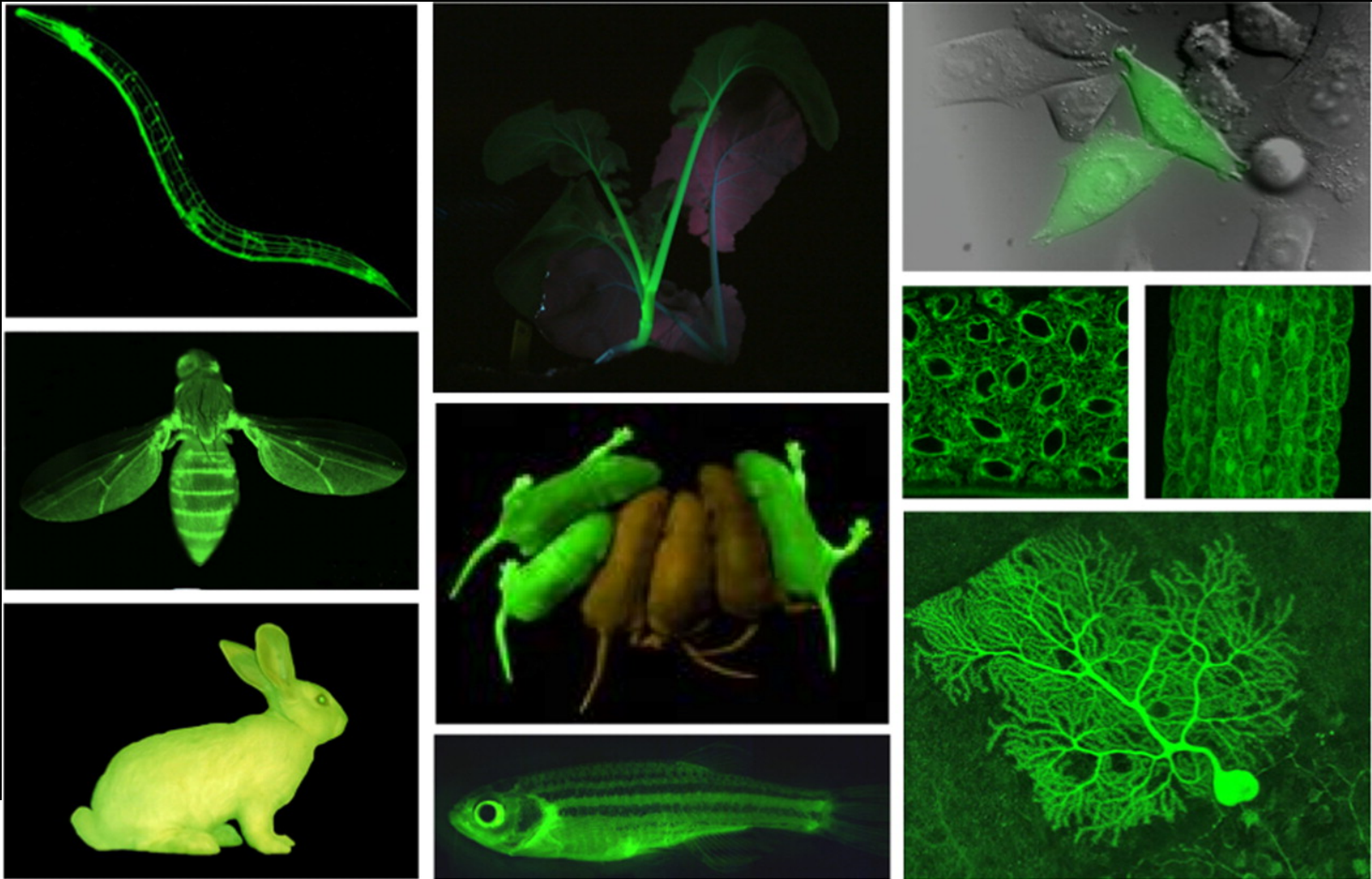
1	Tobacco	23	Tobacco	15.6
2	Lack of fruit & vegetables	6.1	Overweight	6.9
3	Occupational hazard	4.9	Infection	3.7
4	Alcohol	4.6	Exposure to sun & sunbeds	3.6
5	Overweight	4.1	Lack of fruit & vegetables	3.4
6	Exposure to sun & sunbeds	3.5	Alcohol	3.3

Source: Cancer Research UK

Rosetta Stone



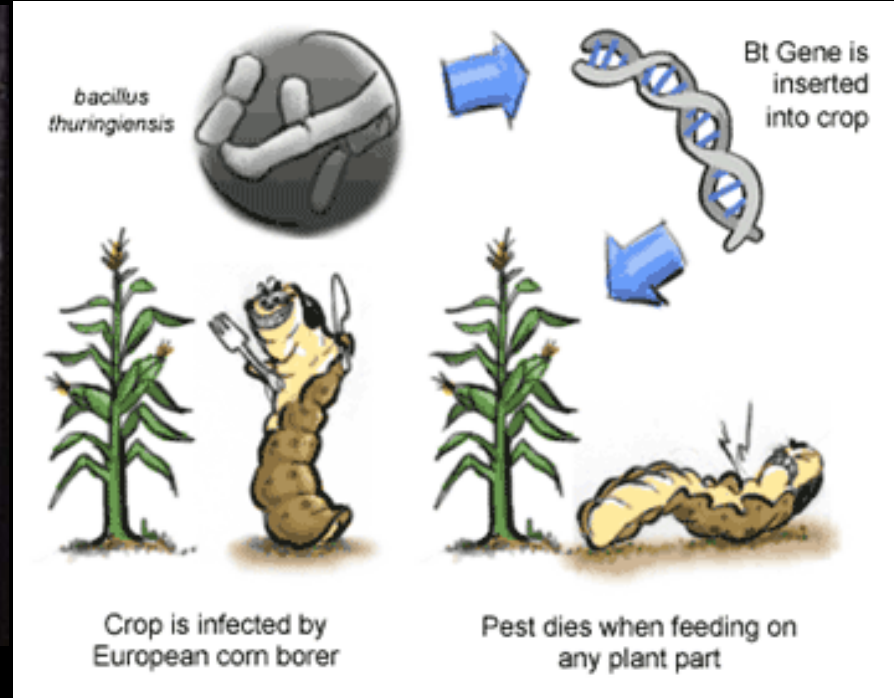
A gallery of GFP images. {By columns left to right: *C. elegans*, *Drosophila*, Alba the GFP bunny, canola, mice, zebrafish, cultured HeLa cells, *Drosophila* embryonic cells, *Arabidopsis thaliana* hypocotyl cells, and mouse Purkinje cell}





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