What's in a cell?

ChE 170, F10

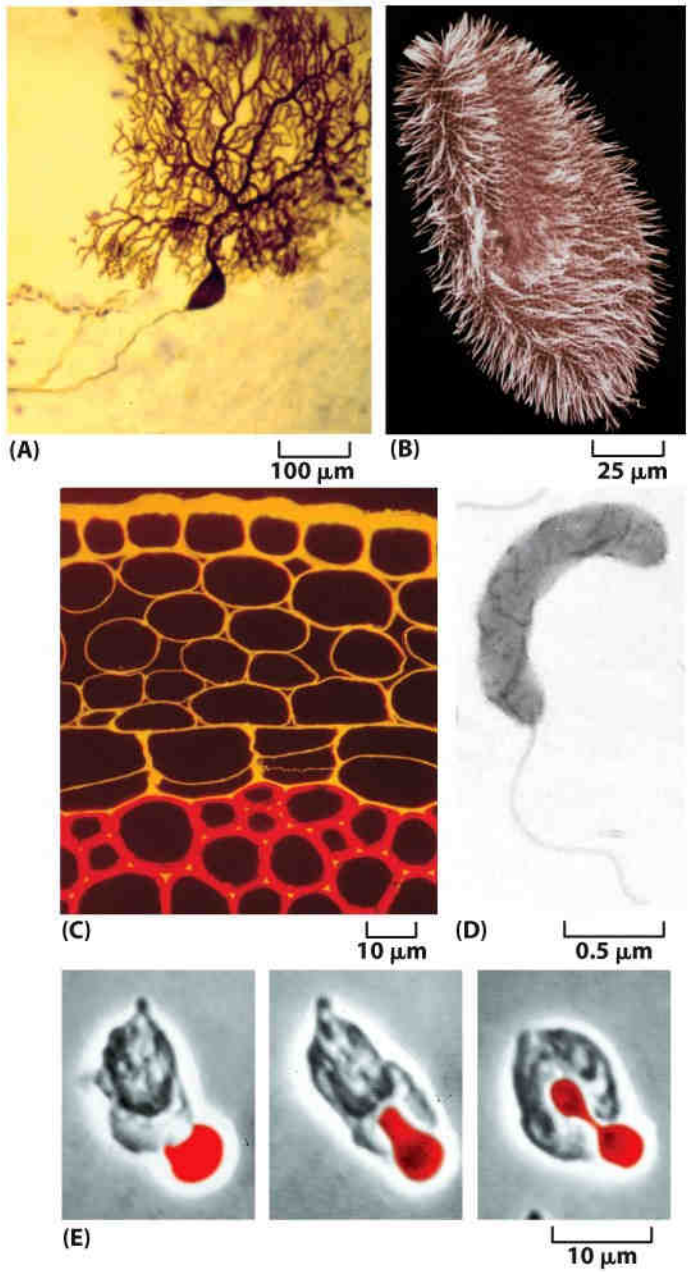


Figure 1-1 *Essential Cell Biology* (© Garland Science 2010)

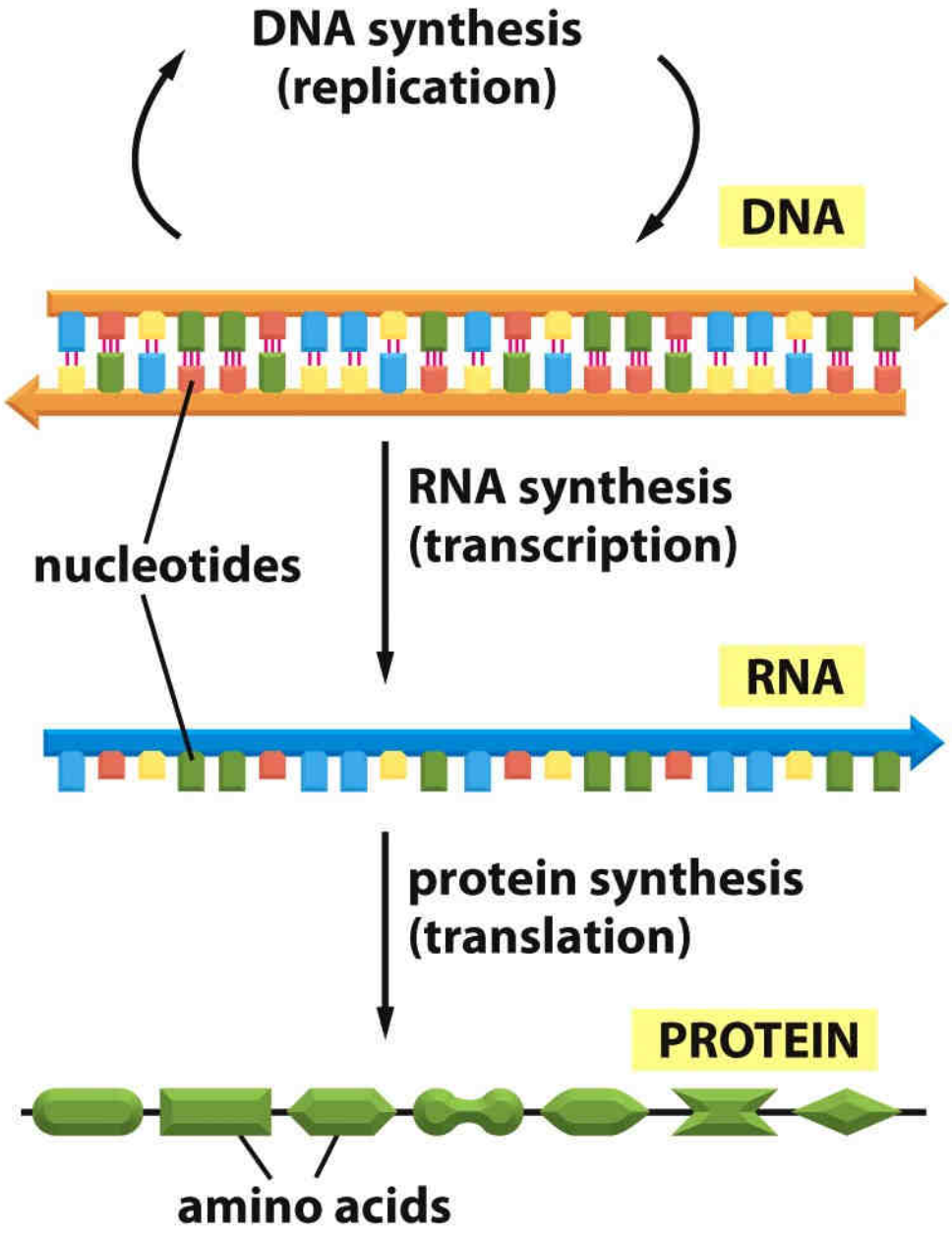


Figure 1-2 *Essential Cell Biology* (© Garland Science 2010)

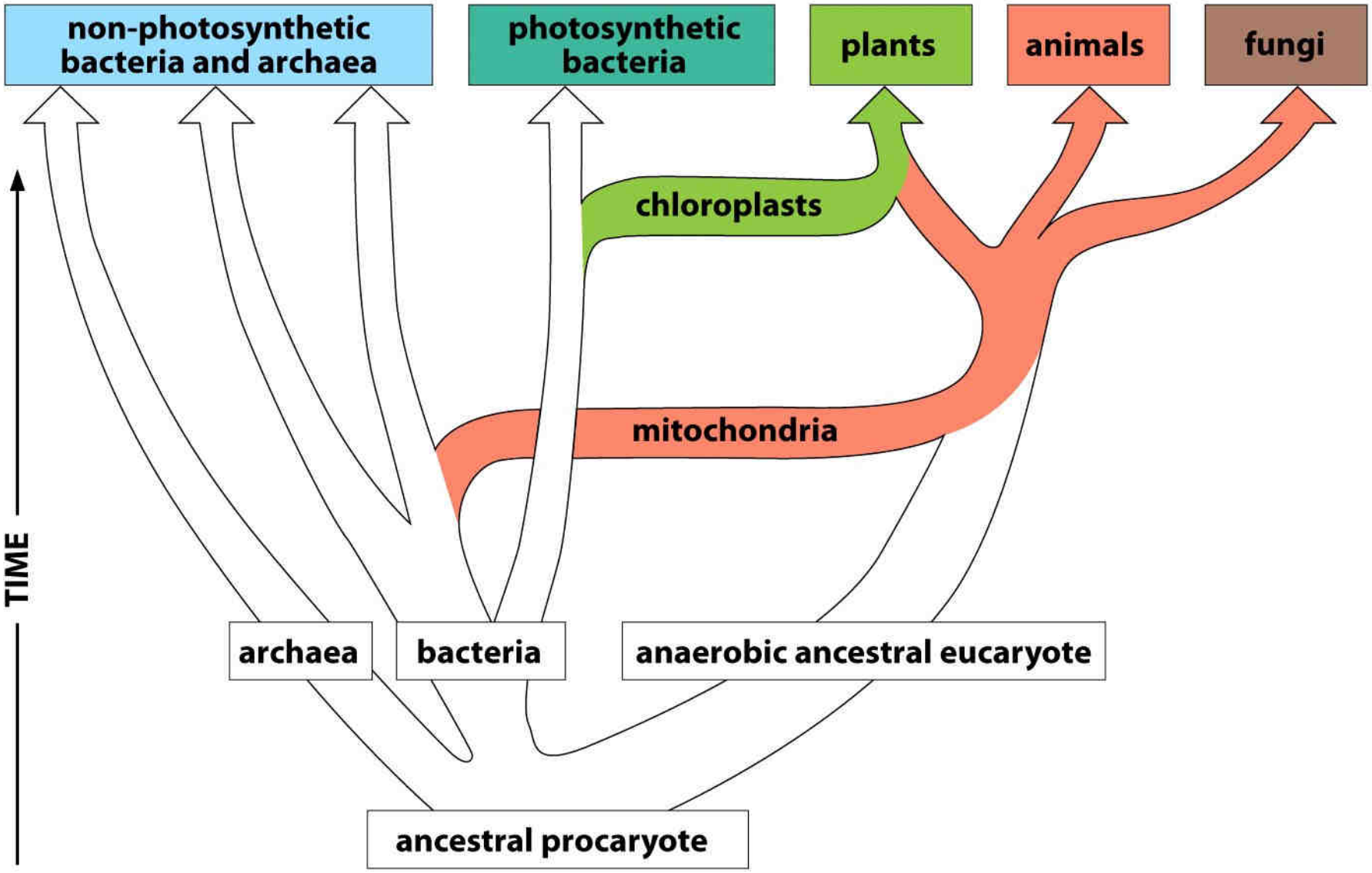
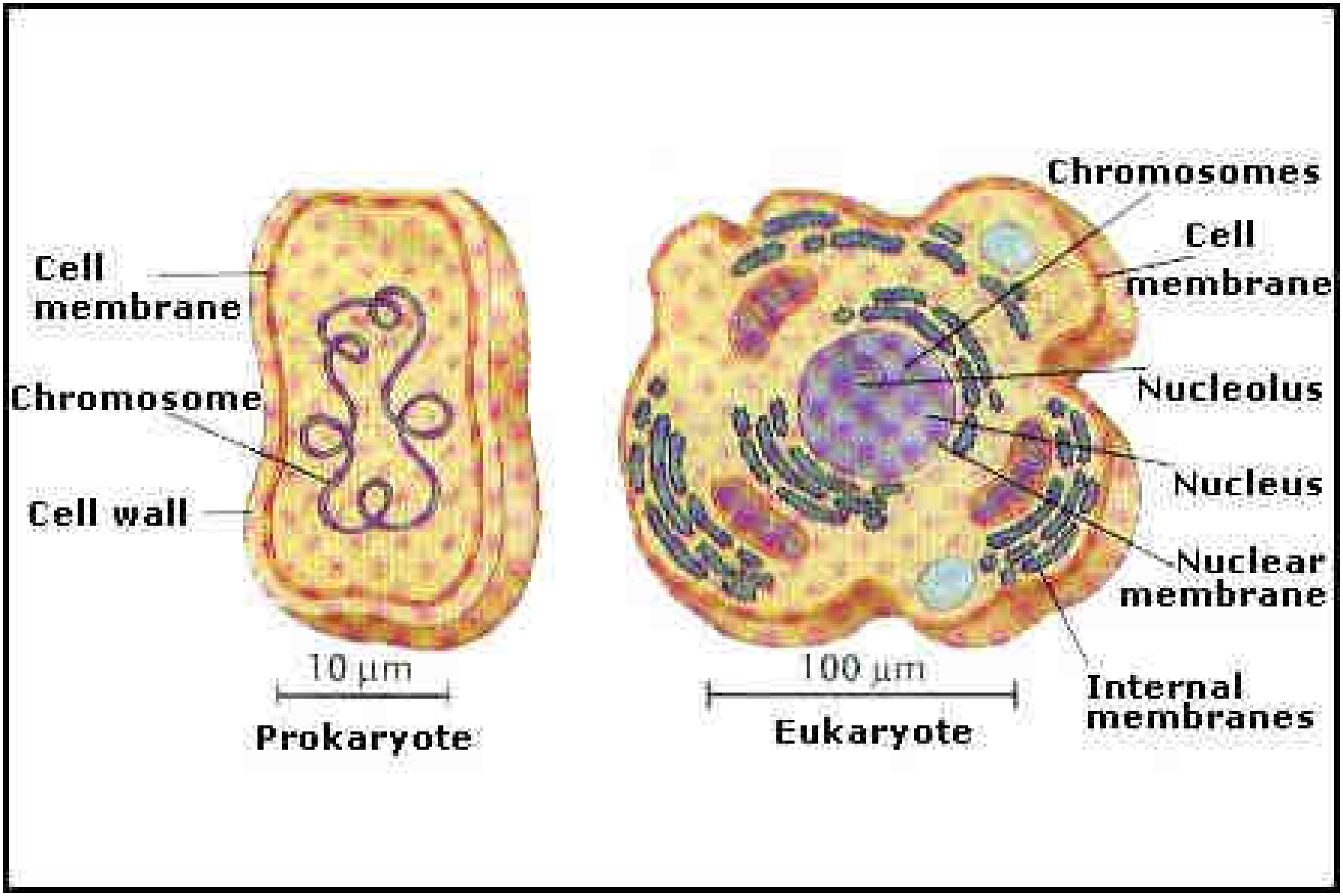


Figure 1-29 *Essential Cell Biology* (© Garland Science 2010)


Cell membrane
Chromosome
Cell wall
10 µm
Prokaryote
Chromosomes
Cell membrane
Nucleolus
Nucleus
Nuclear membrane
Internal membranes
100 µm
Eukaryote

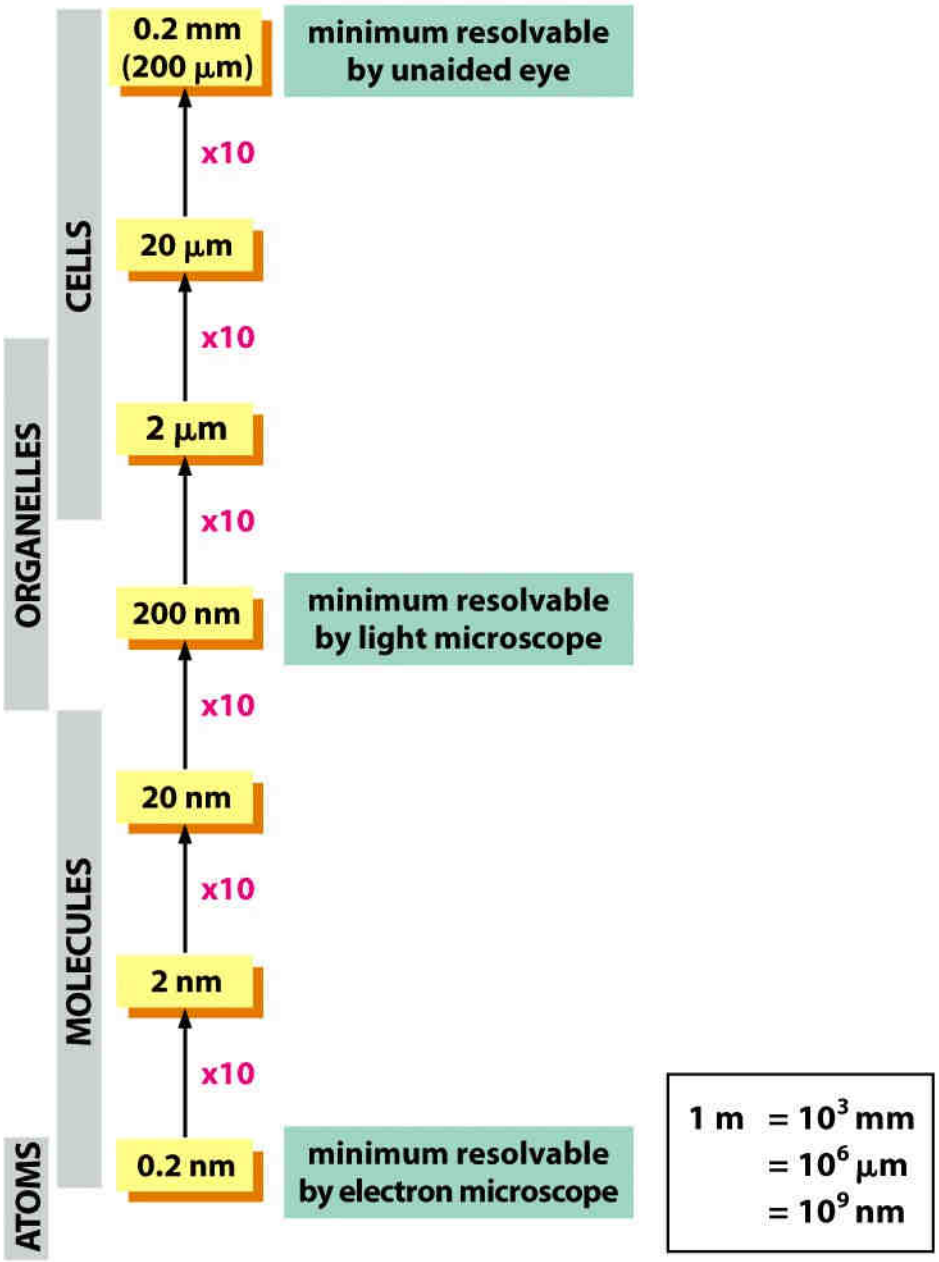


Figure 1-6 *Essential Cell Biology* (© Garland Science 2010)

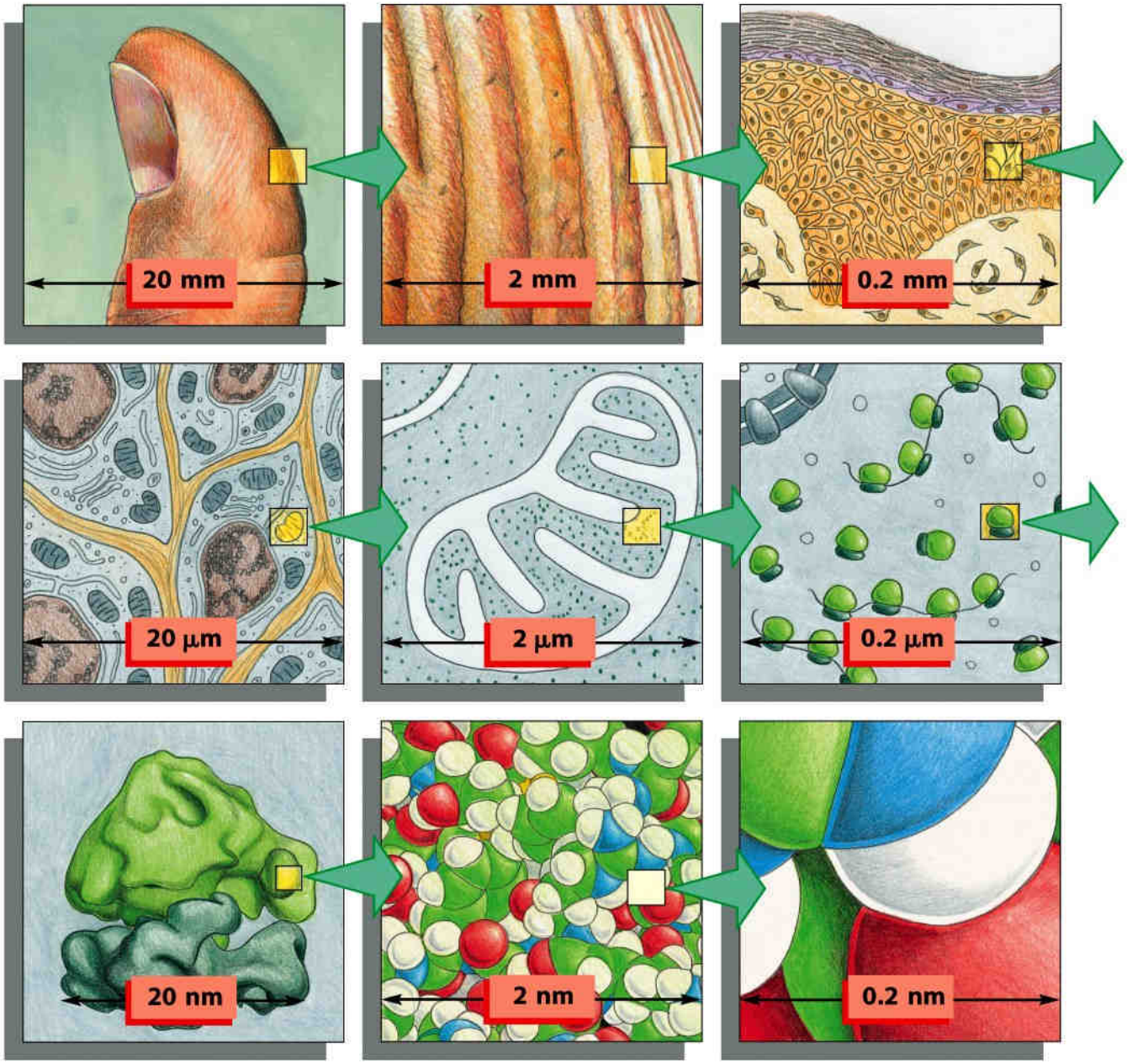
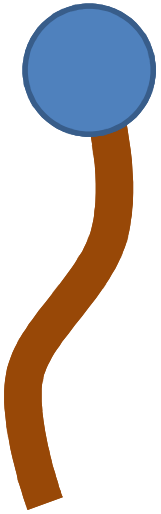


Figure 1-9 *Essential Cell Biology* (© Garland Science 2010)

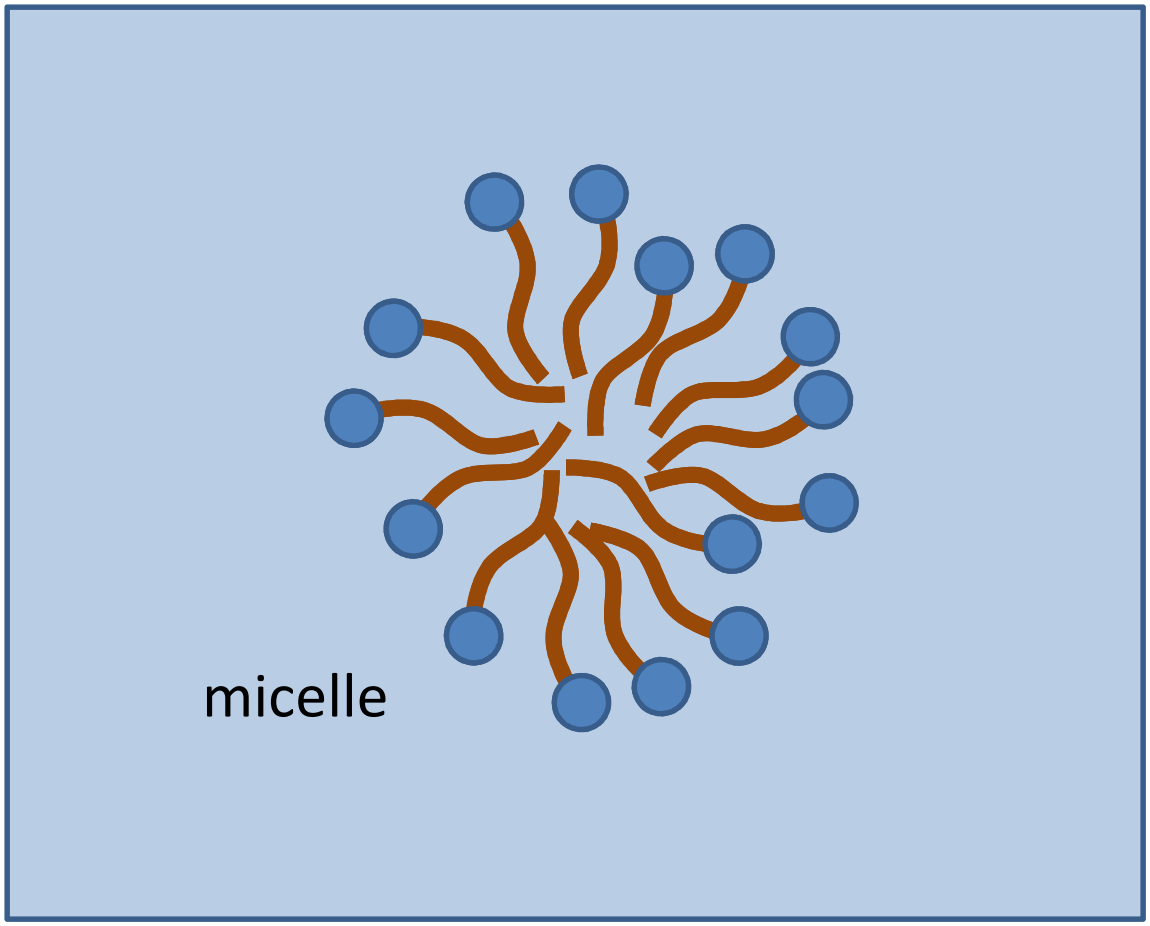
		STRENGTH IN kcal/mole	
BOND TYPE	**LENGTH (nm)**	**IN VACUUM**	**IN WATER**
Covalent	**0.15**	**90 (377)****	**90 (377)**
Noncovalent: ionic bond*	**0.25**	**80 (335)**	**3 (12.6)**
hydrogen bond	**0.30**	**4 (16.7)**	**1 (4.2)**
van der Waals attraction (per atom)	**0.35**	**0.1 (0.4)**	**0.1 (0.4)**

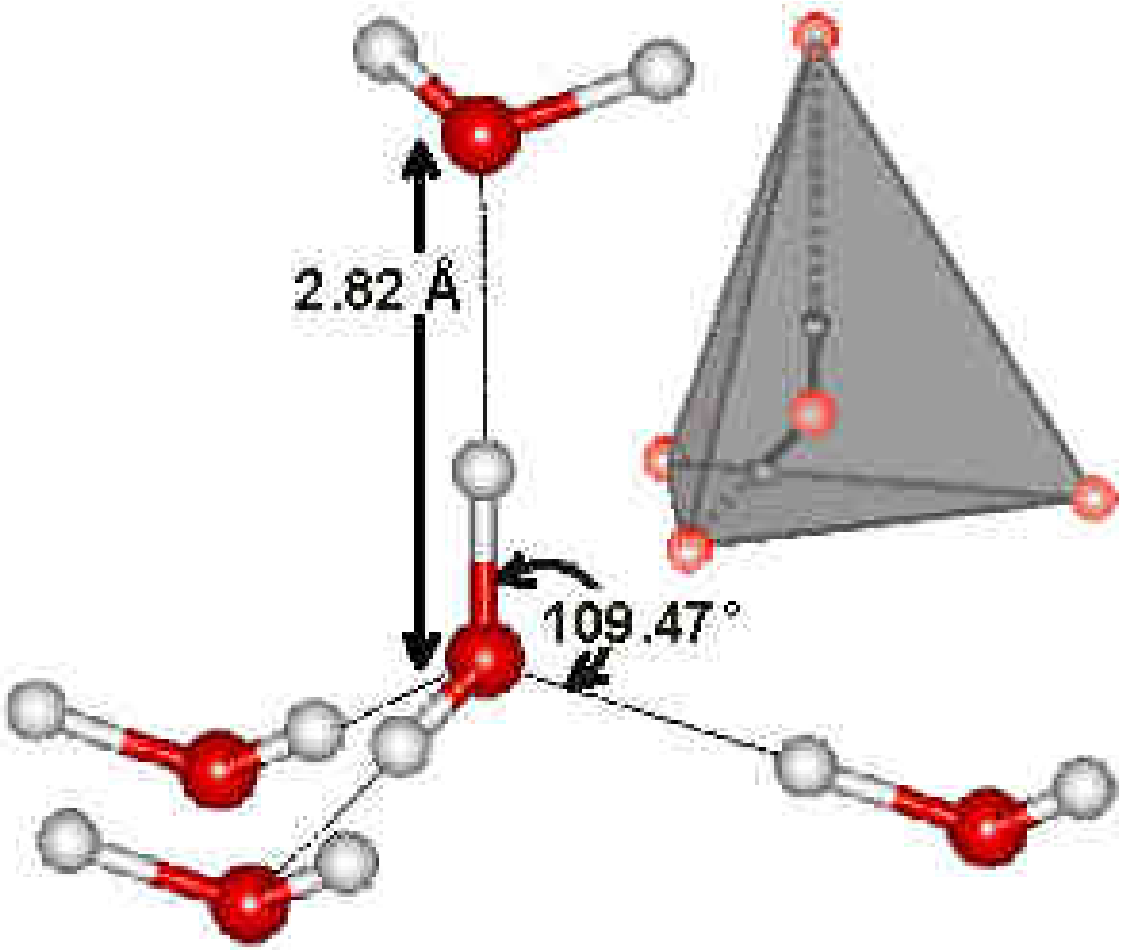
***An ionic bond is an electrostatic attraction between two fully charged atoms.**
****Values in parentheses are kJ/mole. 1 calorie = 4.184 joules.**

Table 2-1 *Essential Cell Biology* (© Garland Science 2010)



surfactant




2.82 Å
109.47°

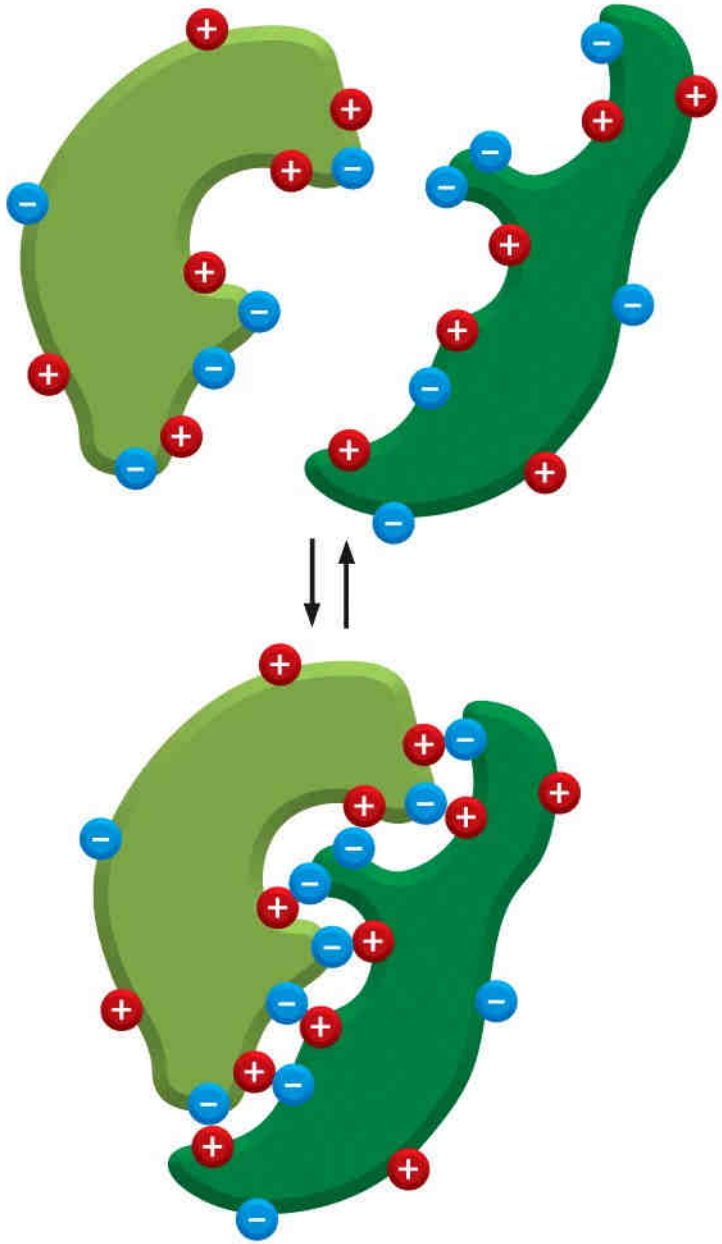


Figure 2-13 *Essential Cell Biology* (© Garland Science 2010)

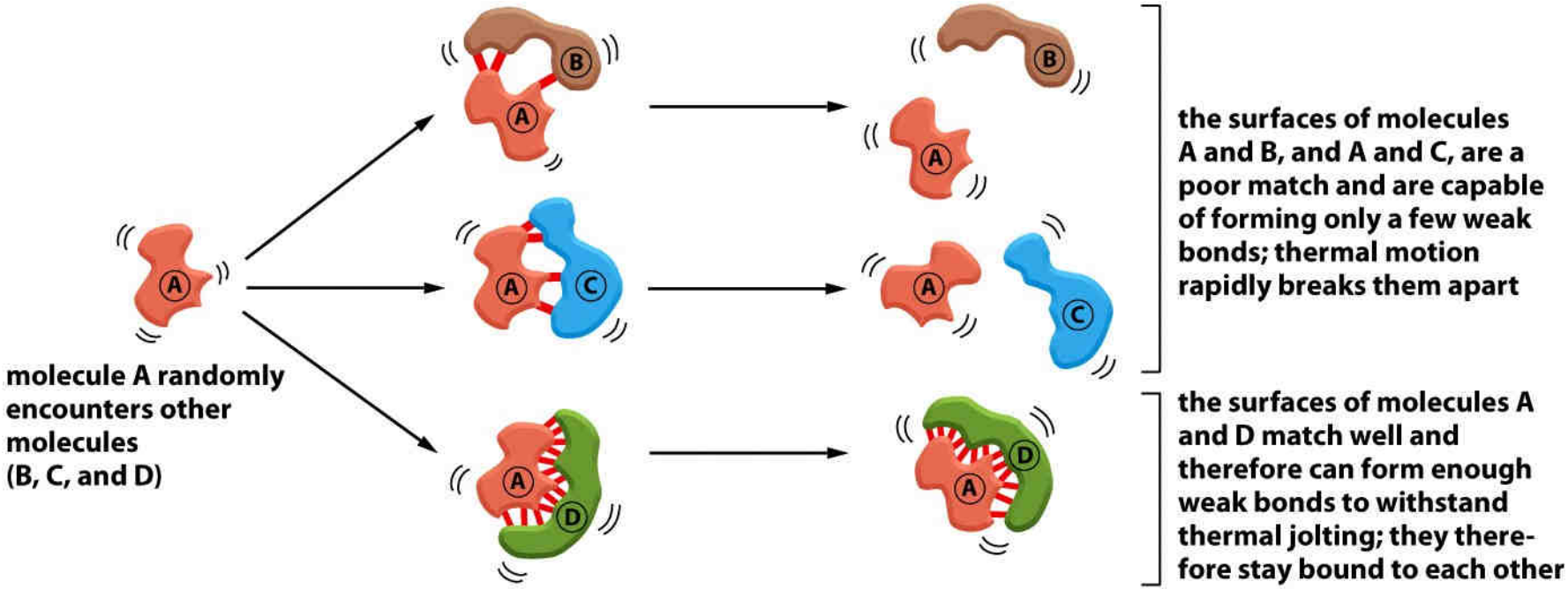
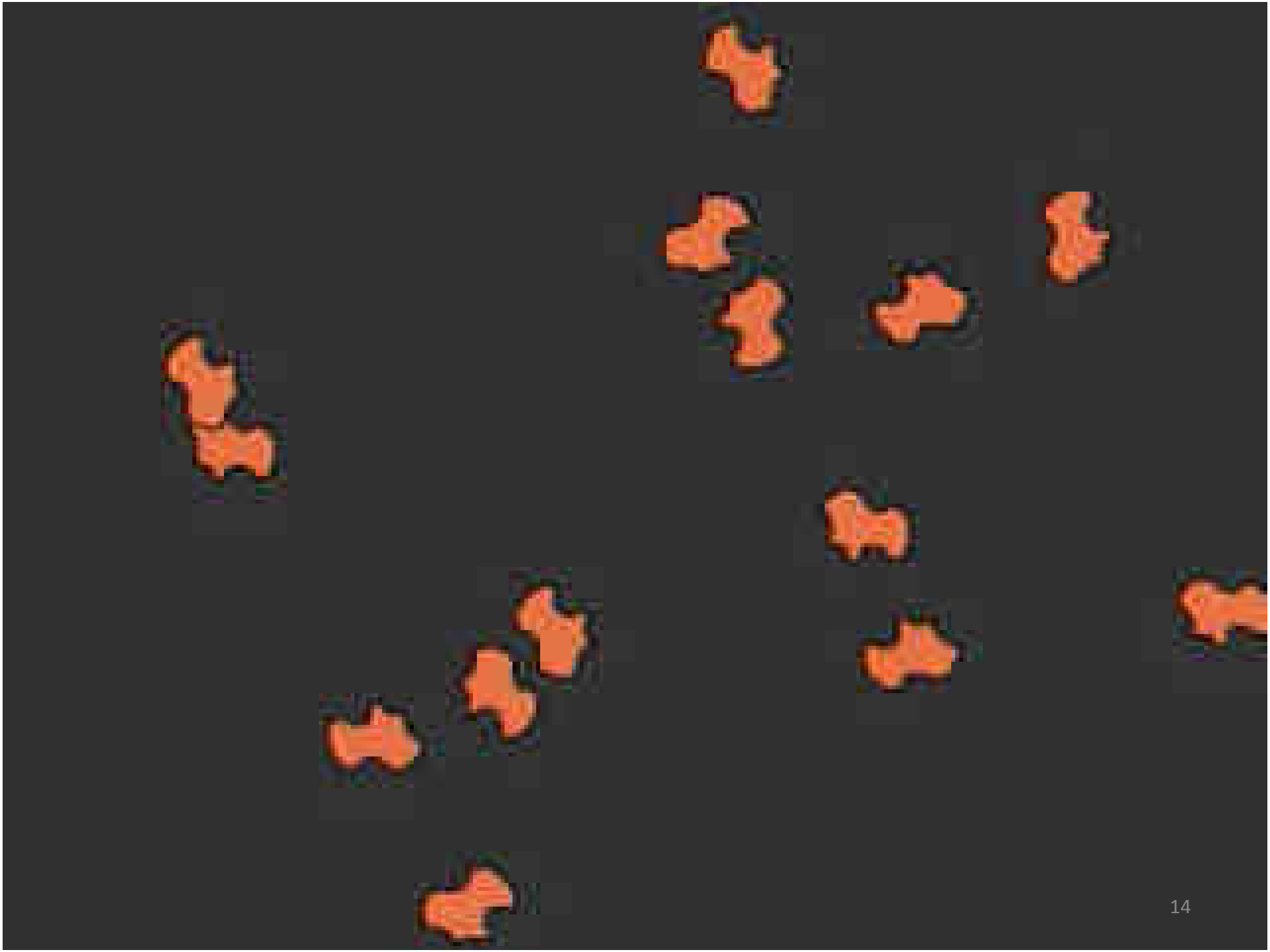


Figure 2-32 *Essential Cell Biology* (© Garland Science 2010)



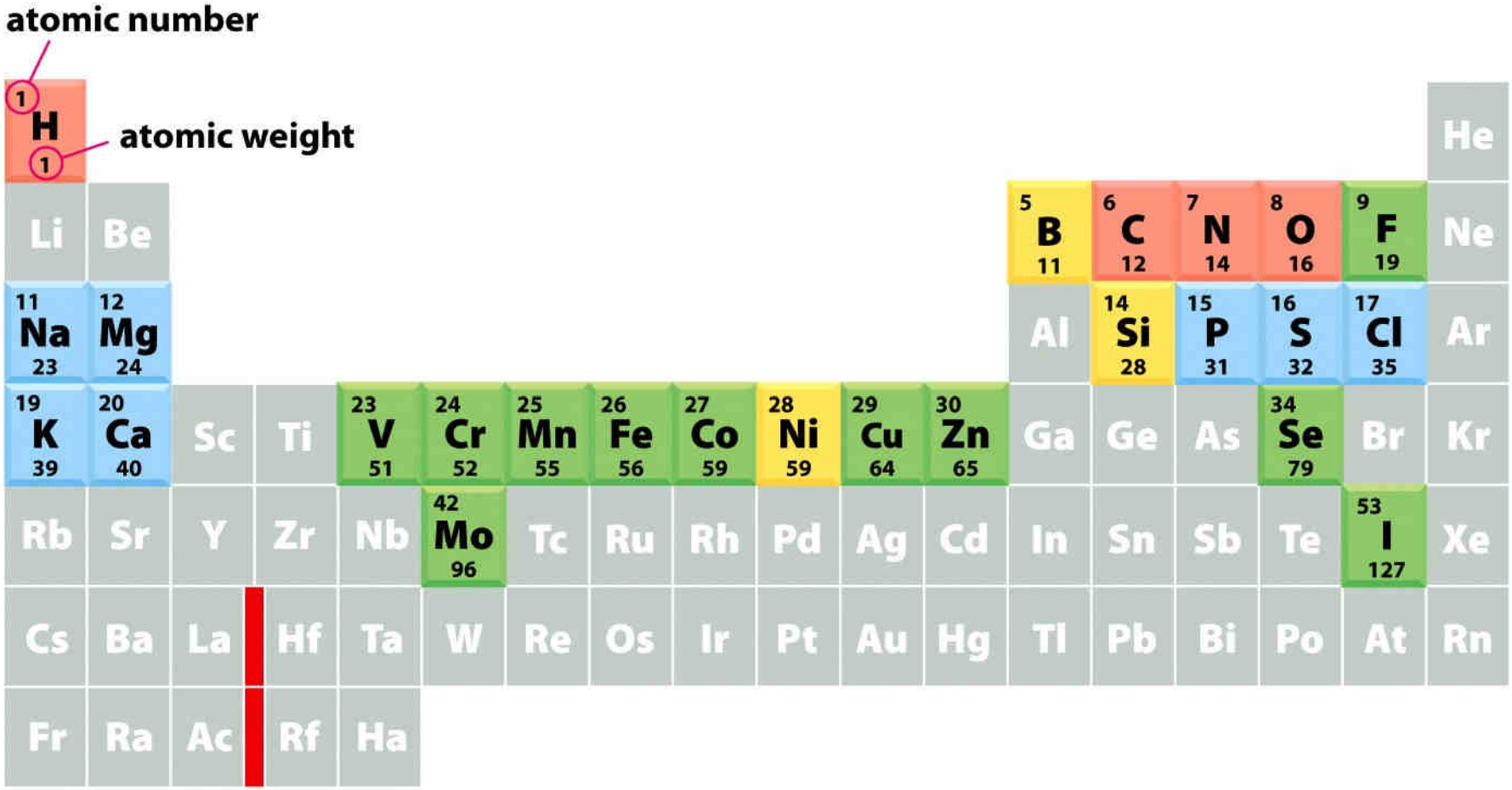


Figure 2-7 *Essential Cell Biology* (© Garland Science 2010)

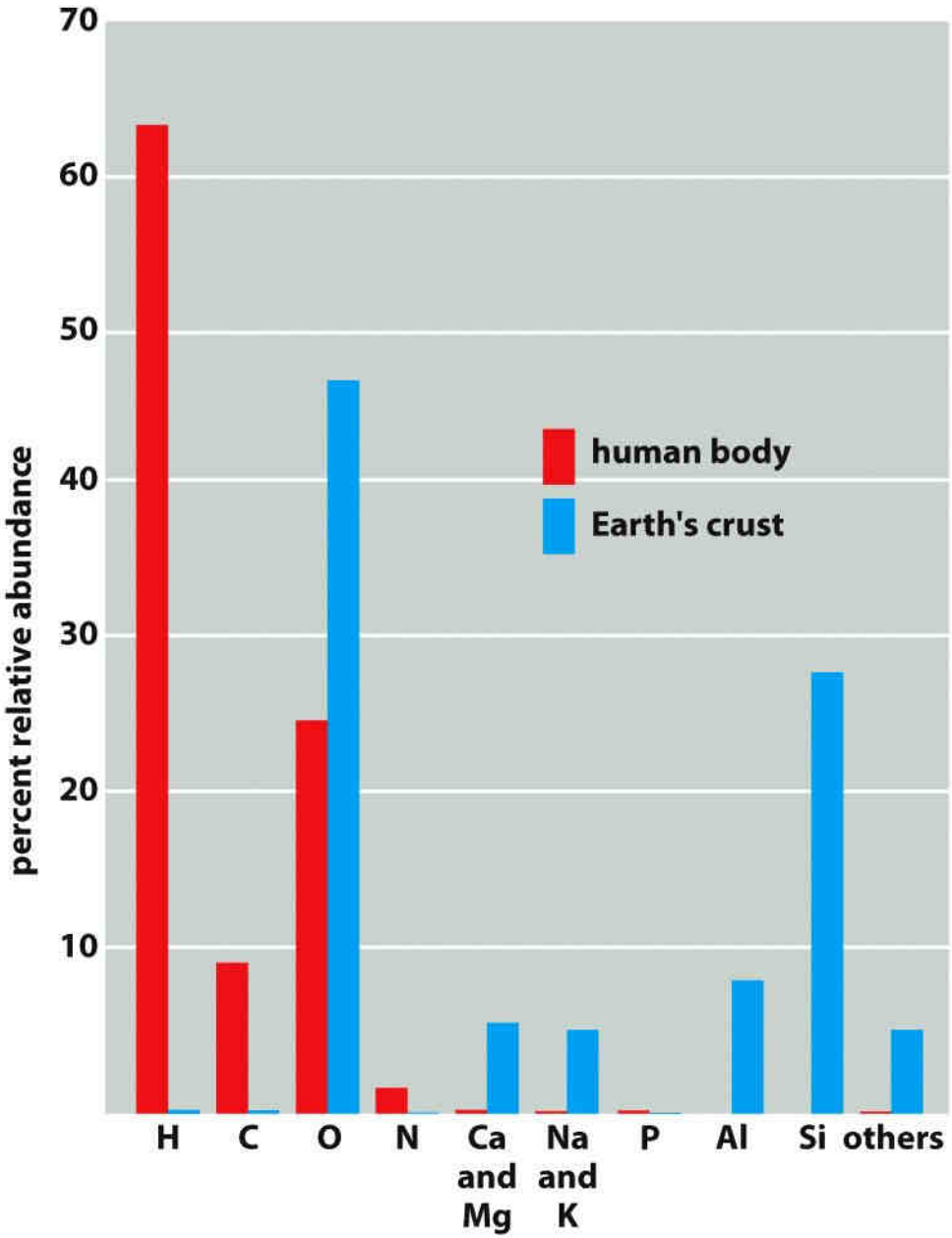


Figure 2-4 *Essential Cell Biology* (© Garland Science 2010)

TABLE 2–2 THE APPROXIMATE CHEMICAL COMPOSITION OF A BACTERIAL CELL

	PERCENTAGE OF TOTAL CELL WEIGHT	NUMBER OF TYPES OF EACH MOLECULE
Water	70	1
Inorganic ions	1	20
Sugars and precursors	1	250
Amino acids and precursors	0.4	100
Nucleotides and precursors	0.4	100
Fatty acids and precursors	1	50
Other small molecules	0.2	~300
Macromolecules (proteins, nucleic acids, polysaccharides, and phospholipids)	26	~3000

Table 2-2 *Essential Cell Biology* (© Garland Science 2010)

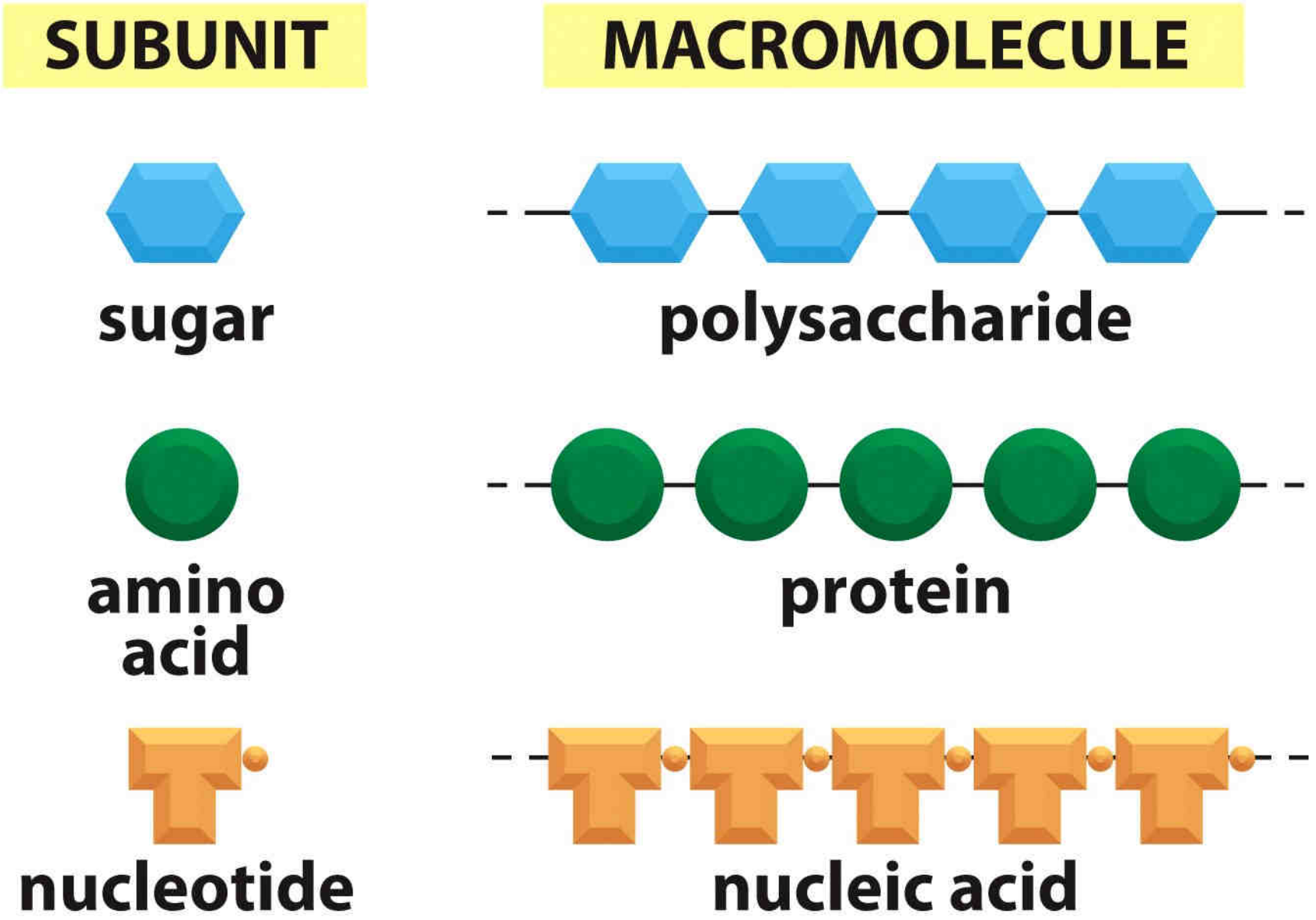


Figure 2-27 *Essential Cell Biology* (© Garland Science 2010)

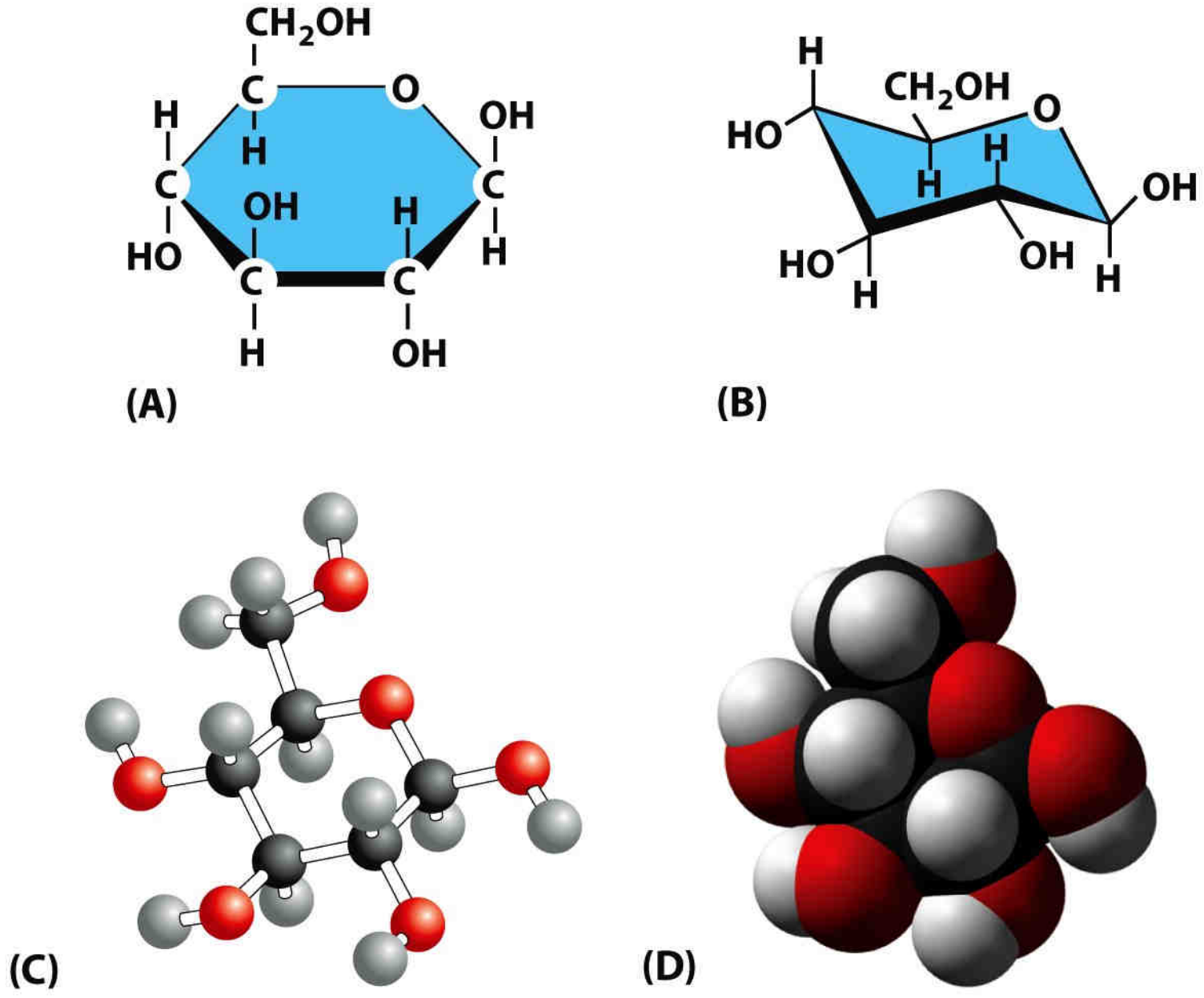


Figure 2-16 *Essential Cell Biology* (© Garland Science 2010)

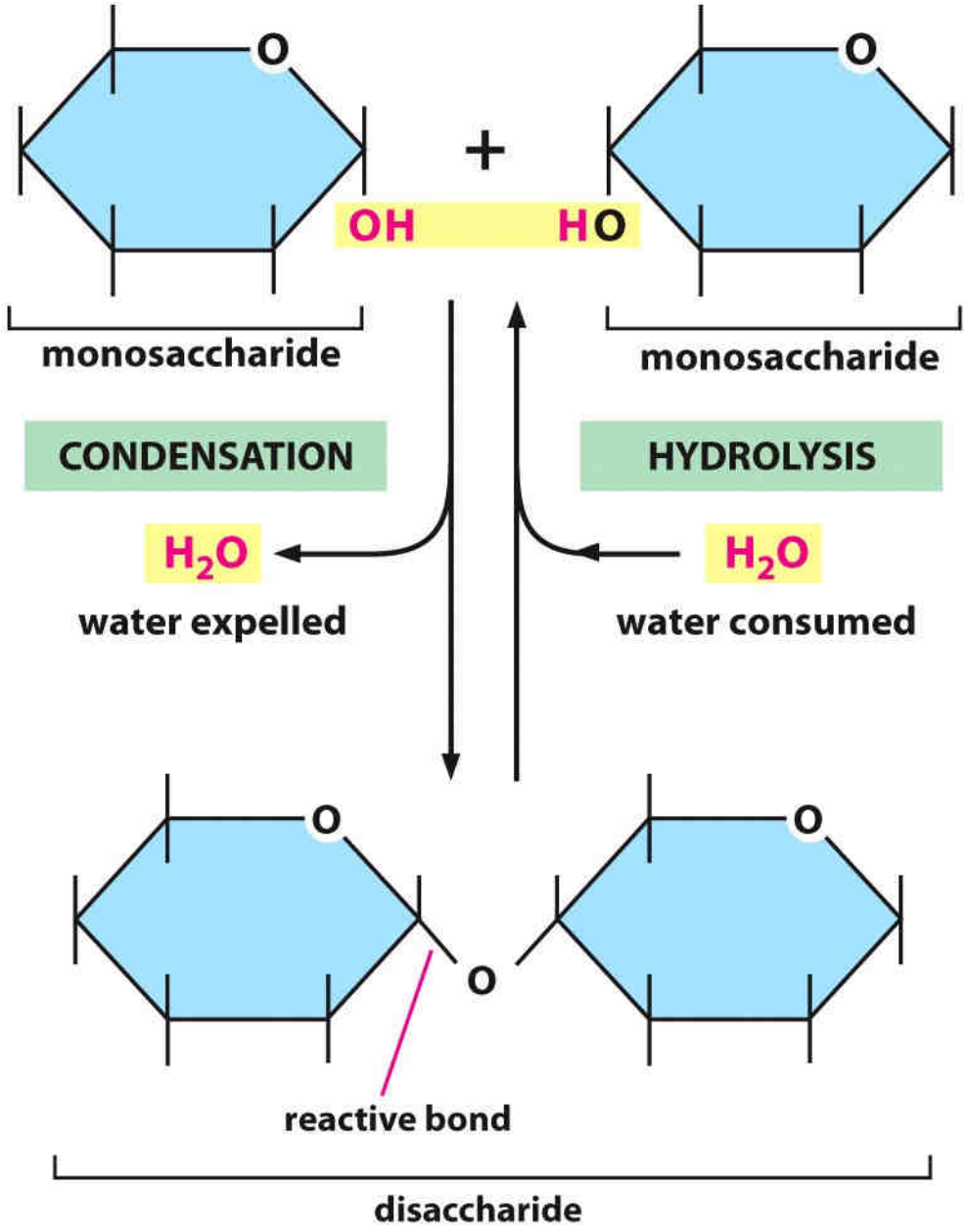


Figure 2-17 *Essential Cell Biology* (© Garland Science 2010)

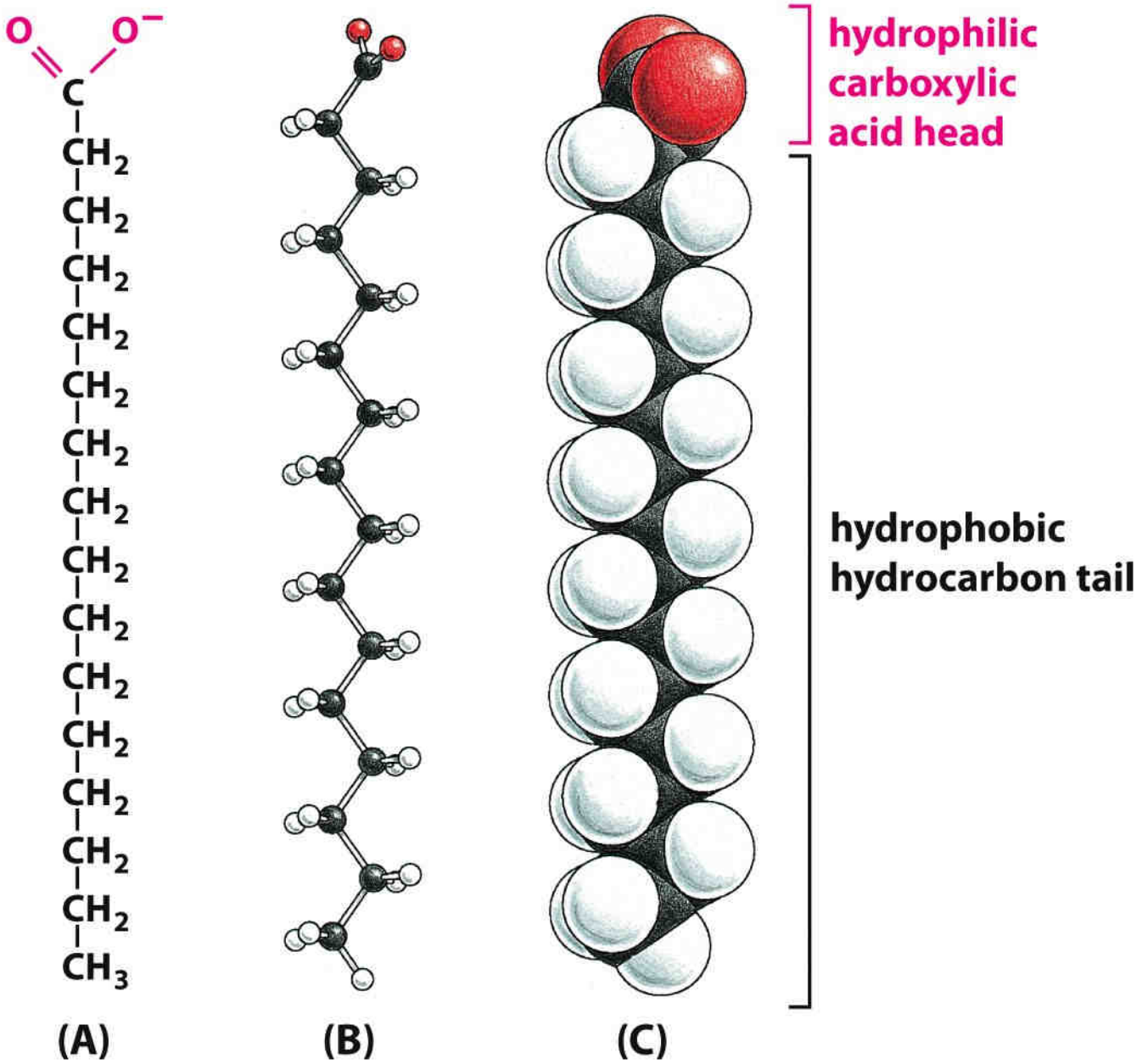


Figure 2-18 *Essential Cell Biology* (© Garland Science 2010)

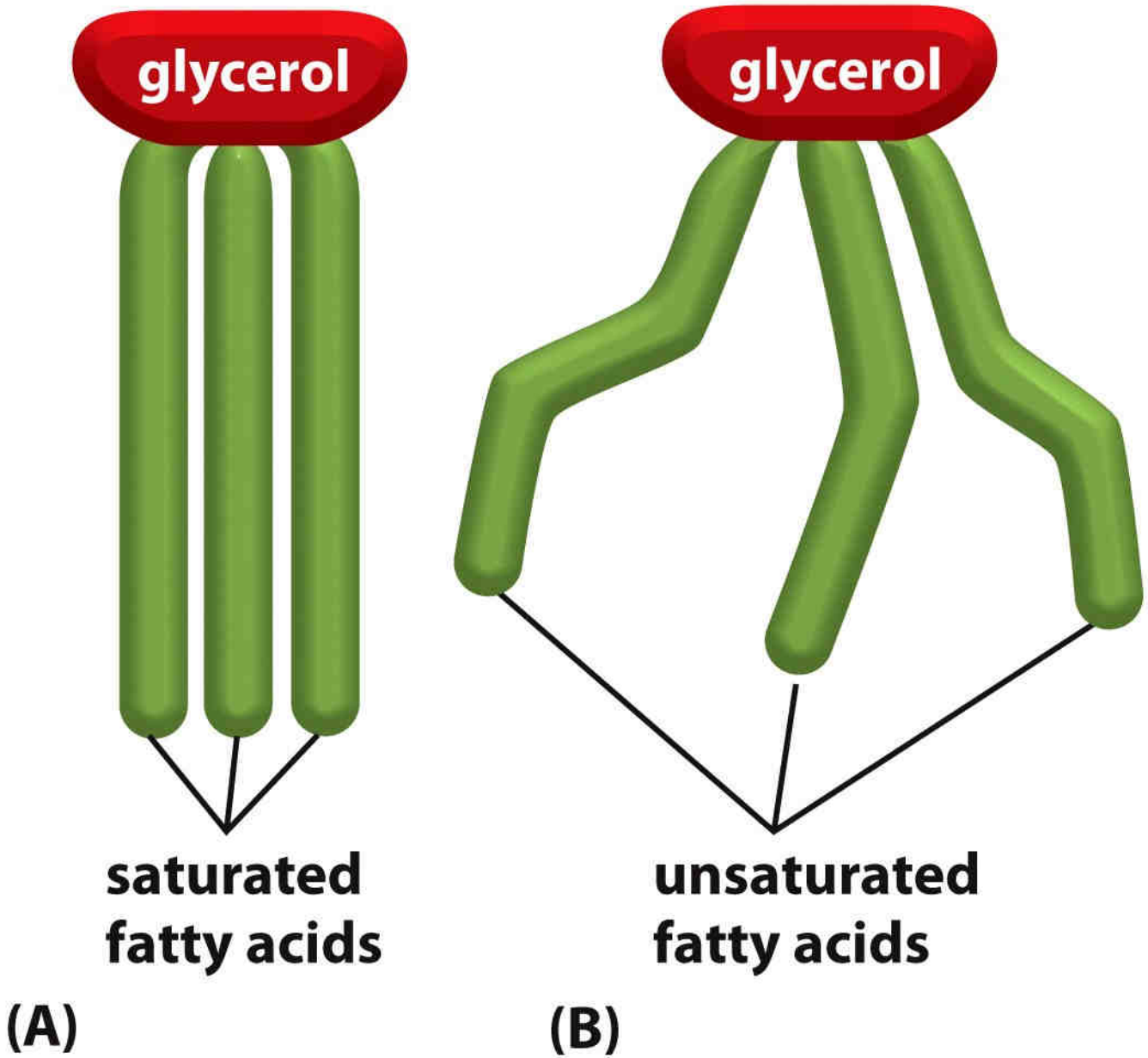


Figure 2-19 *Essential Cell Biology* (© Garland Science 2010)

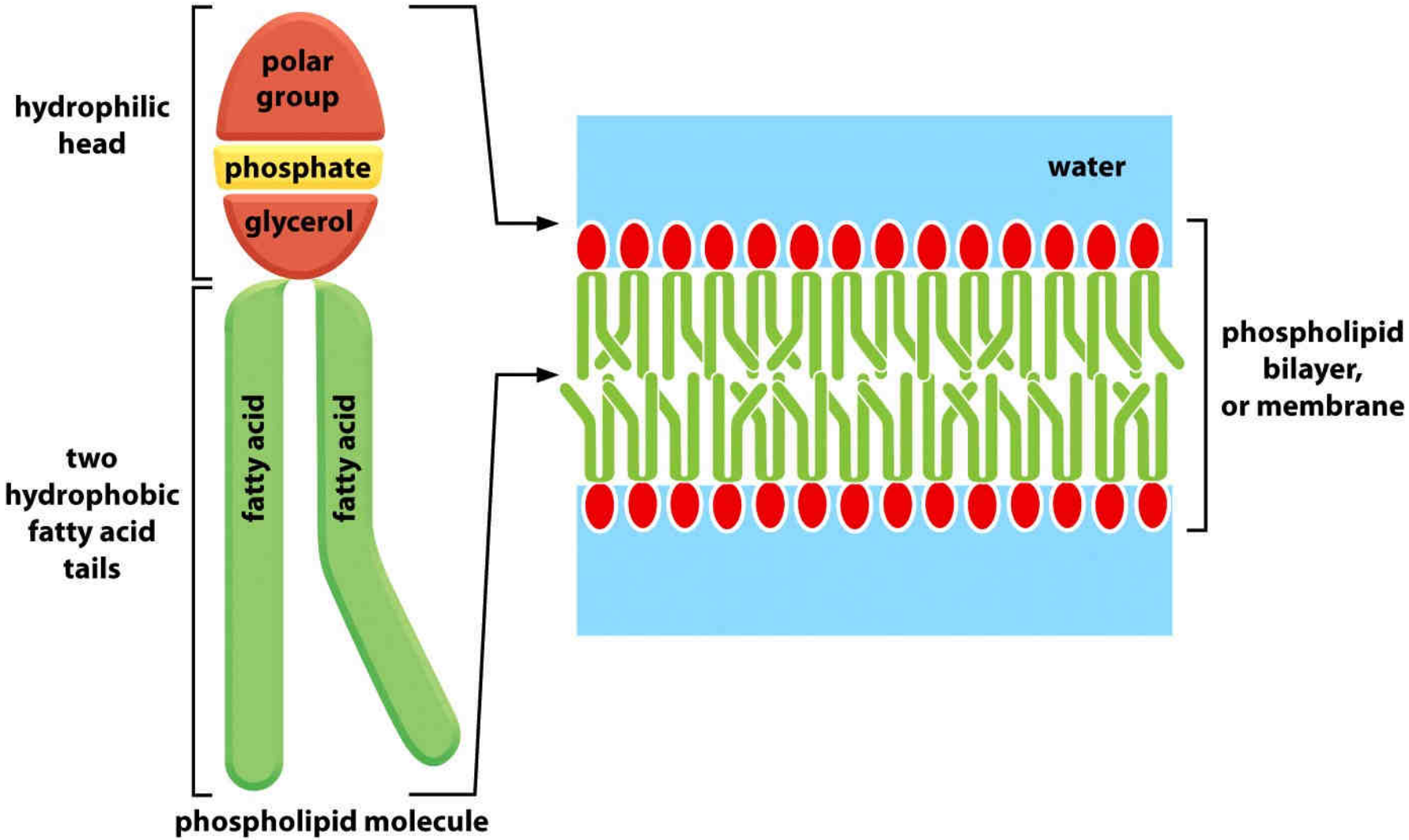


Figure 2-20 *Essential Cell Biology* (© Garland Science 2010)

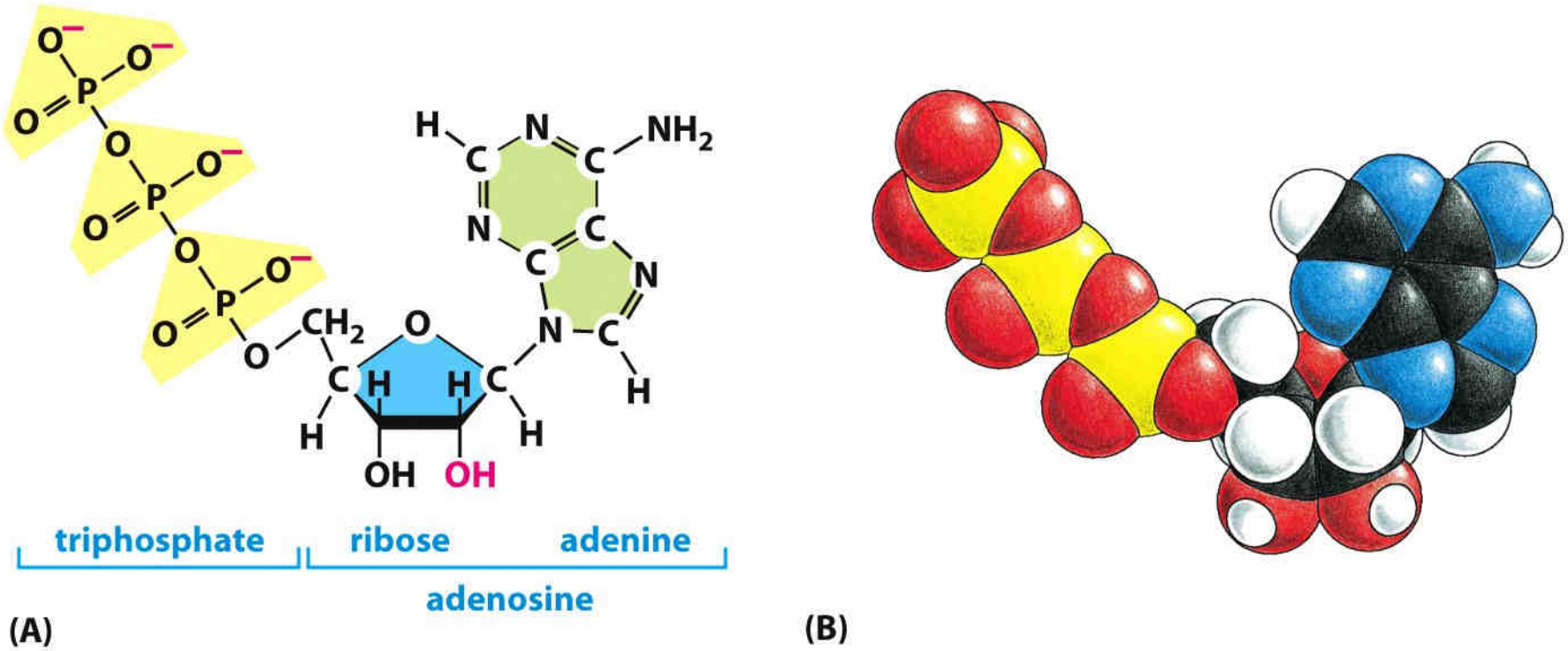
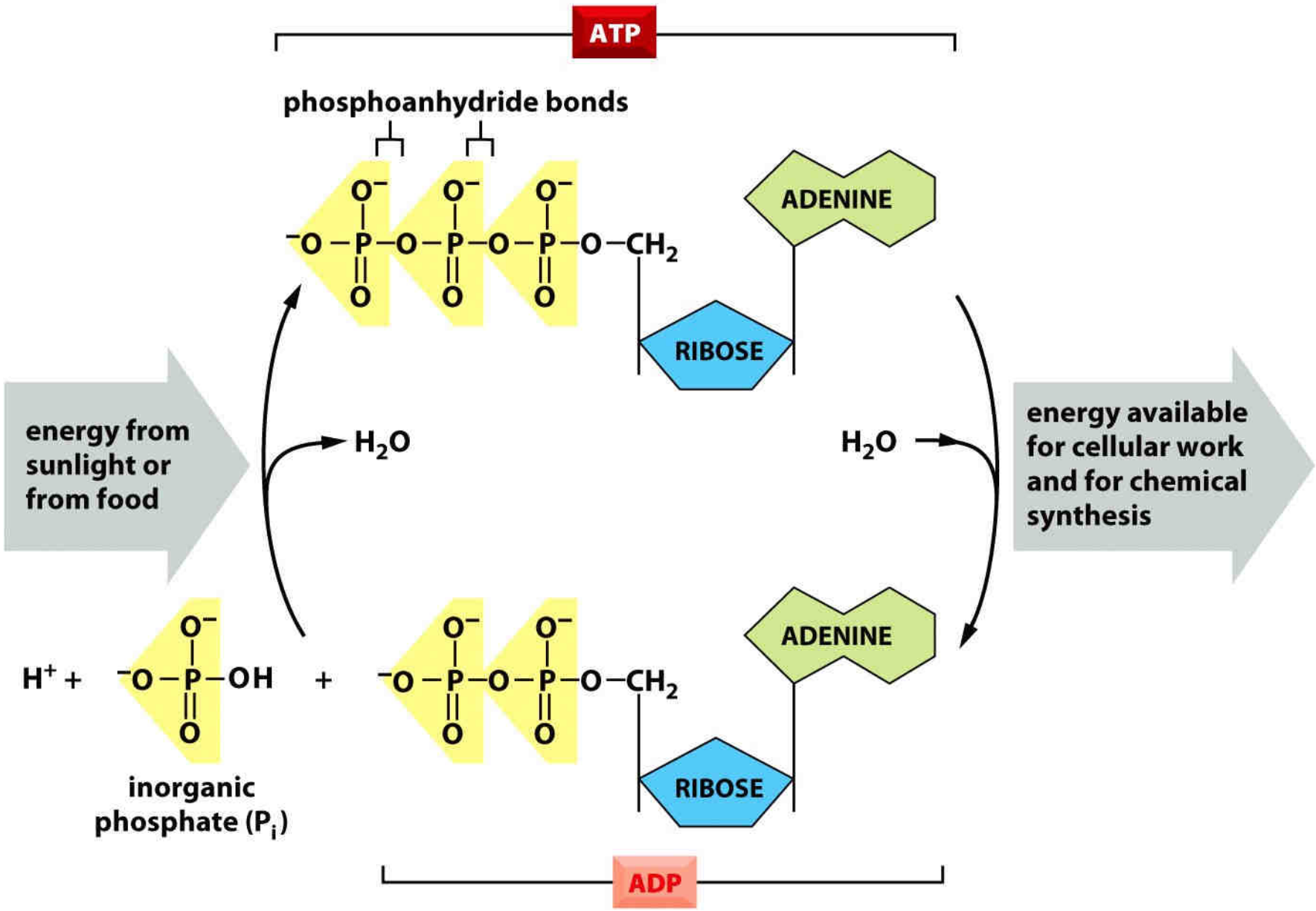


Figure 2-23 *Essential Cell Biology* (© Garland Science 2010)



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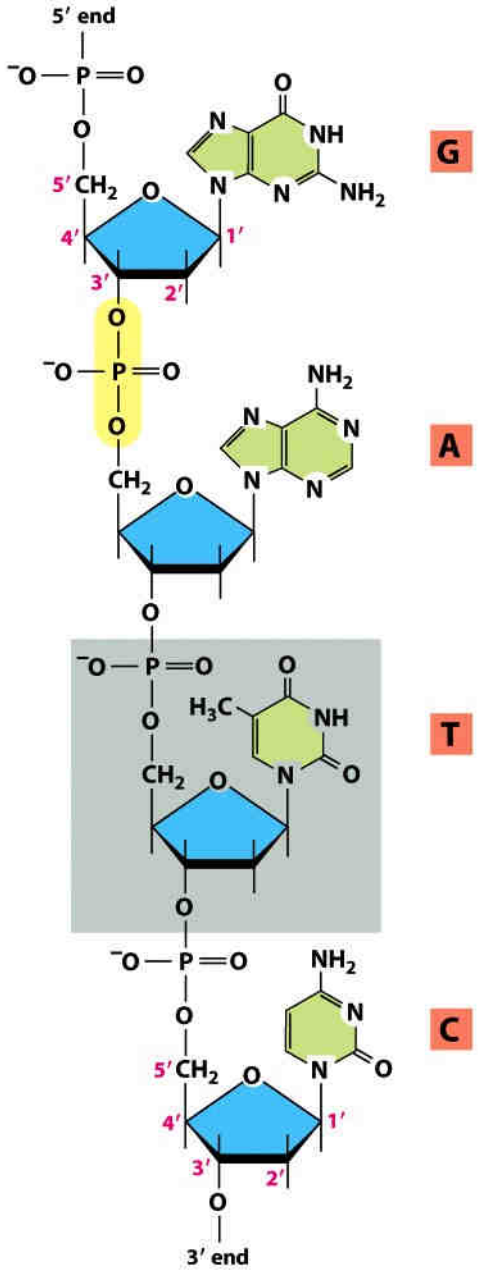
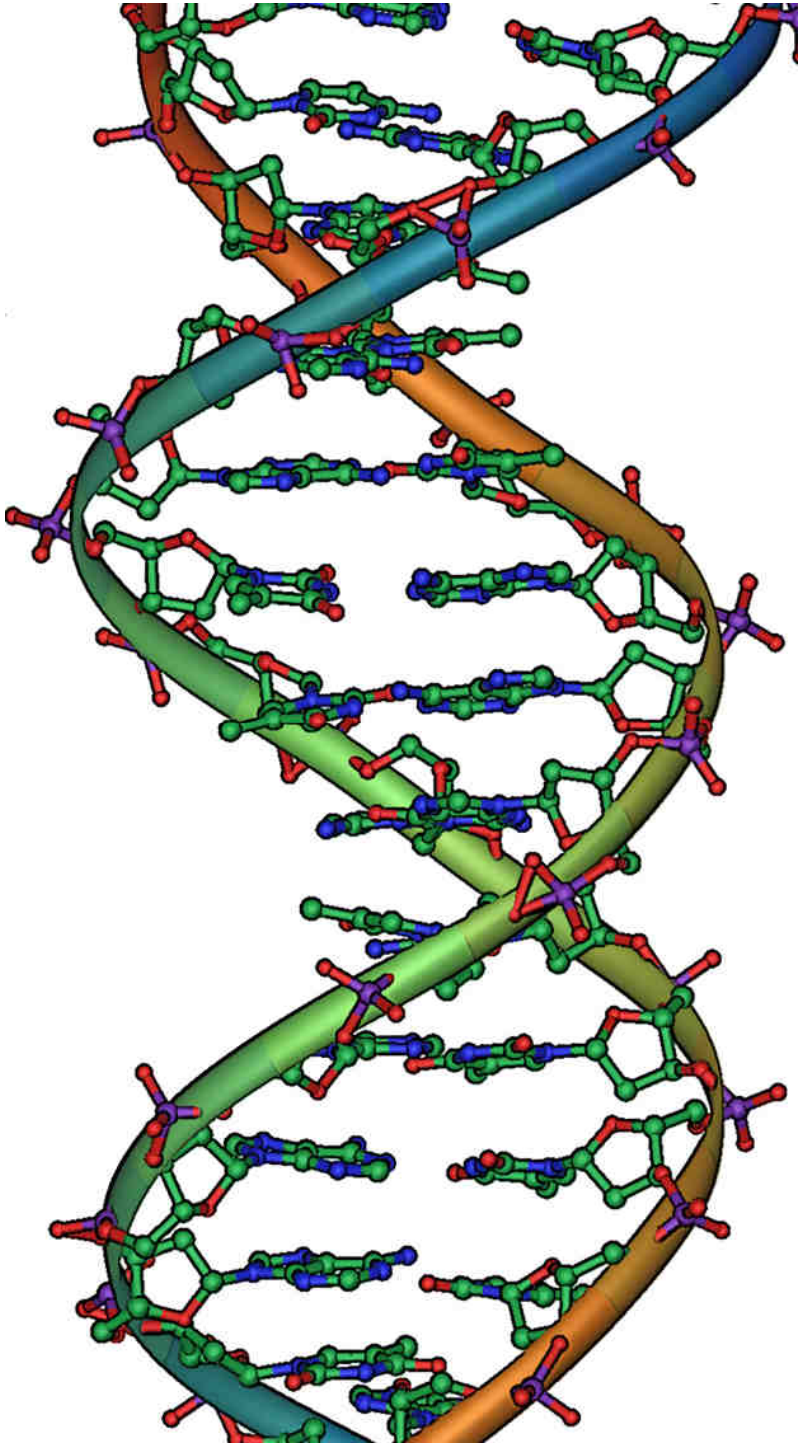
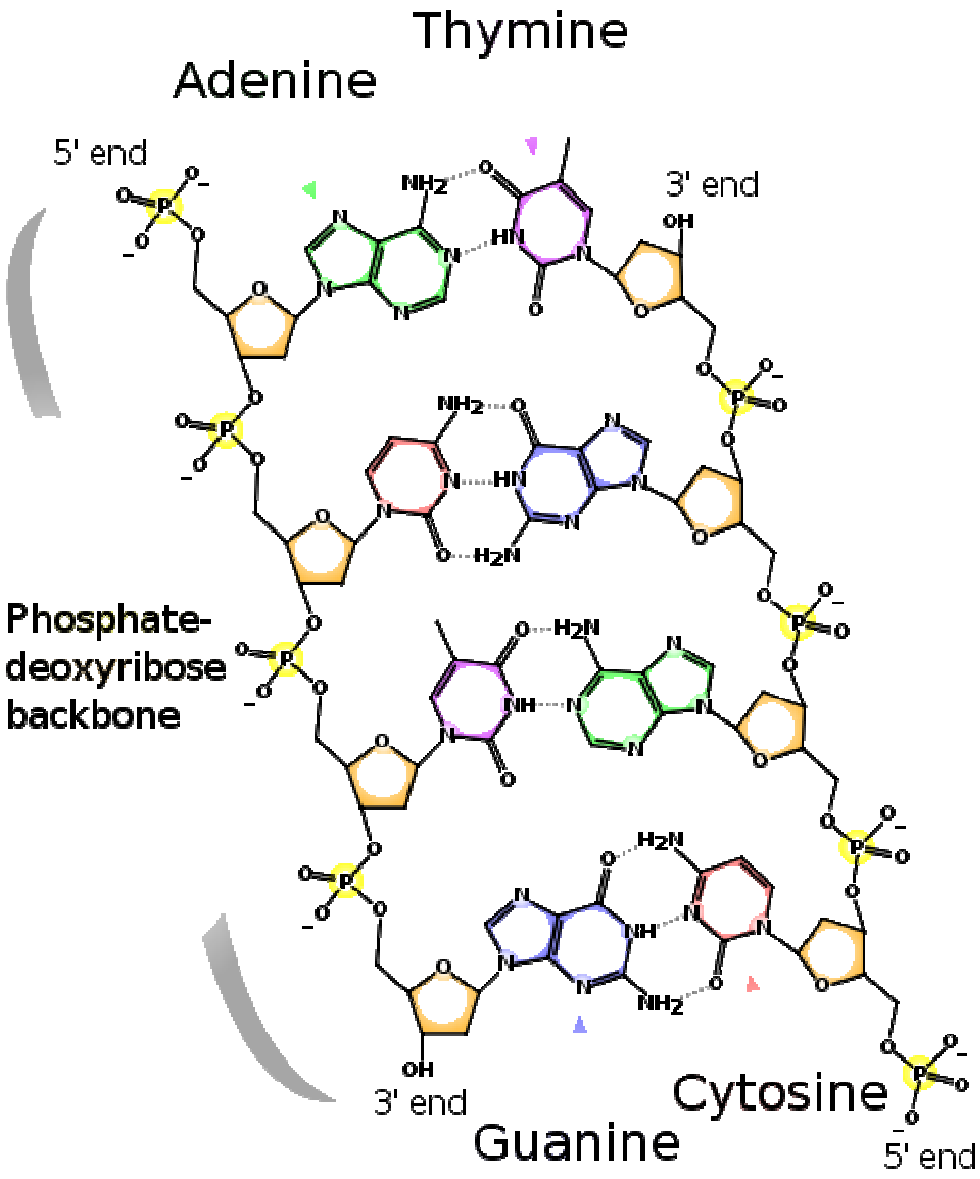


Figure 2-25 *Essential Cell Biology* (© Garland Science 2010)




Thymine
Adenine
5' end
3' end
Phosphate-
deoxyribose
backbone
3' end
Cytosine
Guanine
5' end

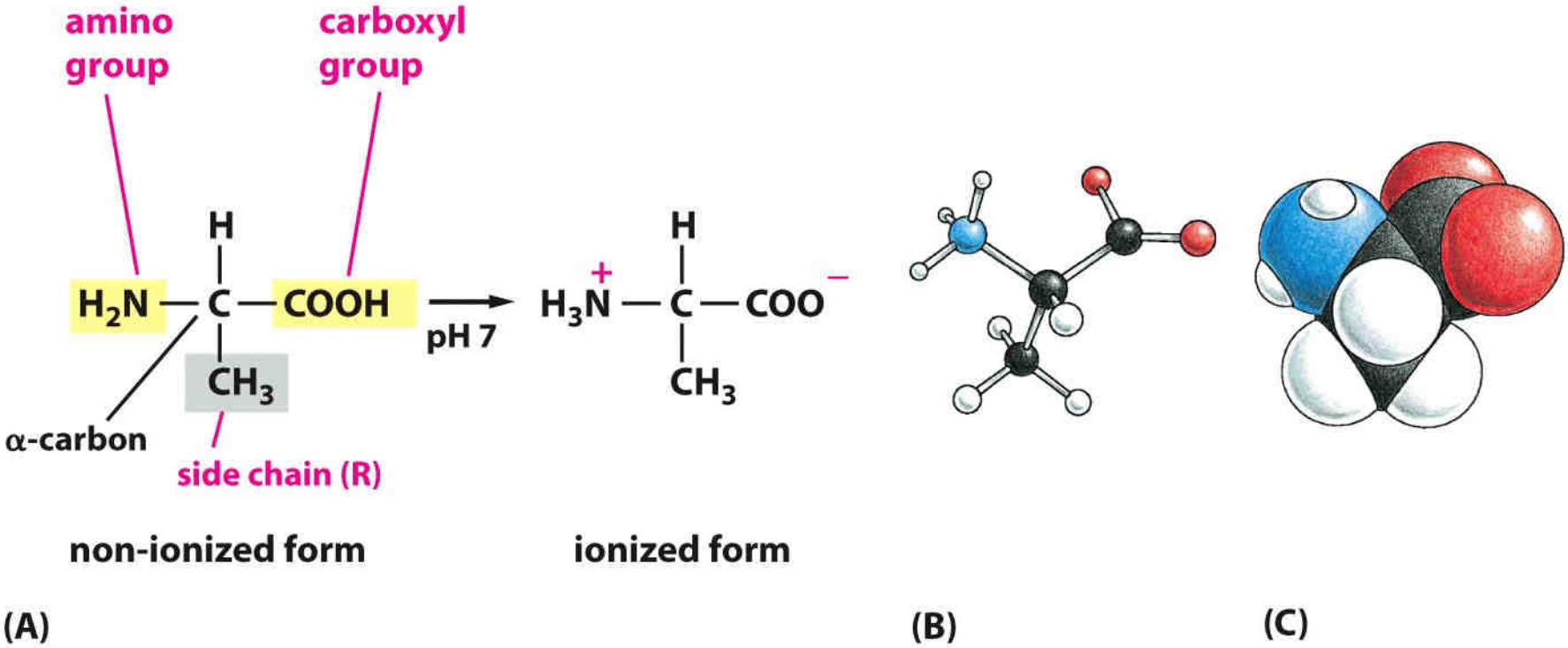


Figure 2-21 *Essential Cell Biology* (© Garland Science 2010)

AMINO ACID			SIDE CHAIN
Aspartic acid	Asp	D	negative
Glutamic acid	Glu	E	negative
Arginine	Arg	R	positive
Lysine	Lys	K	positive
Histidine	His	H	positive
Asparagine	Asn	N	uncharged polar
Glutamine	Gln	Q	uncharged polar
Serine	Ser	S	uncharged polar
Threonine	Thr	T	uncharged polar
Tyrosine	Tyr	Y	uncharged polar

POLAR AMINO ACIDS
(hydrophilic)

AMINO ACID			SIDE CHAIN
Alanine	Ala	A	nonpolar
Glycine	Gly	G	nonpolar
Valine	Val	V	nonpolar
Leucine	Leu	L	nonpolar
Isoleucine	Ile	I	nonpolar
Proline	Pro	P	nonpolar
Phenylalanine	Phe	F	nonpolar
Methionine	Met	M	nonpolar
Tryptophan	Trp	W	nonpolar
Cysteine	Cys	C	nonpolar

NONPOLAR AMINO ACIDS
(hydrophobic)

Figure 4-3 *Essential Cell Biology* (© Garland Science 2010)

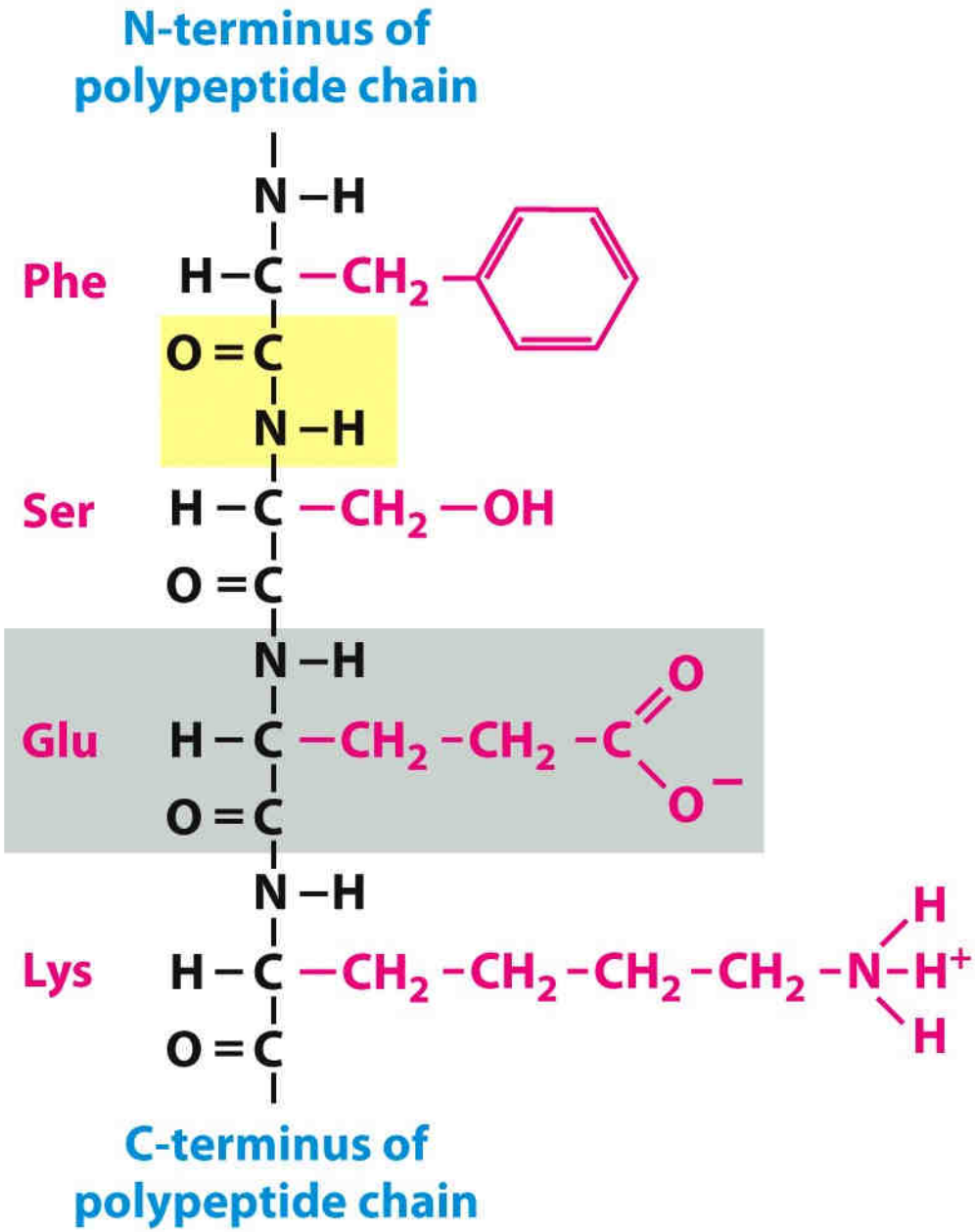


Figure 2-22 *Essential Cell Biology* (© Garland Science 2010)

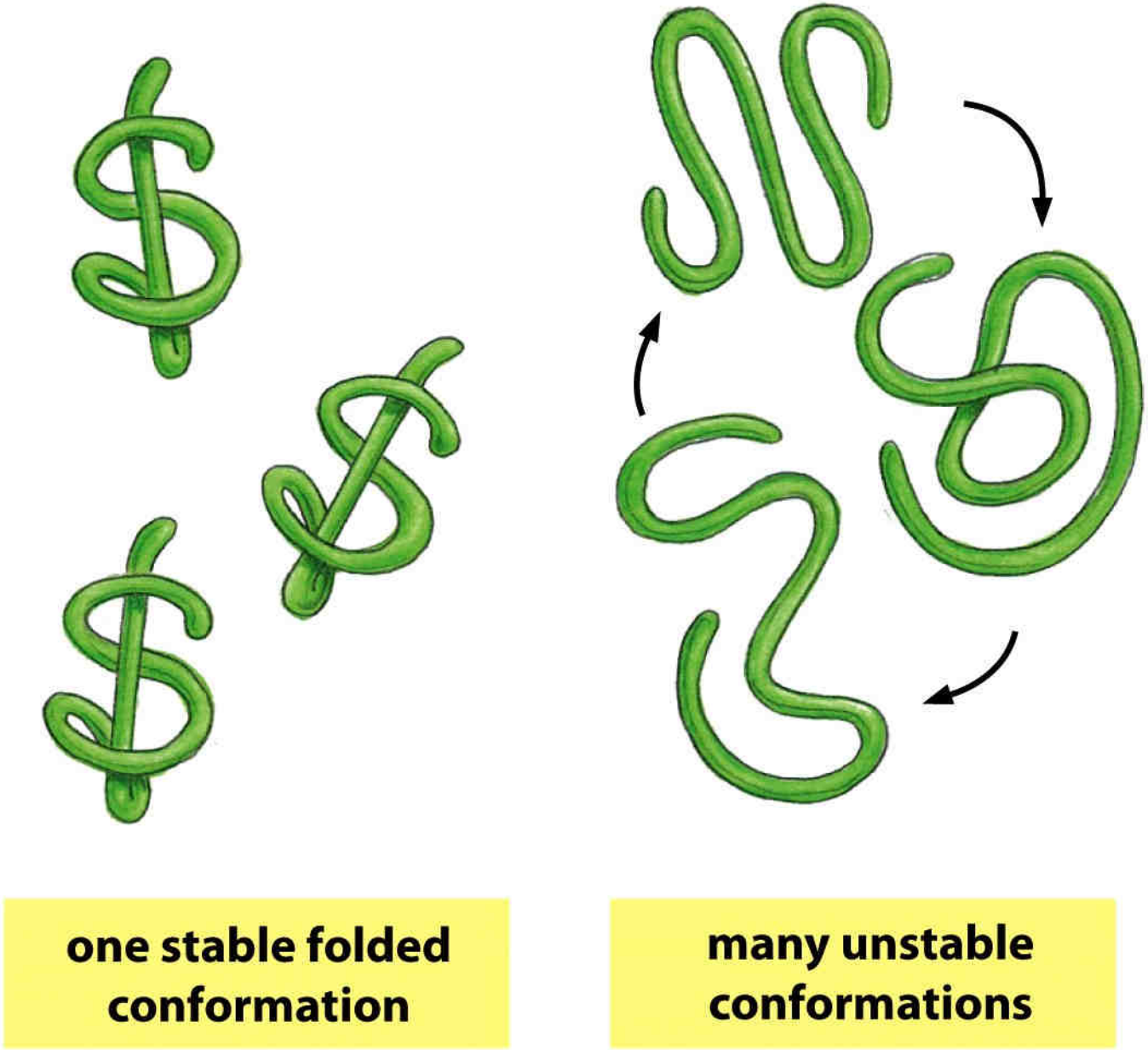


Figure 2-31 *Essential Cell Biology* (© Garland Science 2010)

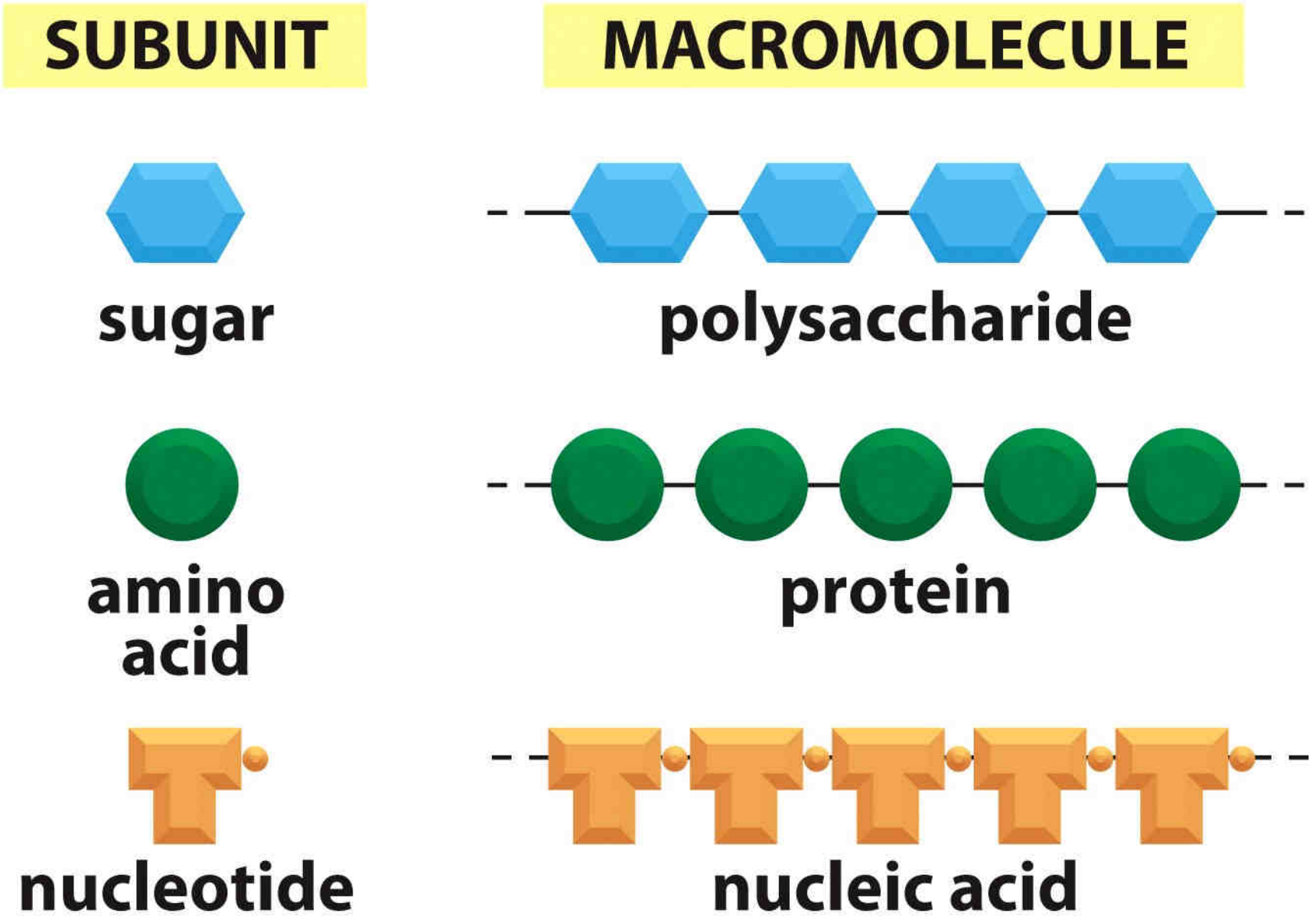


Figure 2-27 *Essential Cell Biology* (© Garland Science 2010)

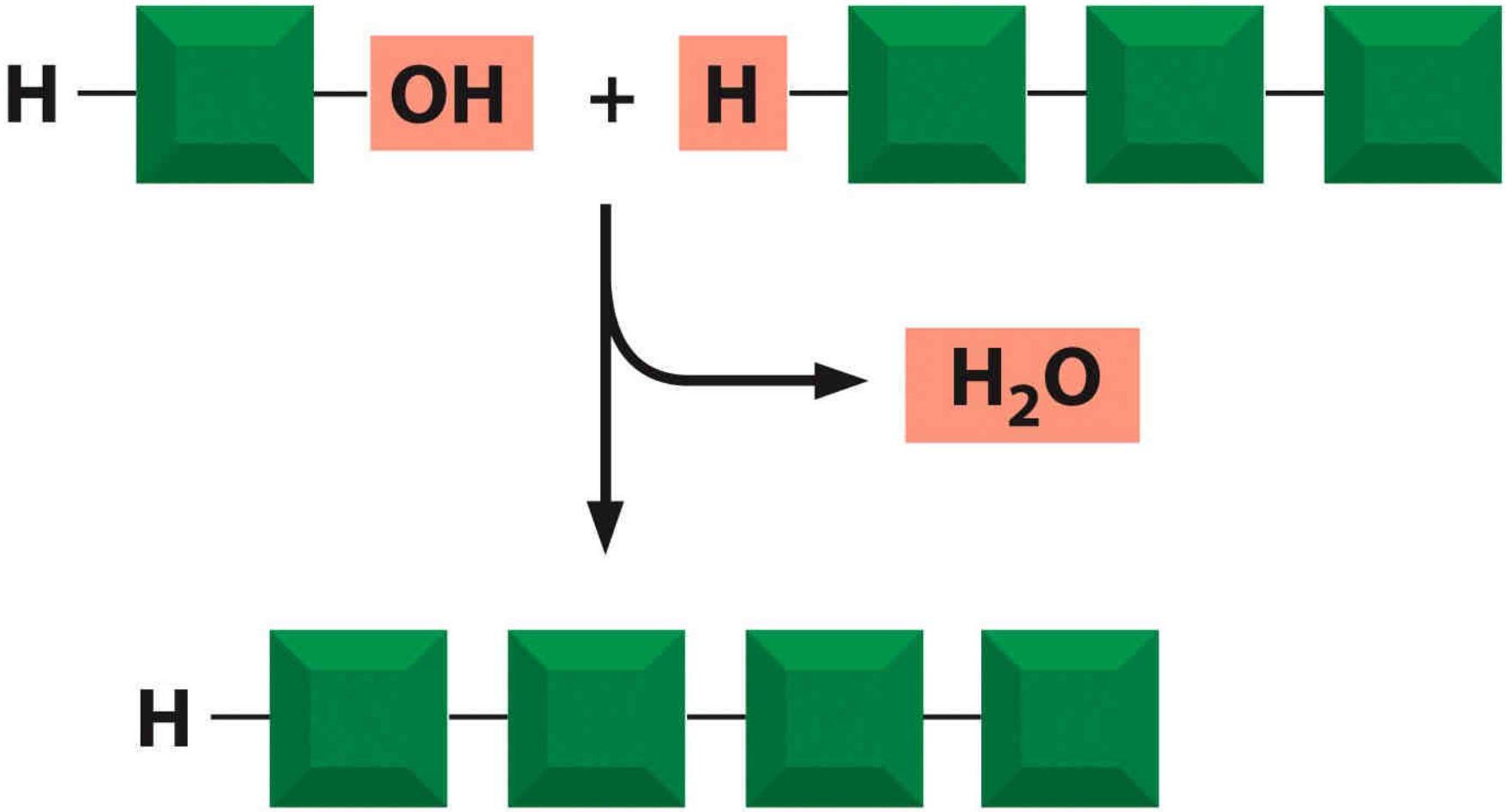


Figure 2-28 *Essential Cell Biology* (© Garland Science 2010)

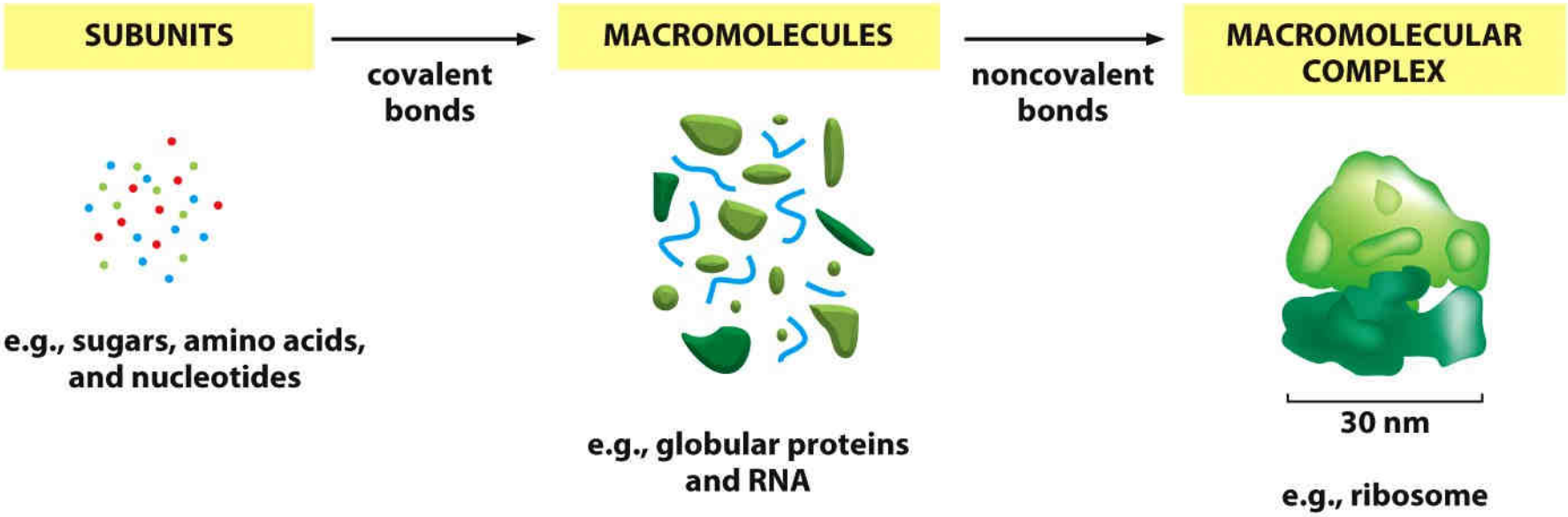


Figure 2-33 *Essential Cell Biology* (© Garland Science 2010)

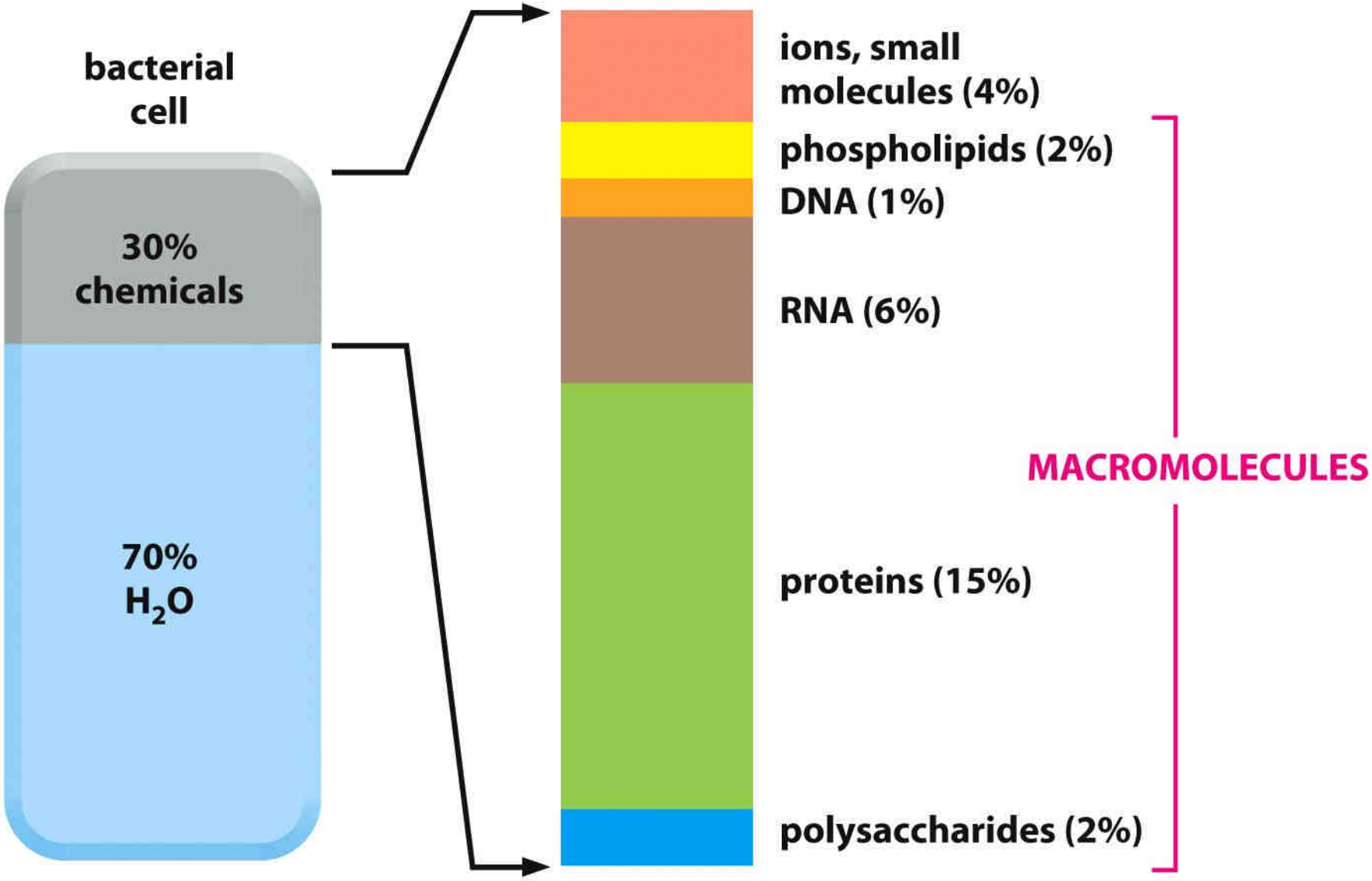


Figure 2-26 *Essential Cell Biology* (© Garland Science 2010)

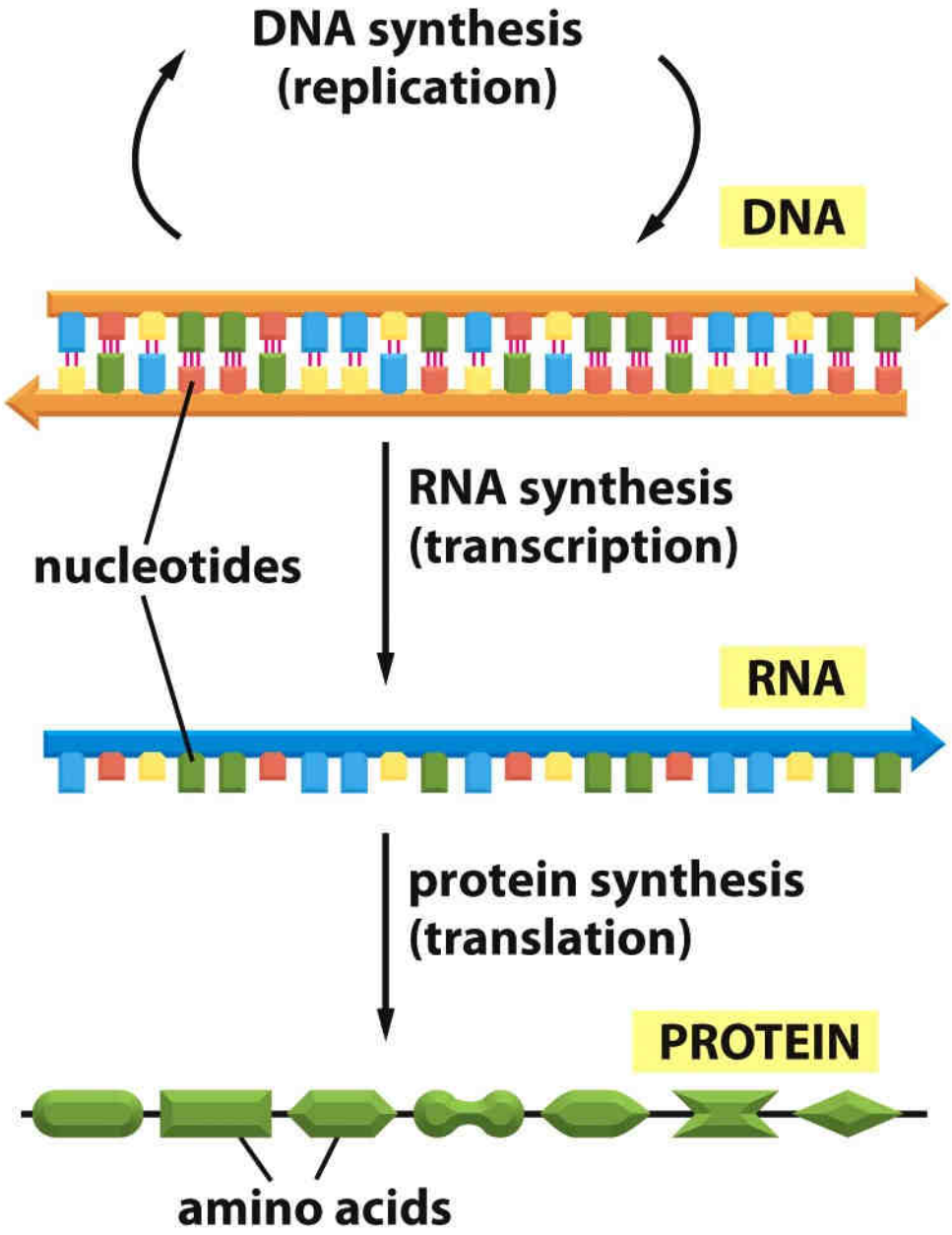


Figure 1-2 *Essential Cell Biology* (© Garland Science 2010)

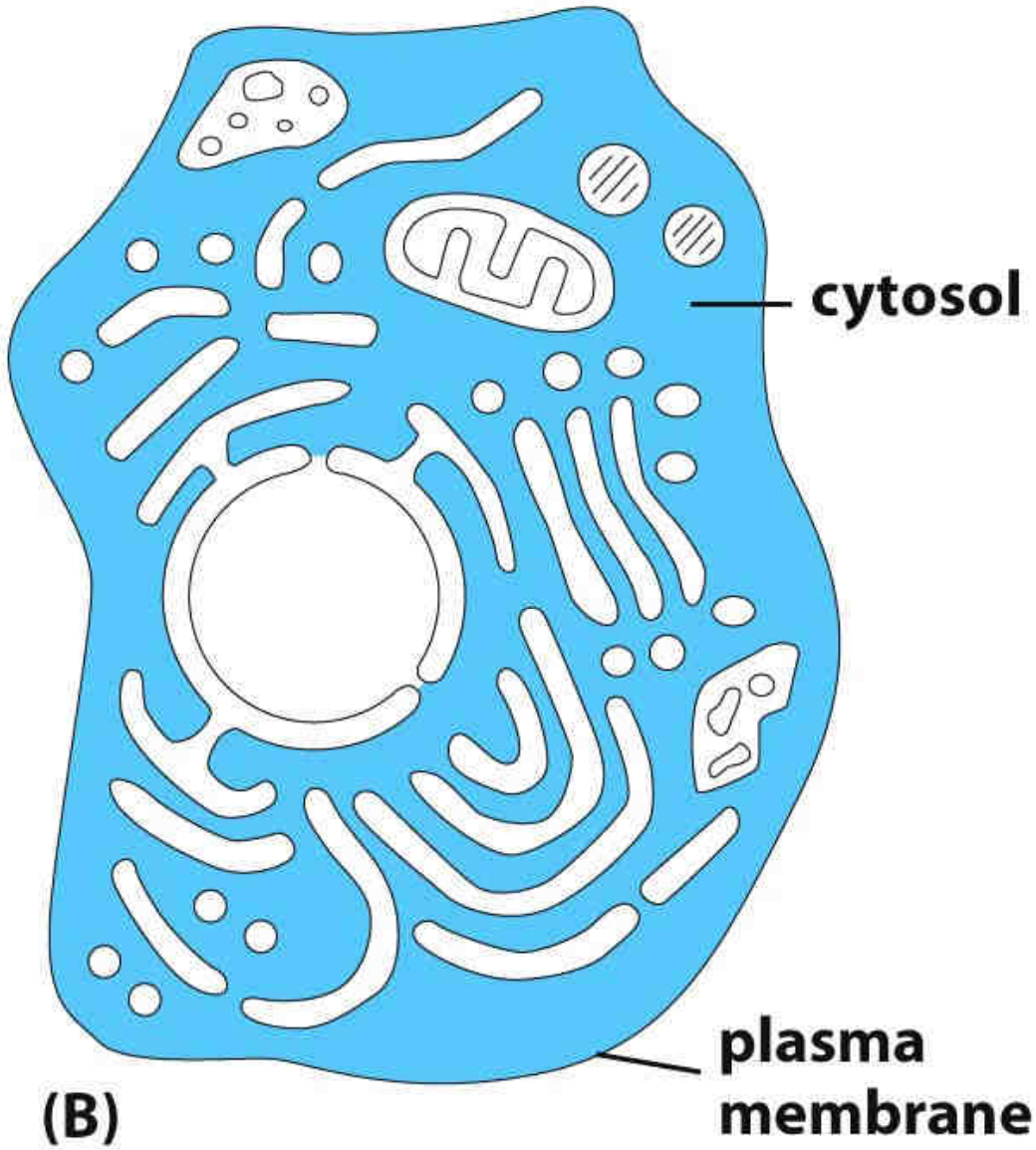
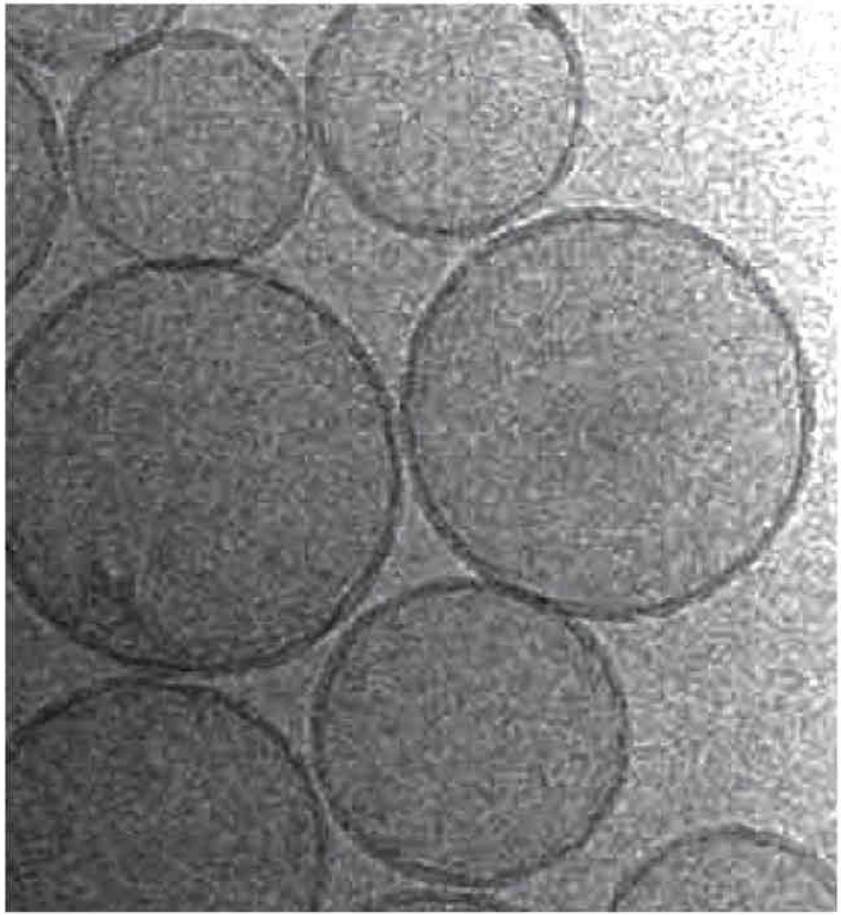
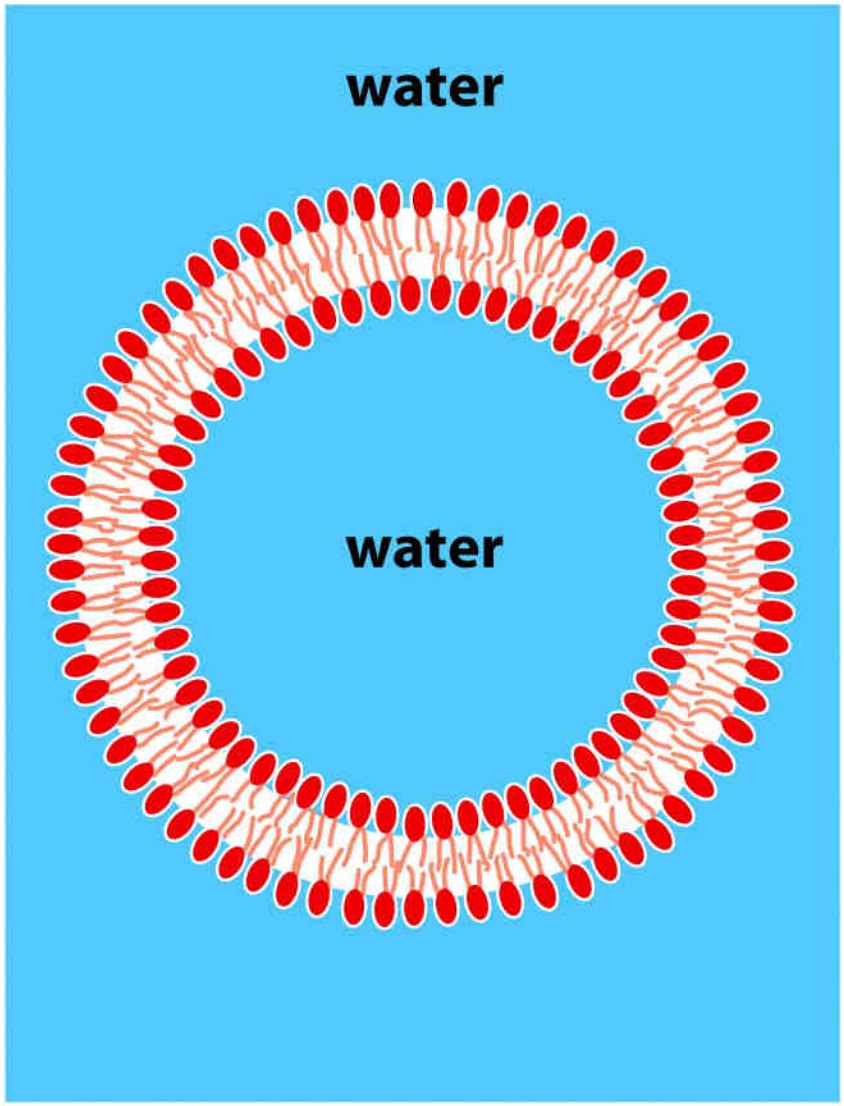


Figure 1-24 *Essential Cell Biology* (© Garland Science 2010)

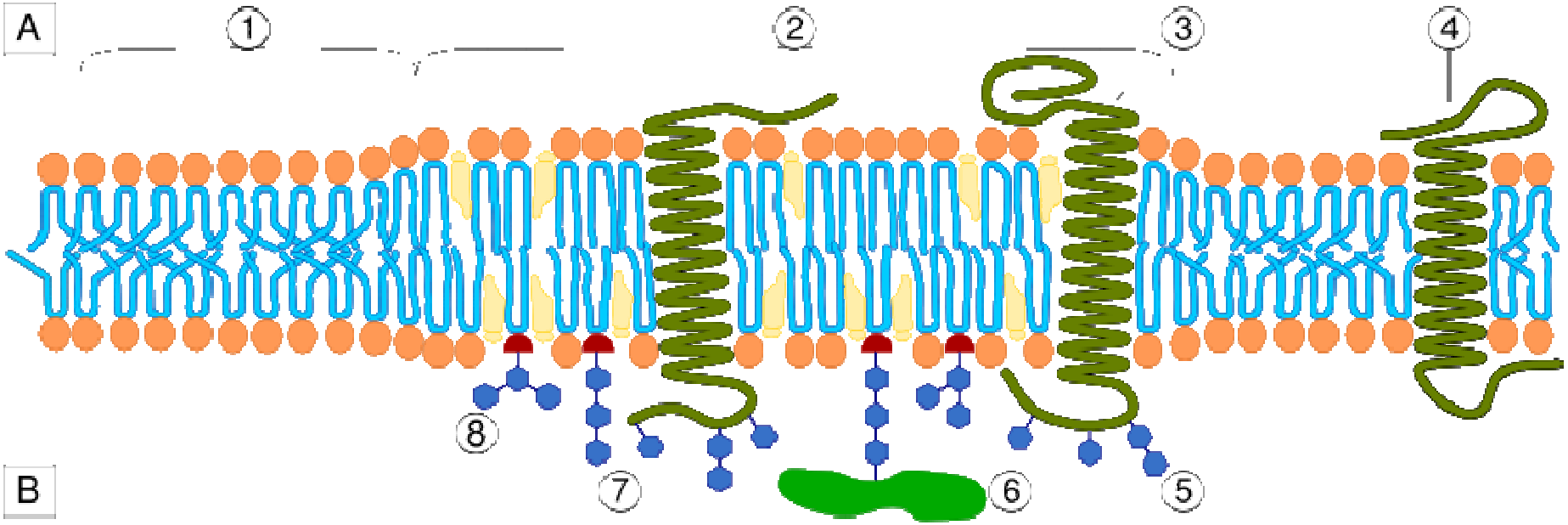




(A)

(B)

Figure 11-13 *Essential Cell Biology* (© Garland Science 2010)


A
1
2
3
4
8
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6
5
B

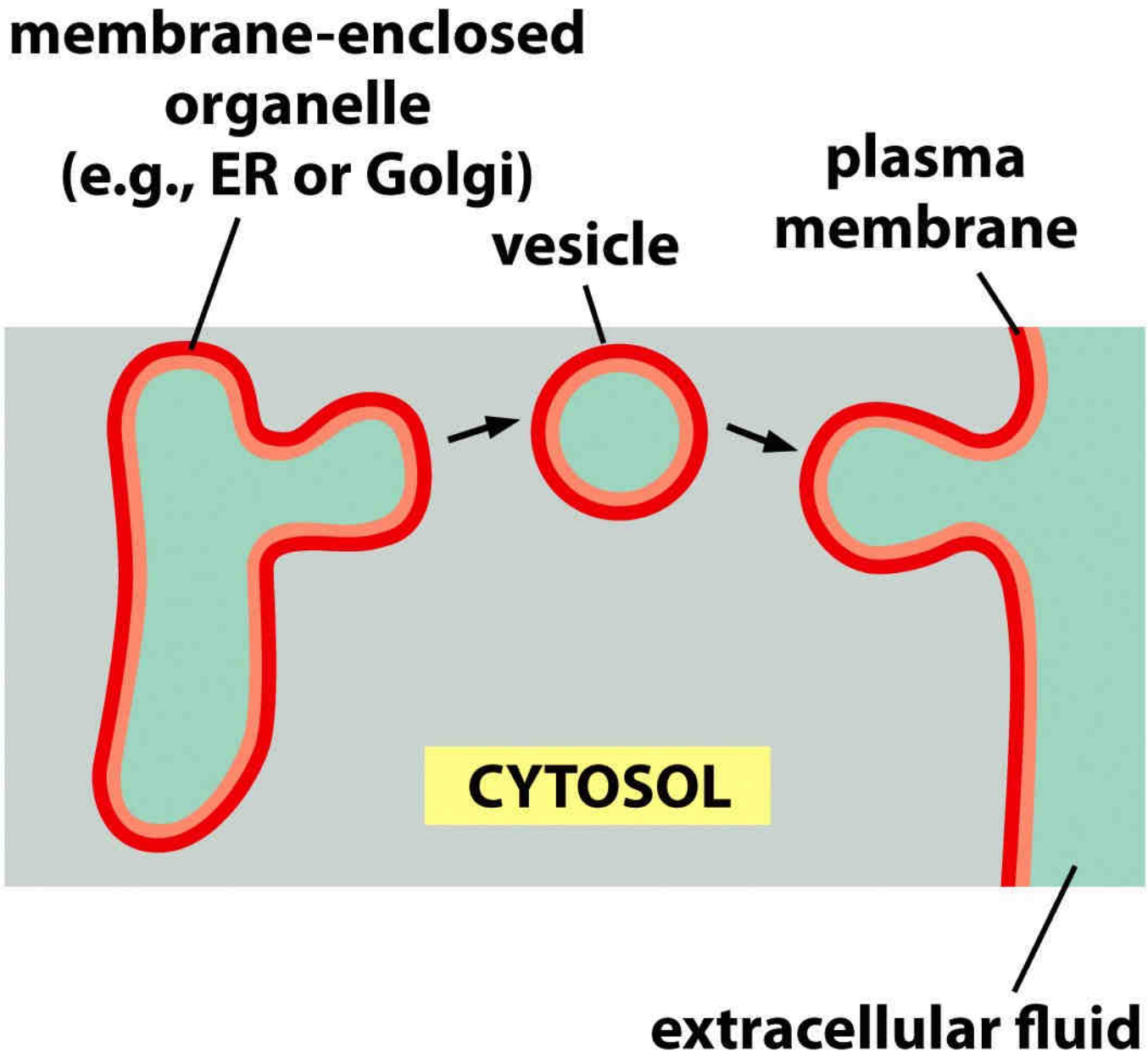


Figure 11-19 *Essential Cell Biology* (© Garland Science 2010)

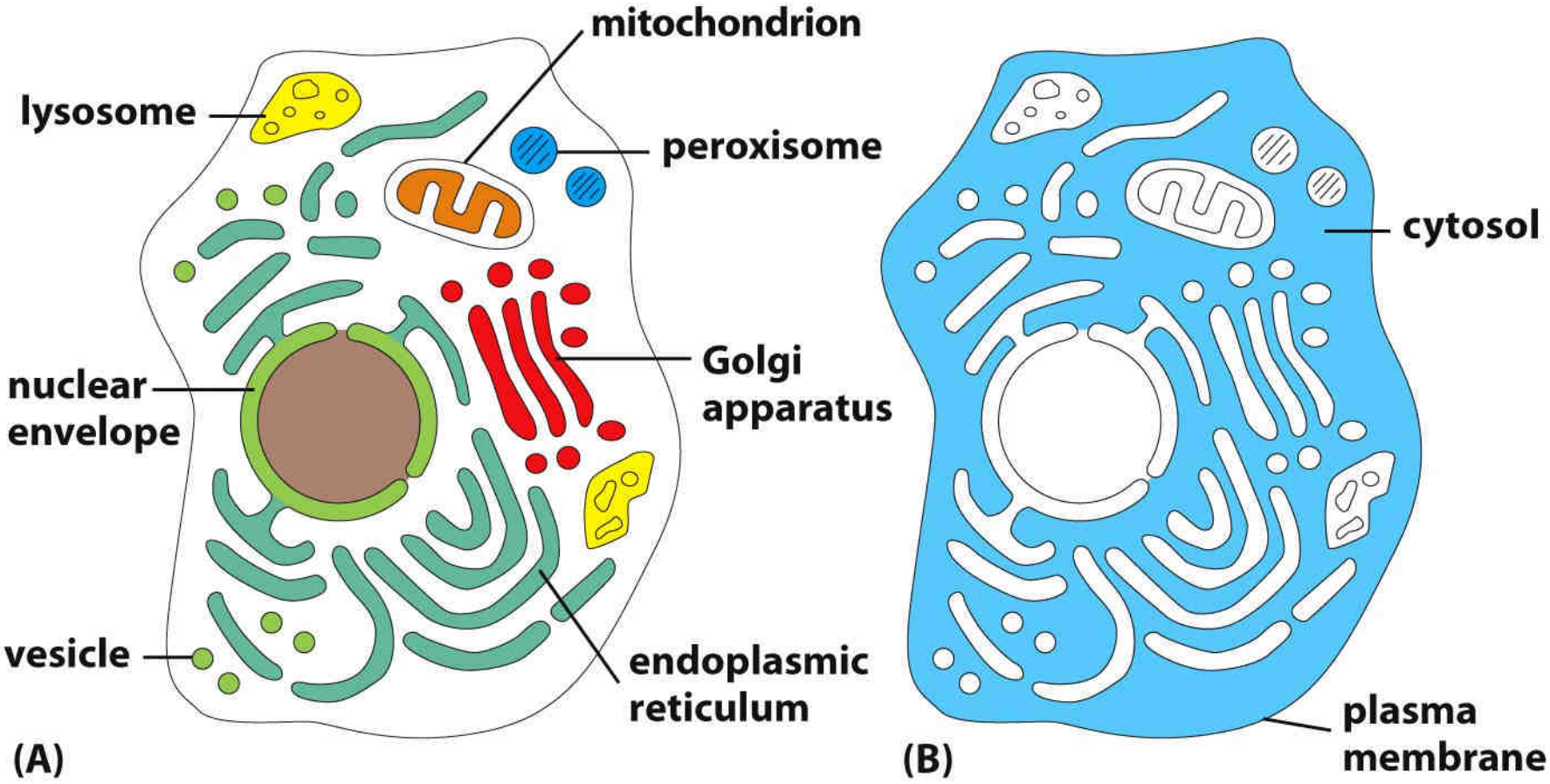


Figure 1-24 *Essential Cell Biology* (© Garland Science 2010)

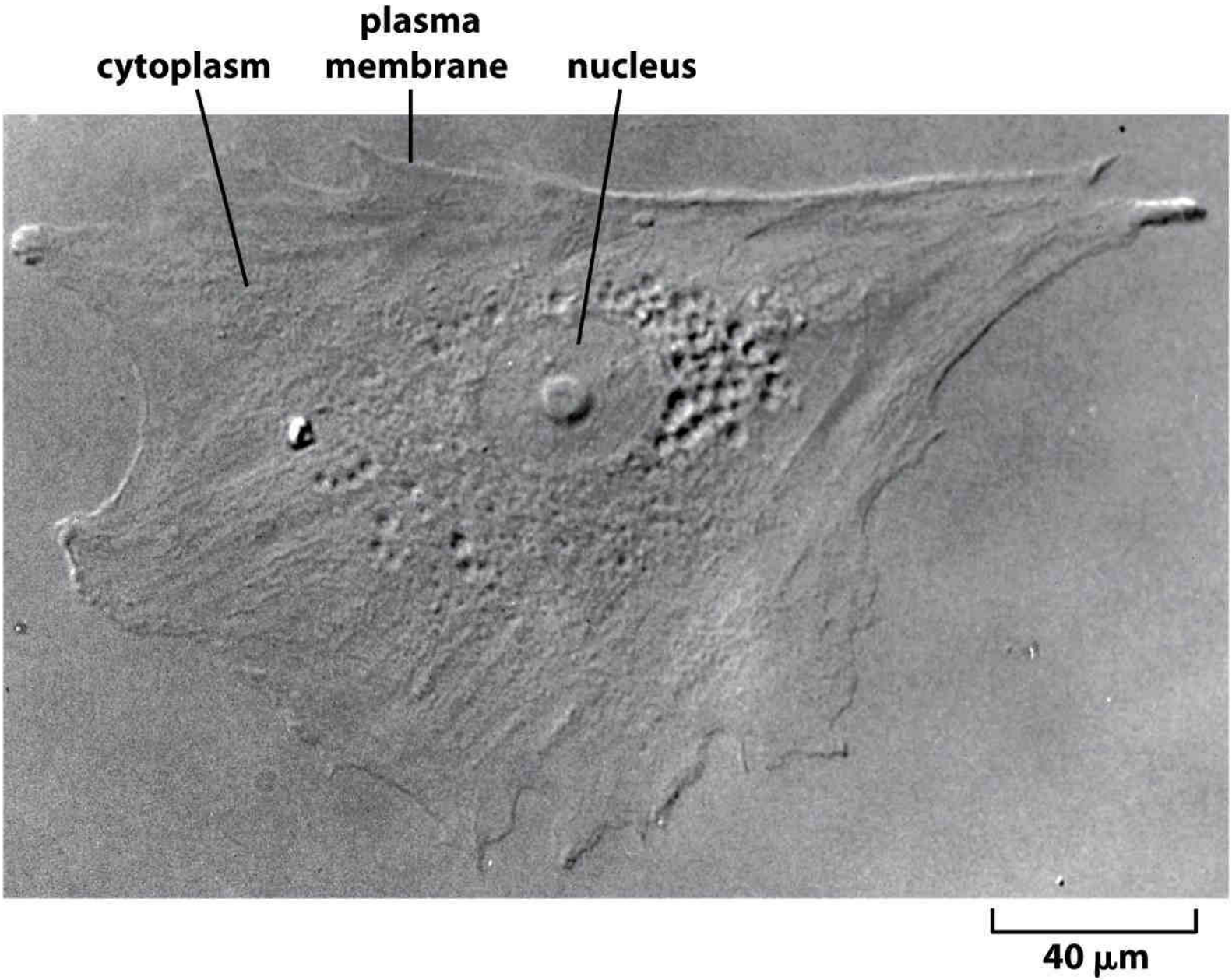


Figure 1-7a *Essential Cell Biology* (© Garland Science 2010)

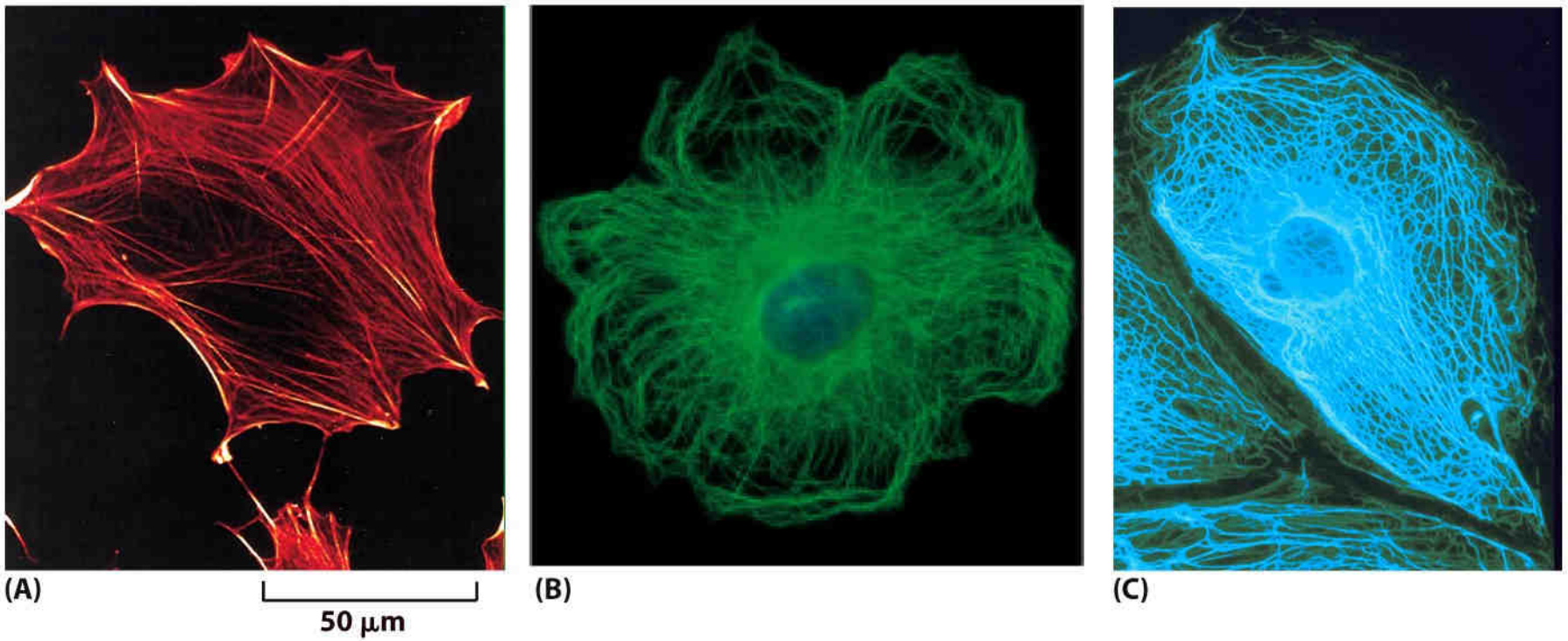


Figure 1-27 *Essential Cell Biology* (© Garland Science 2010)

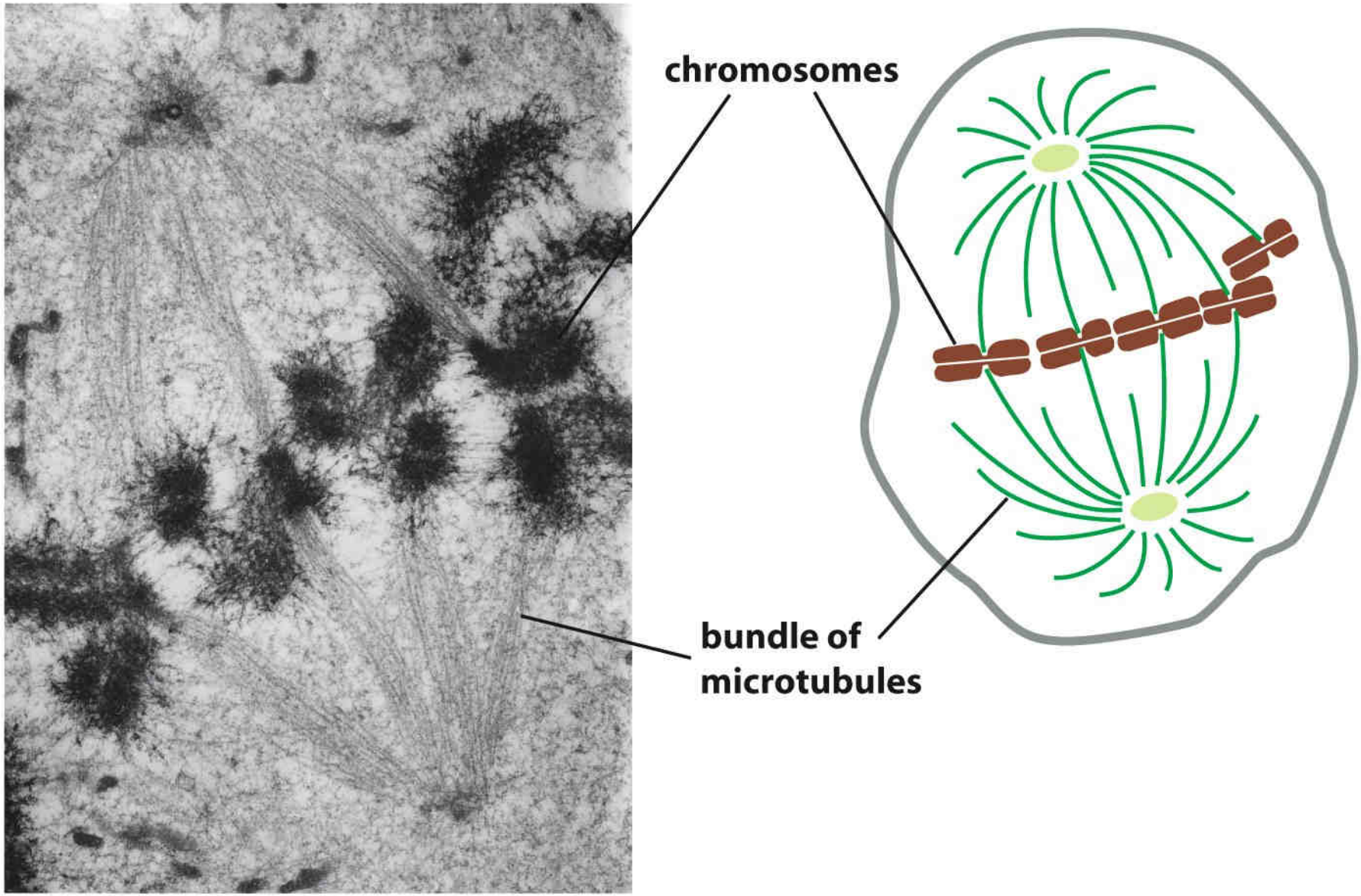


Figure 1-28 *Essential Cell Biology* (© Garland Science 2010)

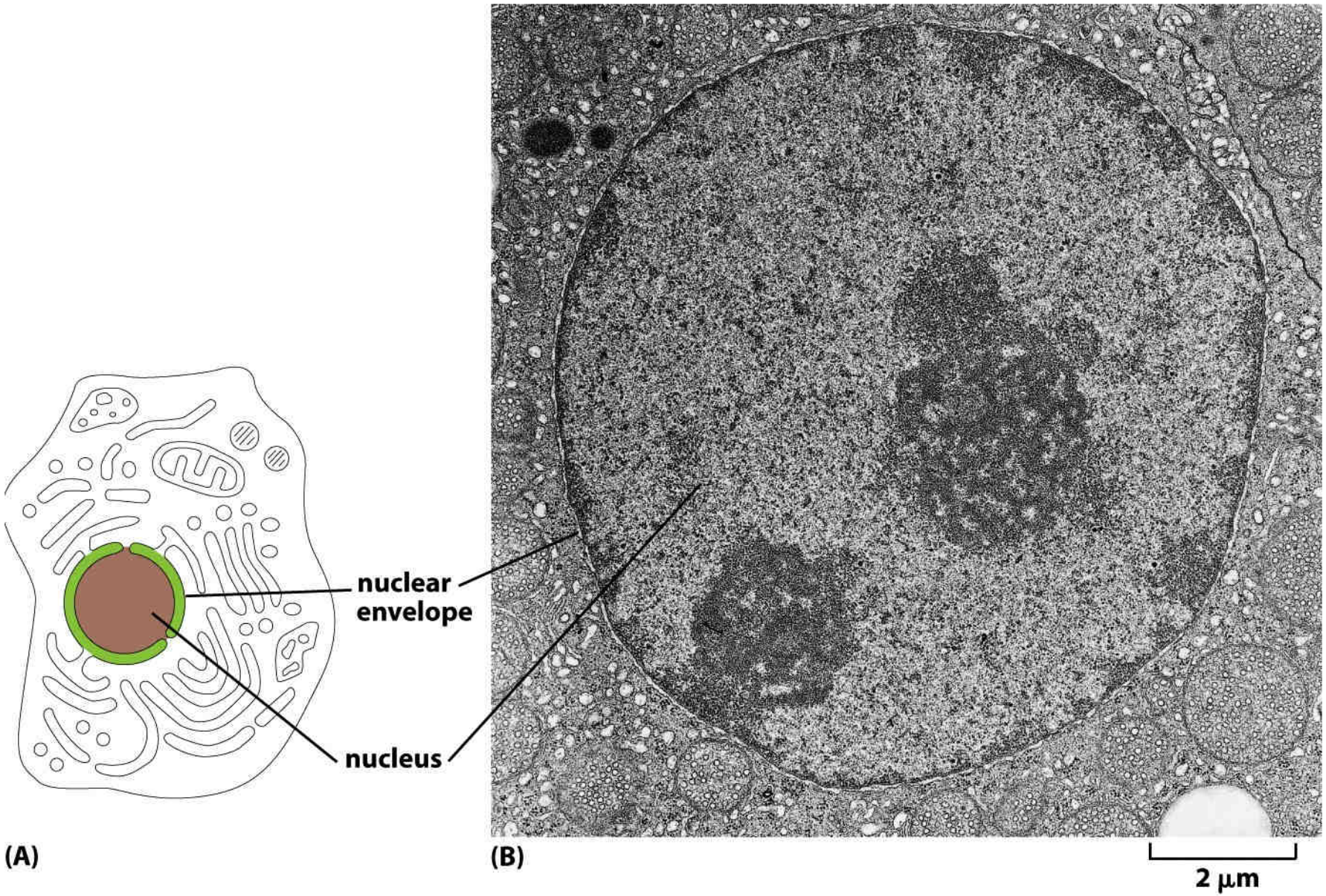


Figure 1-15 *Essential Cell Biology* (© Garland Science 2010)

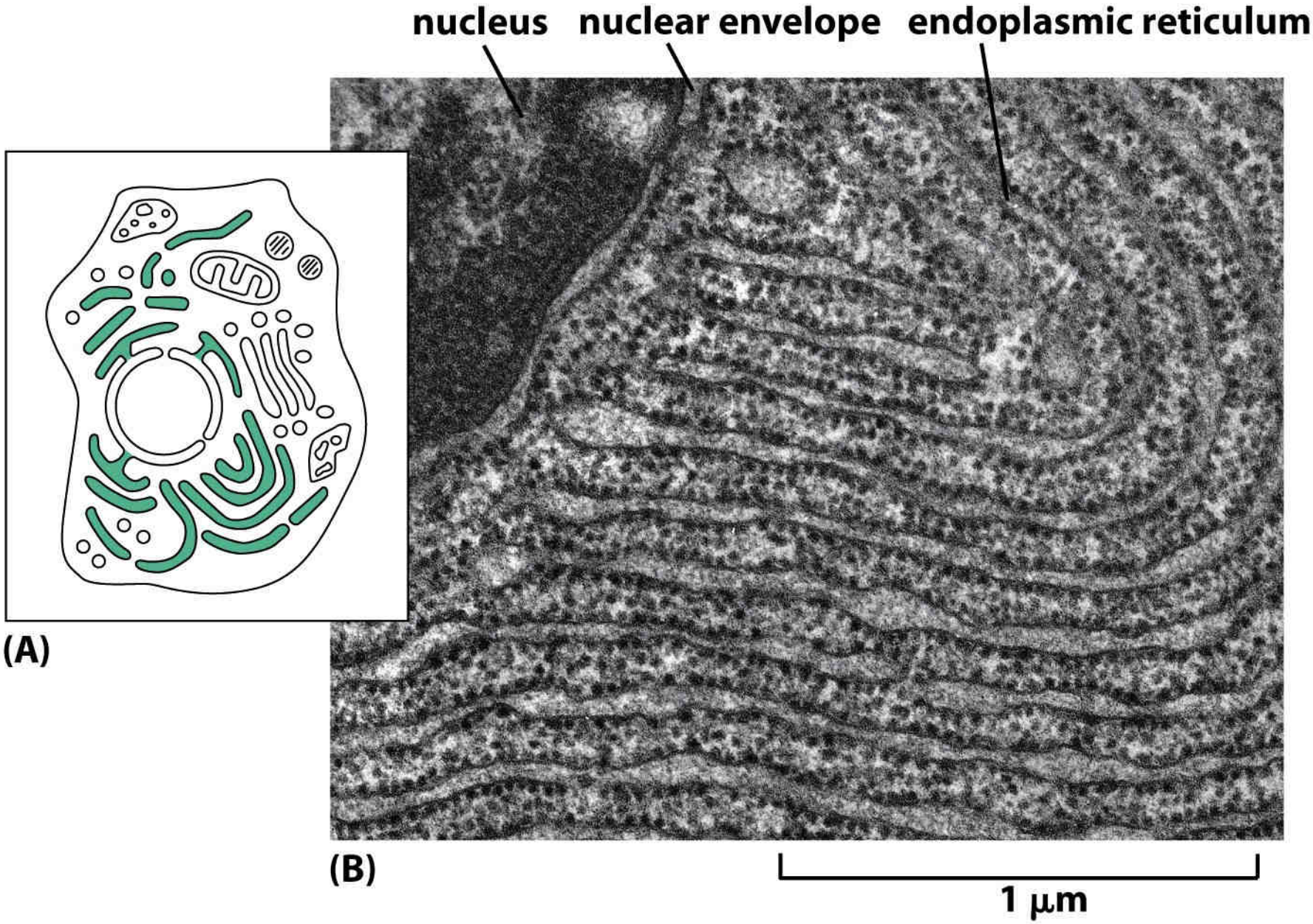


Figure 1-22 *Essential Cell Biology* (© Garland Science 2010)

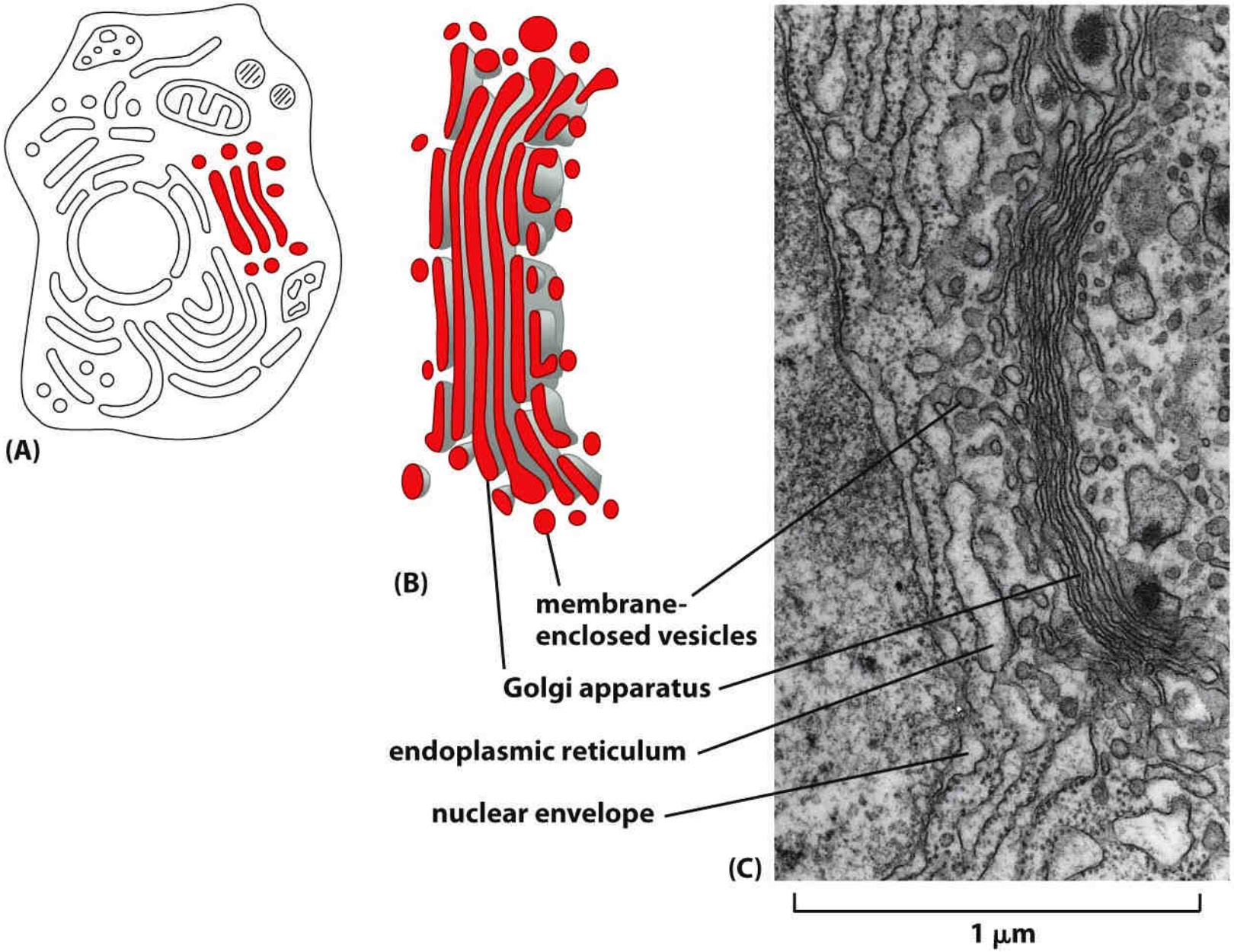


Figure 1-23 *Essential Cell Biology* (© Garland Science 2010)

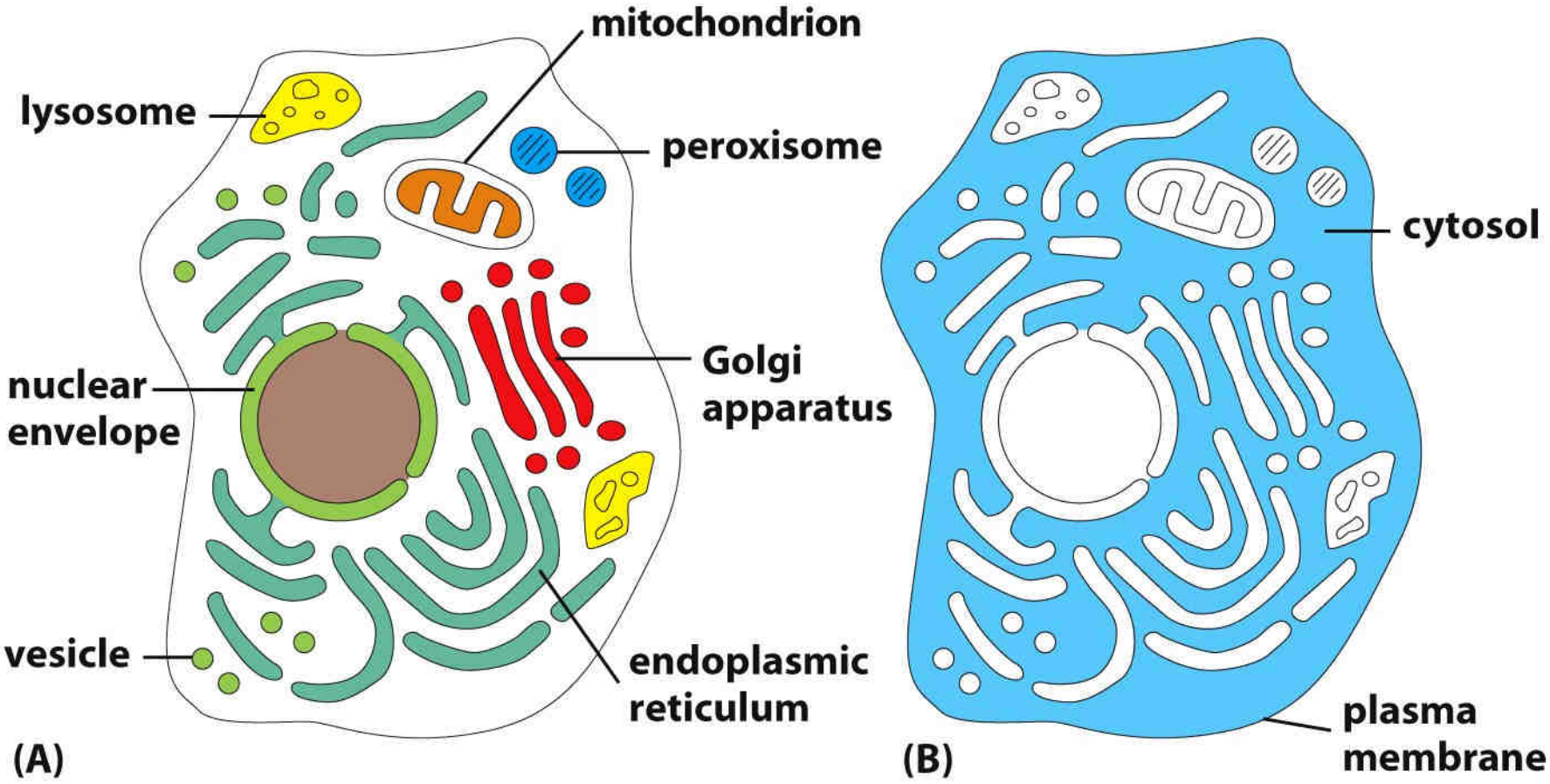


Figure 1-24 *Essential Cell Biology* (© Garland Science 2010)

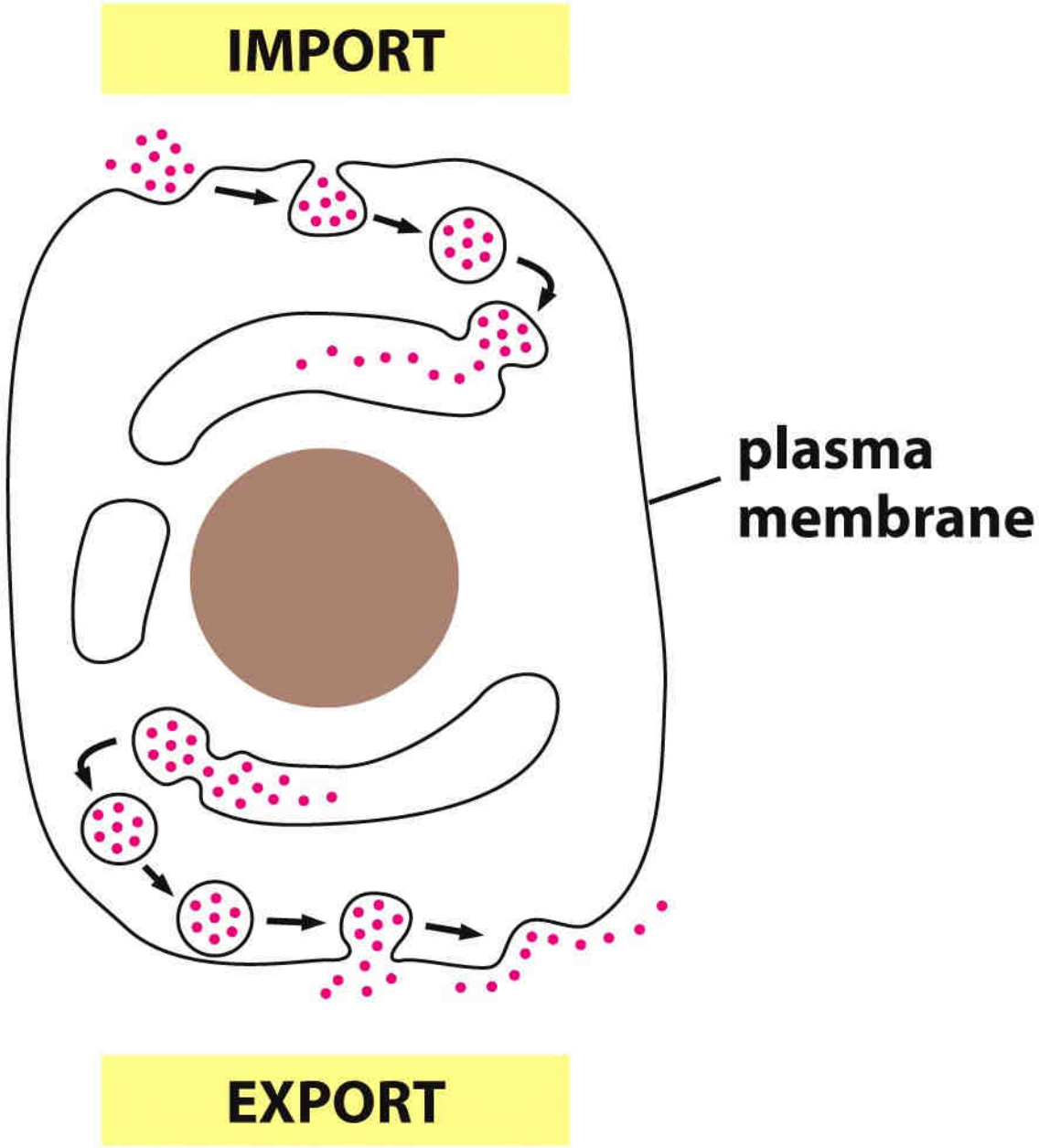
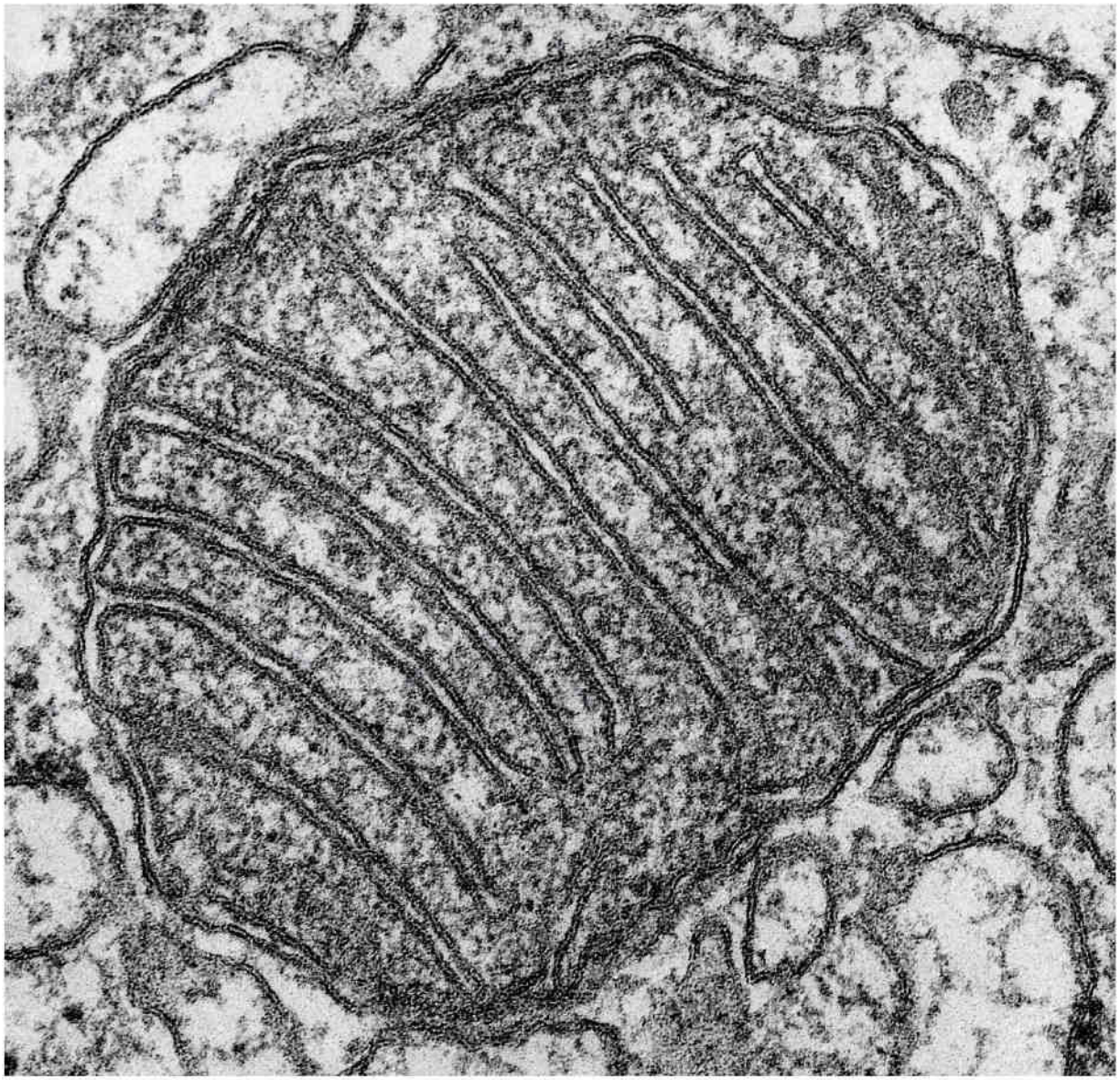


Figure 1-25 *Essential Cell Biology* (© Garland Science 2010)



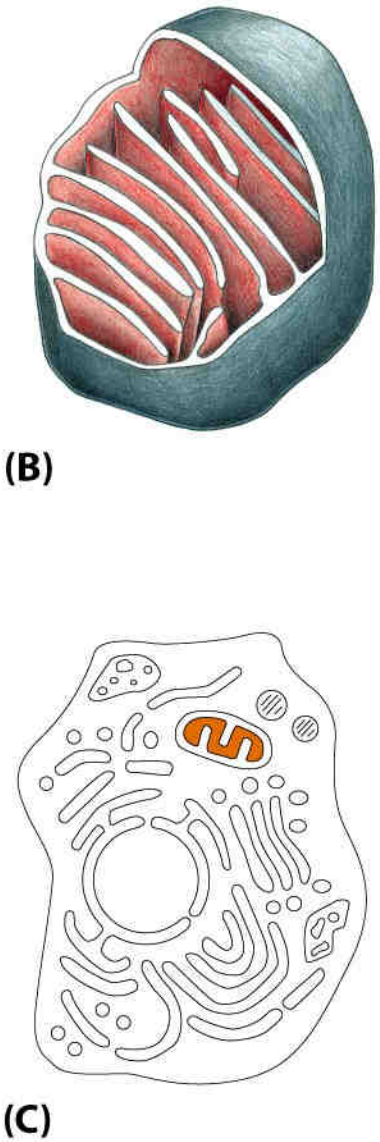


Figure 1-18 *Essential Cell Biology* (© Garland Science 2010)

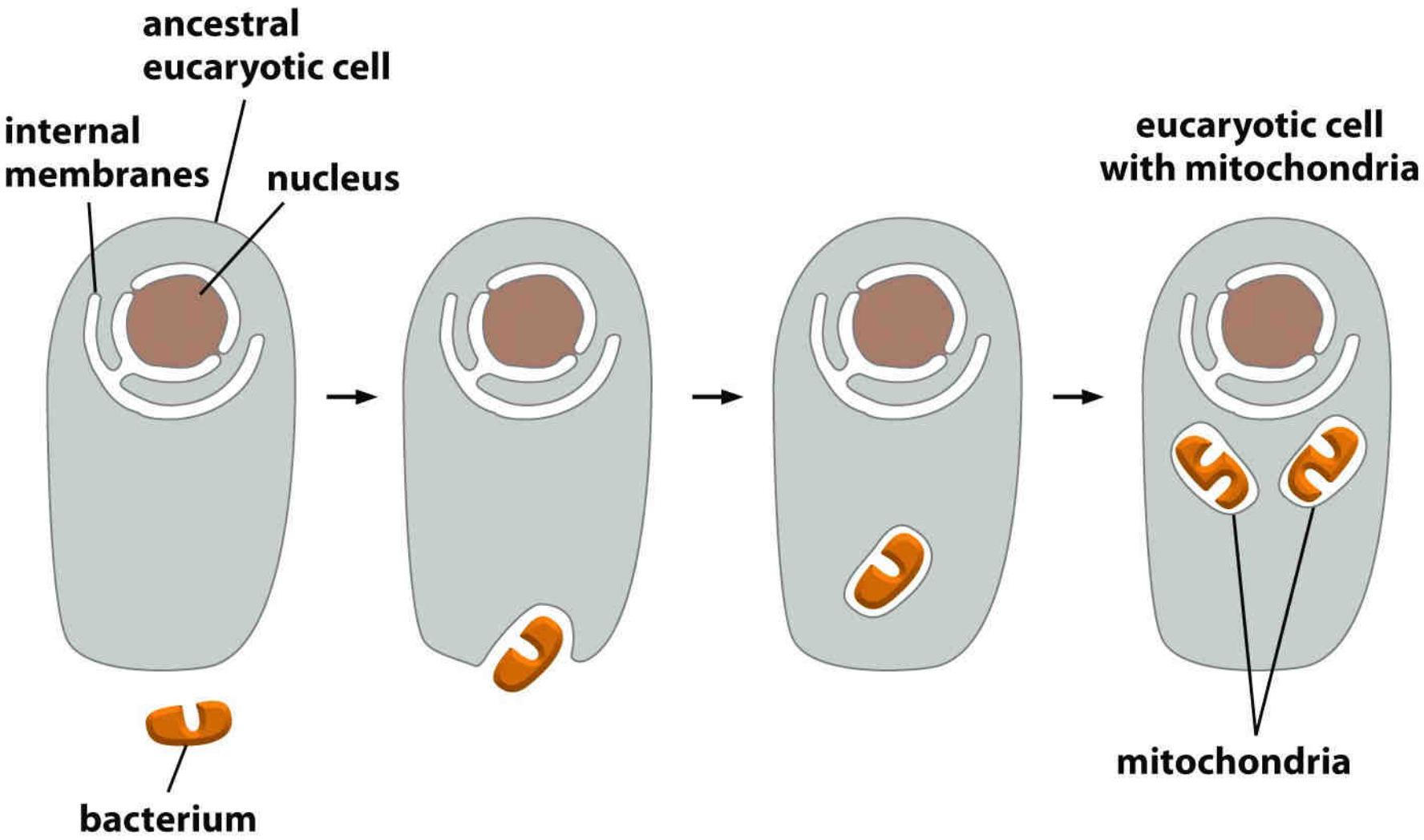


Figure 1-19 *Essential Cell Biology* (© Garland Science 2010)

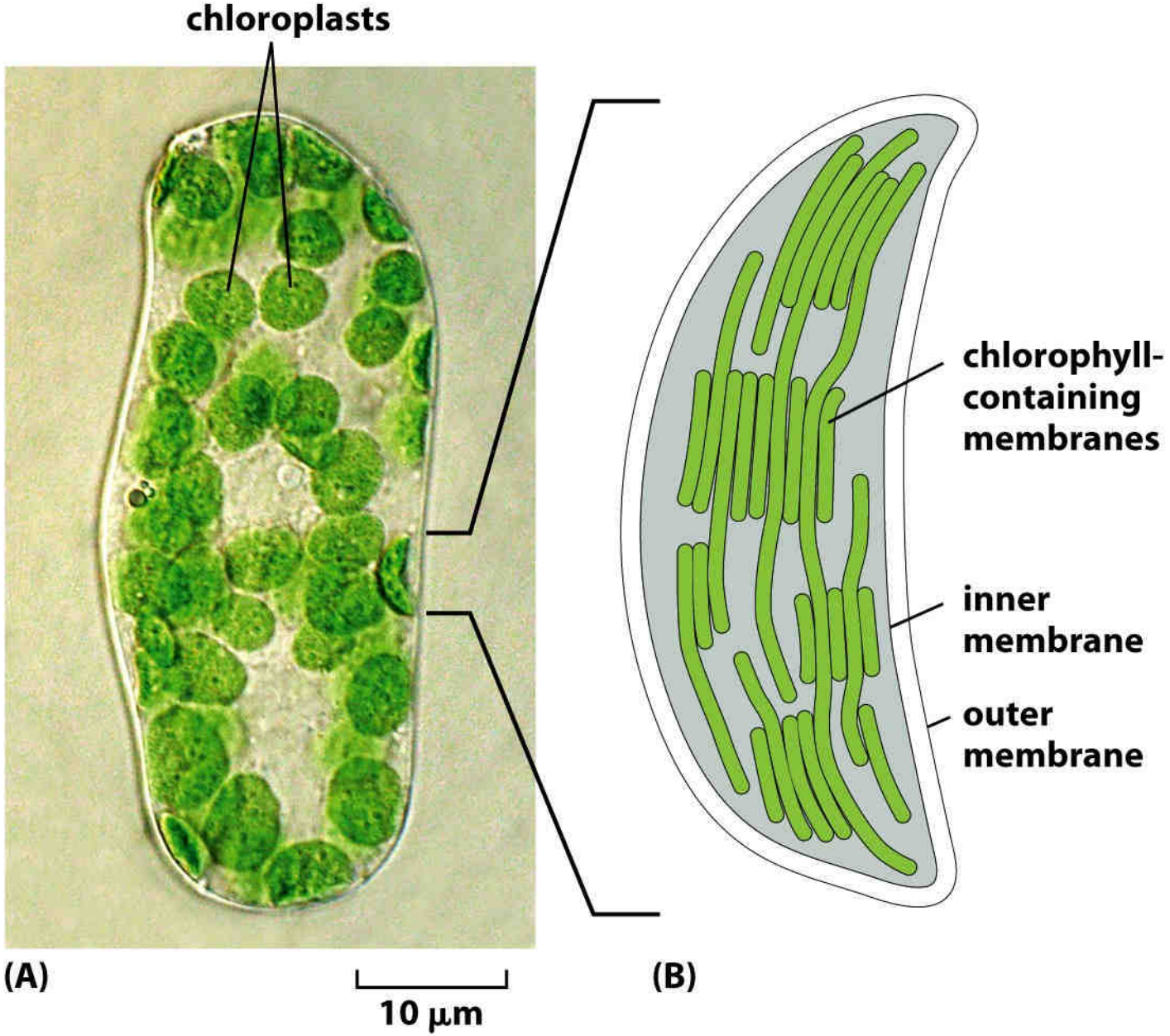


Figure 1-20 *Essential Cell Biology* (© Garland Science 2010)

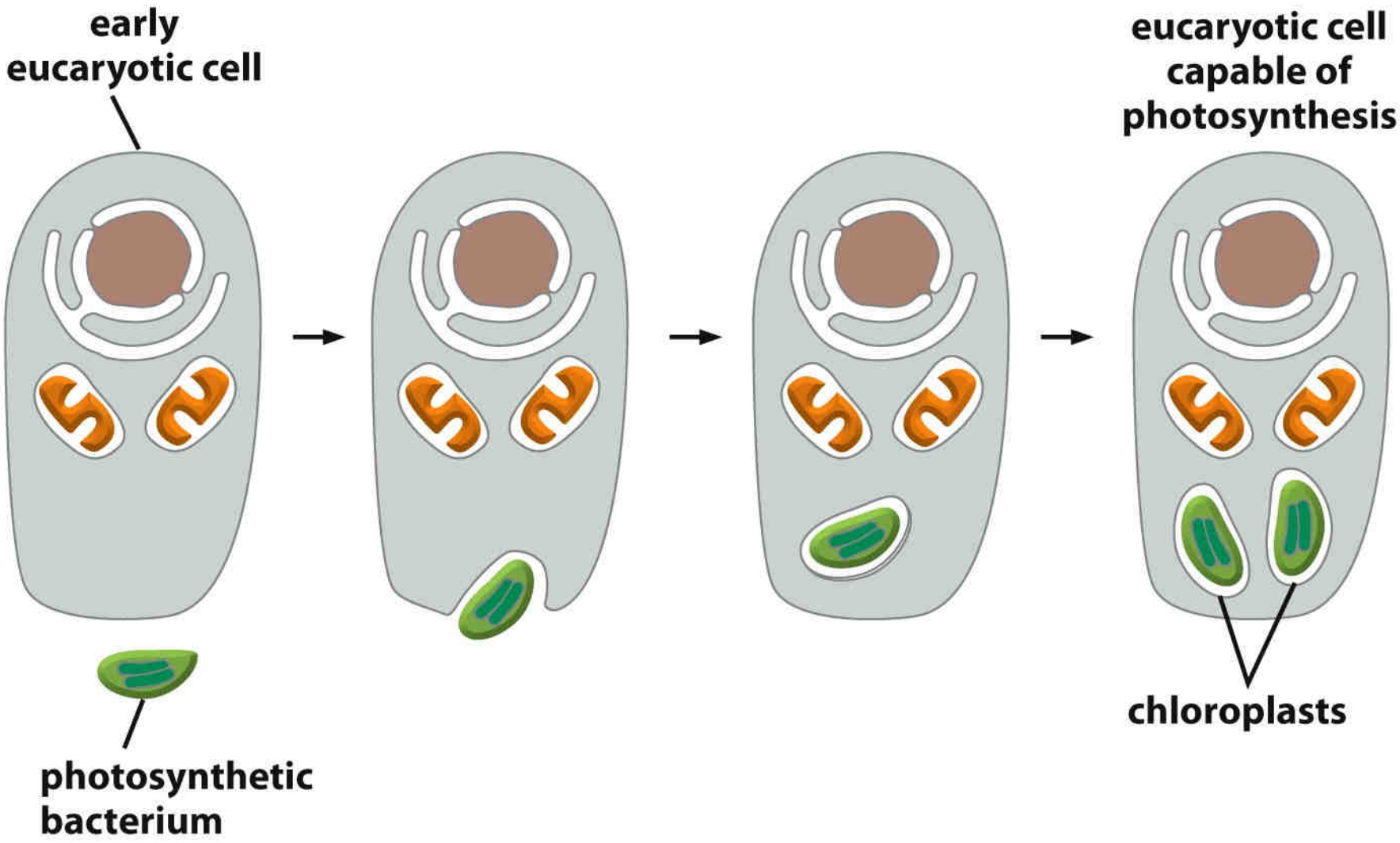
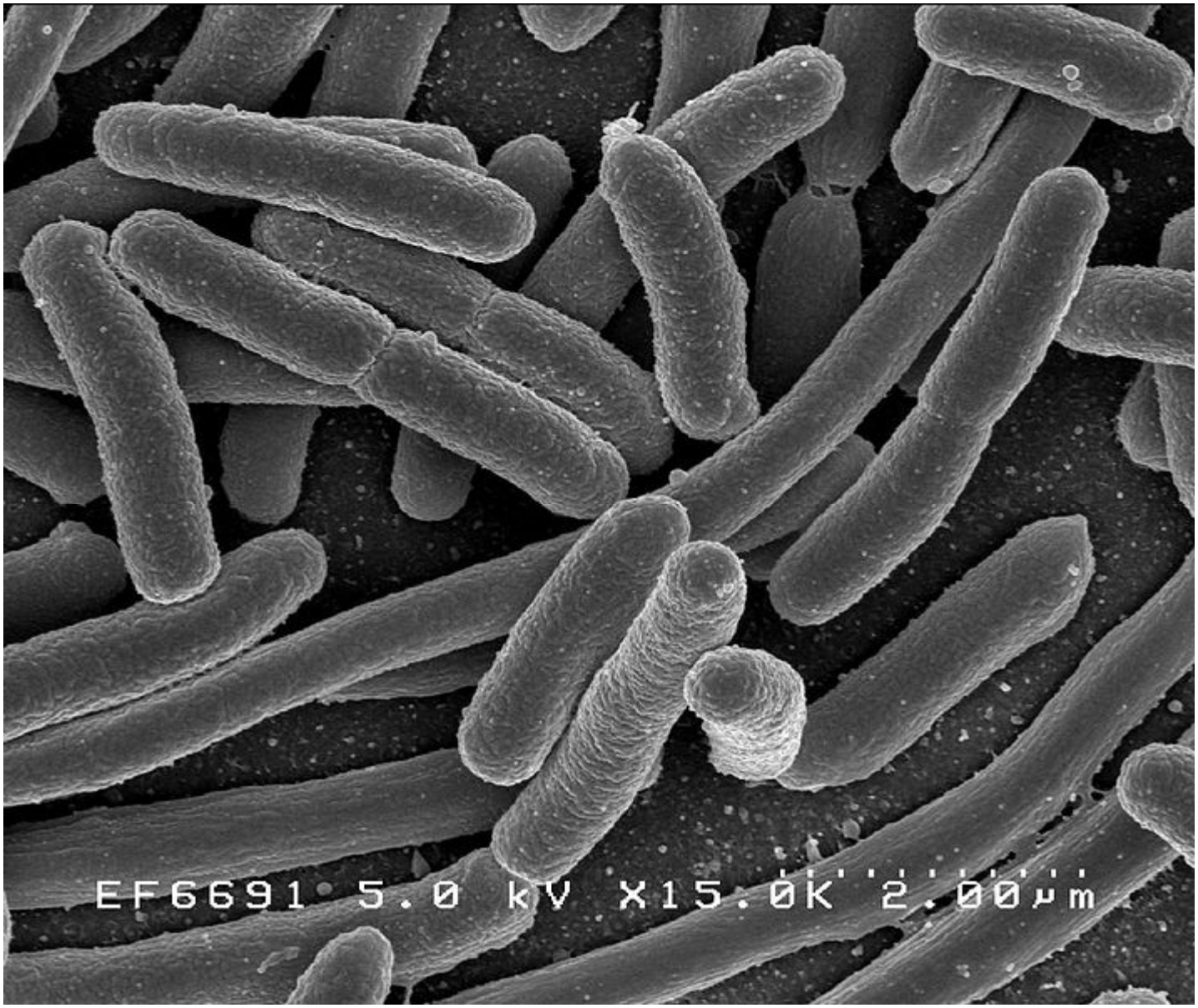


Figure 1-21 *Essential Cell Biology* (© Garland Science 2010)



E. coli

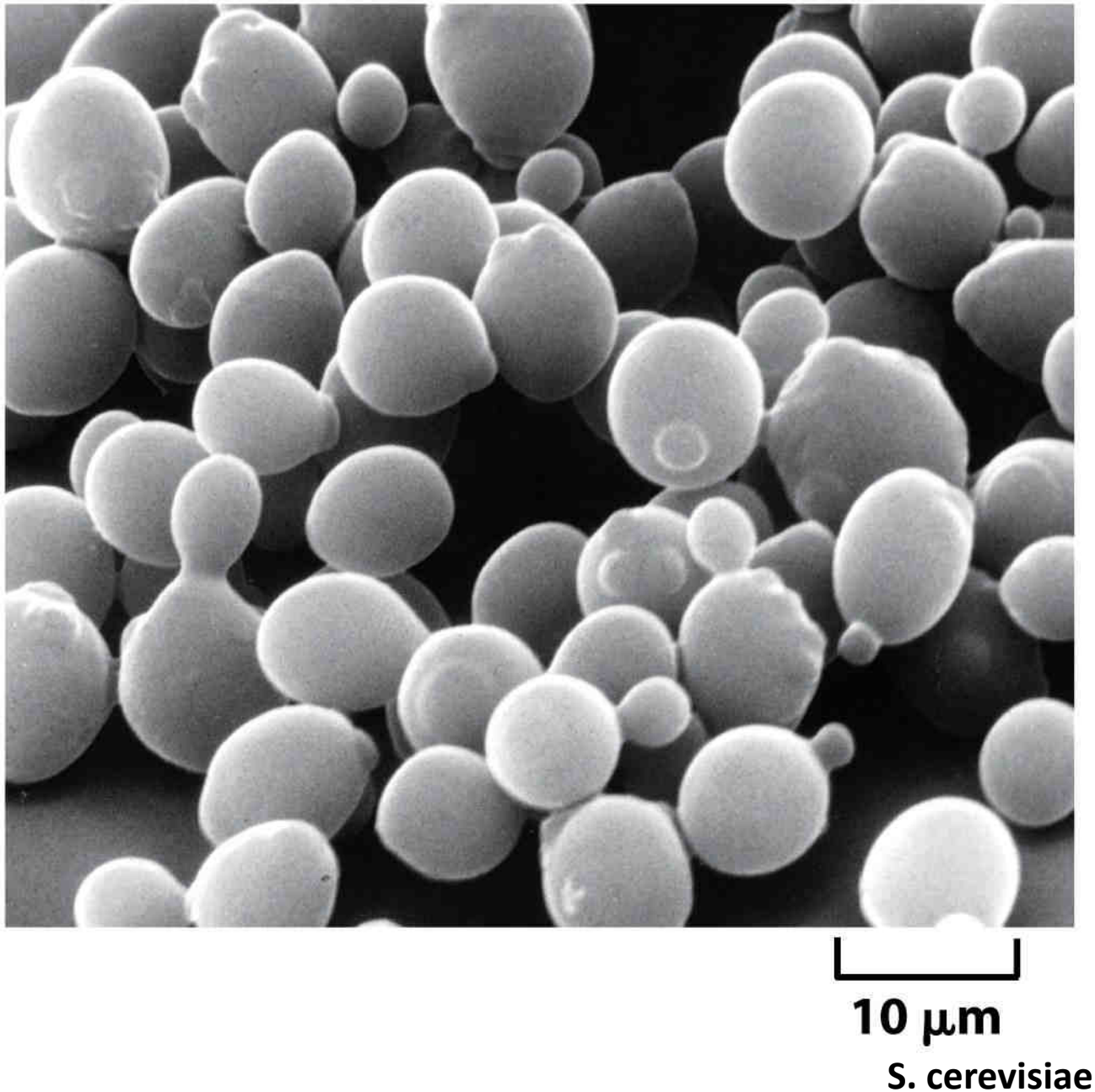


Figure 1-32 *Essential Cell Biology* (© Garland Science 2010)

Figure 1-33 *Essential Cell Biology* (© Garland Science 2010)

arabidopsis thaliana

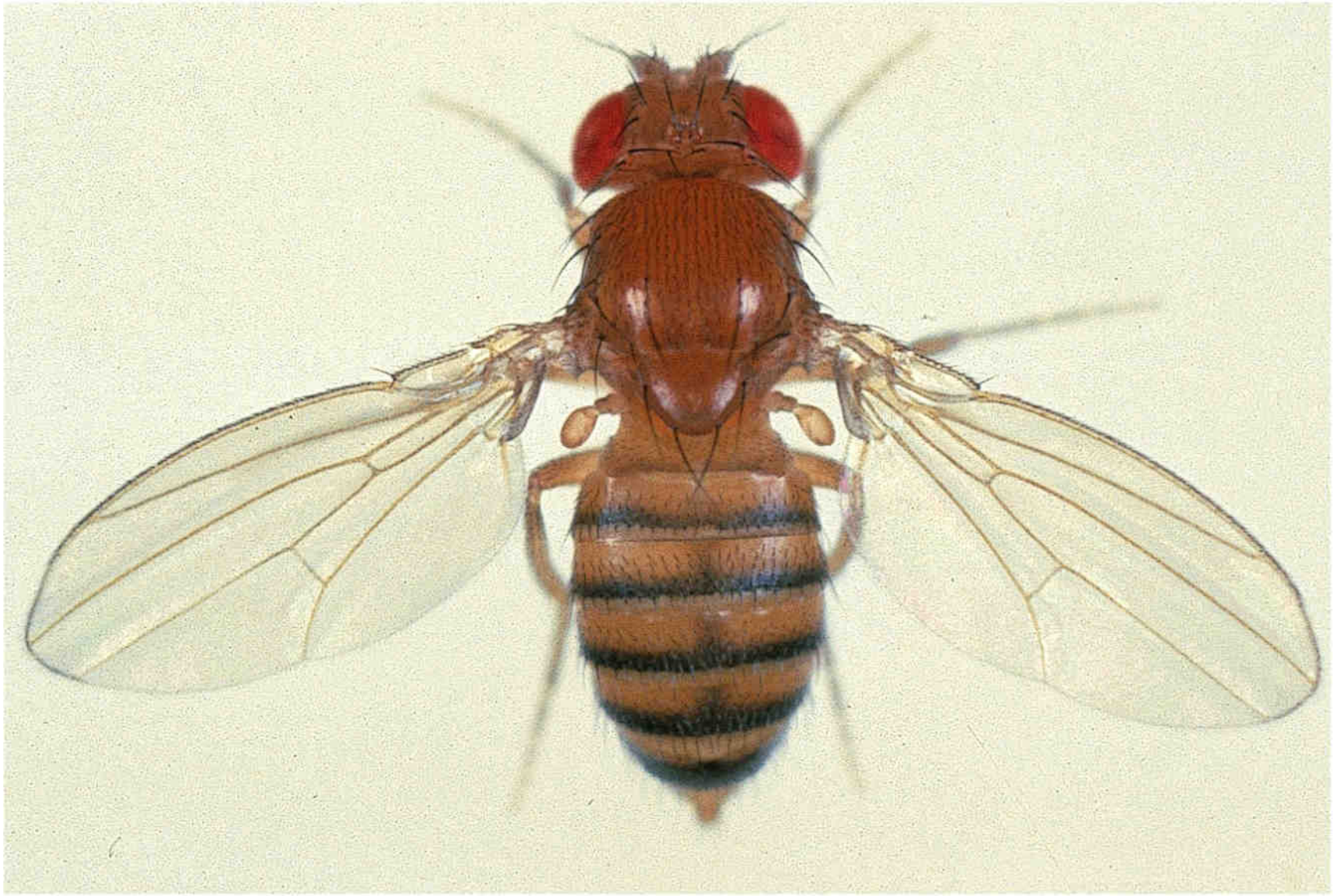


Figure 1-34 *Essential Cell Biology* (© Garland Science 2010)

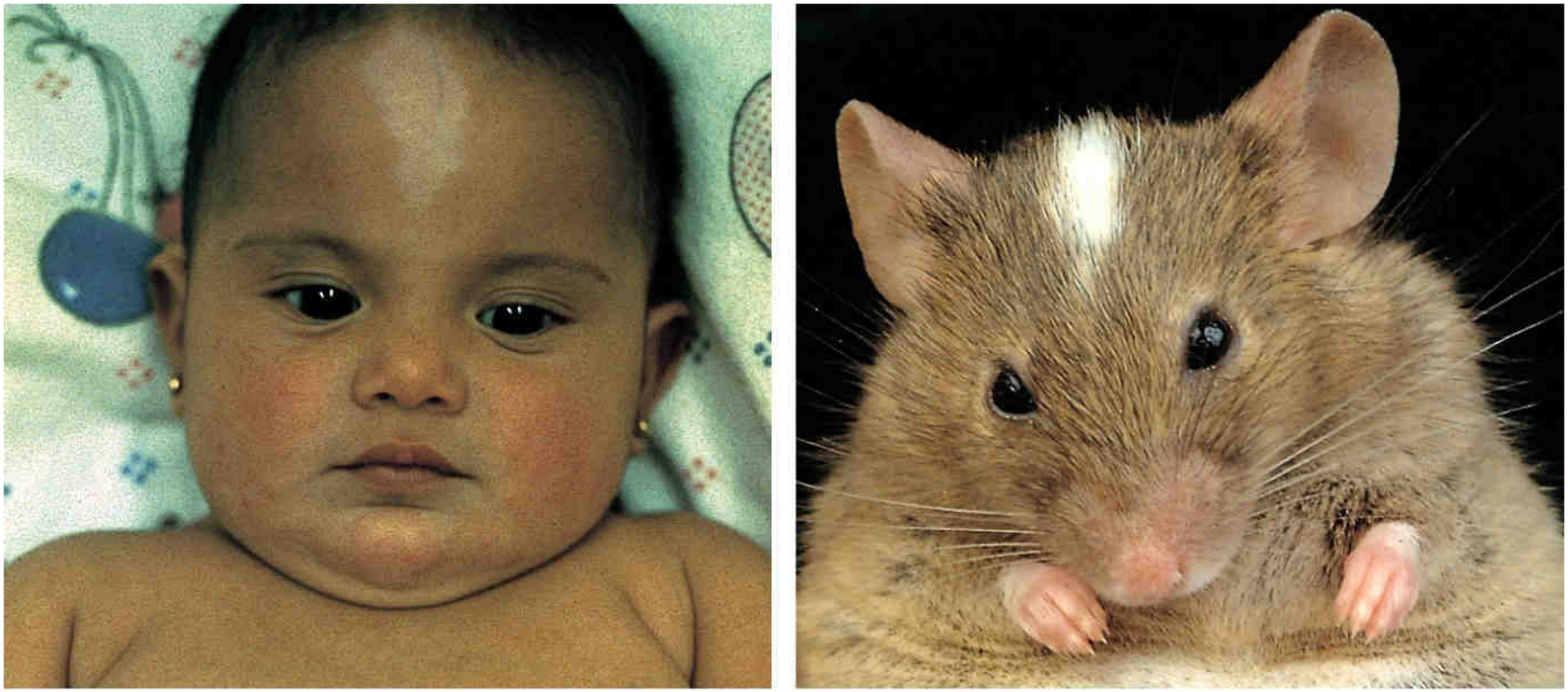


Figure 1-40 *Essential Cell Biology* (© Garland Science 2010)

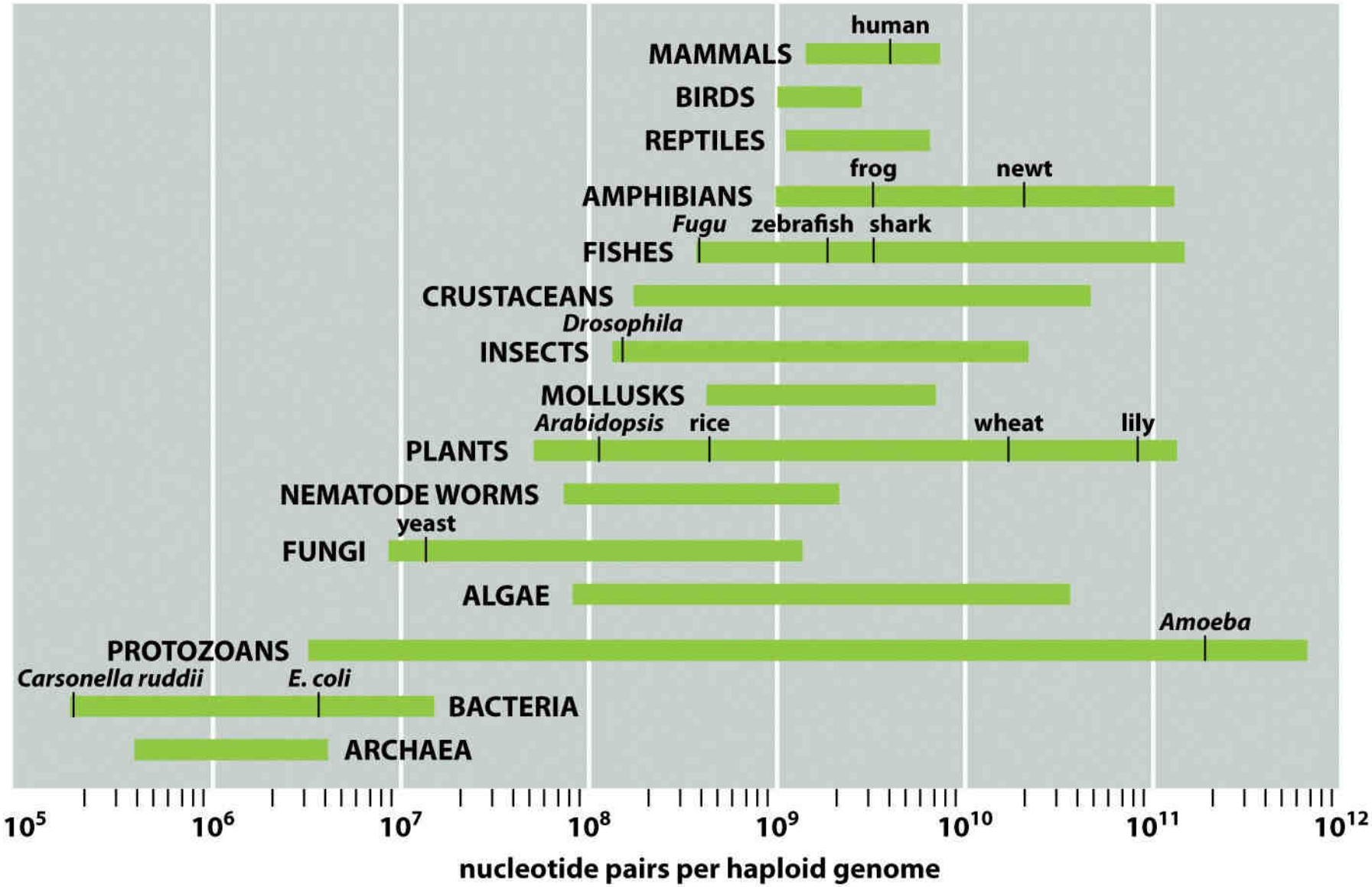


Figure 1-41 *Essential Cell Biology* (© Garland Science 2010)