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Didattica web: Fisiologia per Biologia

LIBRI TESTO CONSIGLIATI

SILVERTHORN - FISIOLOGIA

Pearson - 94 Euro

STANFIELD-GERMAN - FISIOLOGIA

Edises - (83) 53 E

BERNE-LEVY - FISIOLOGIA

Casa Editrice Ambrosiana - 114 E

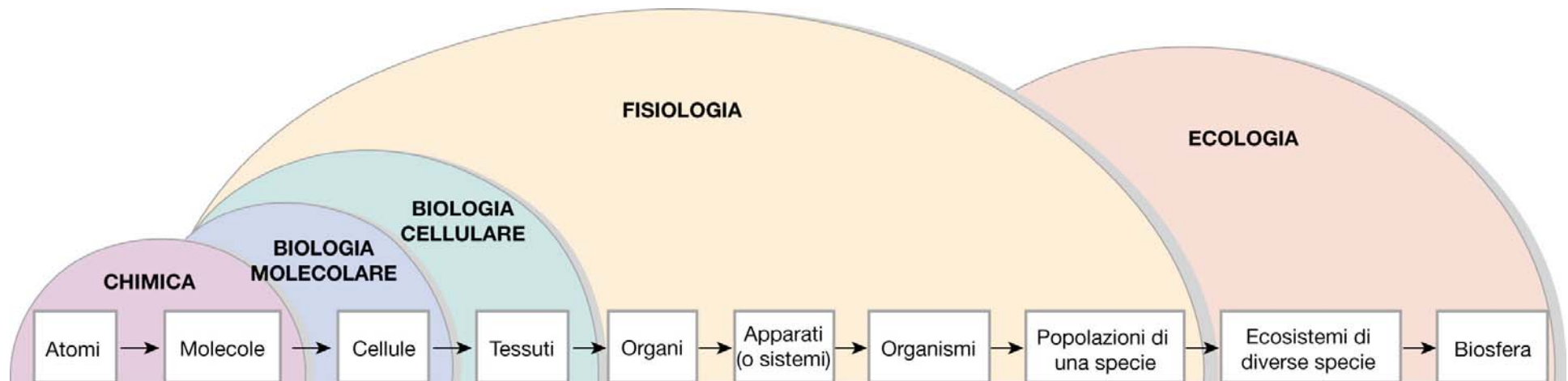
CARBONE et al. - FISIOLOGIA (Dalle molecole ai
Sistemi integrati)

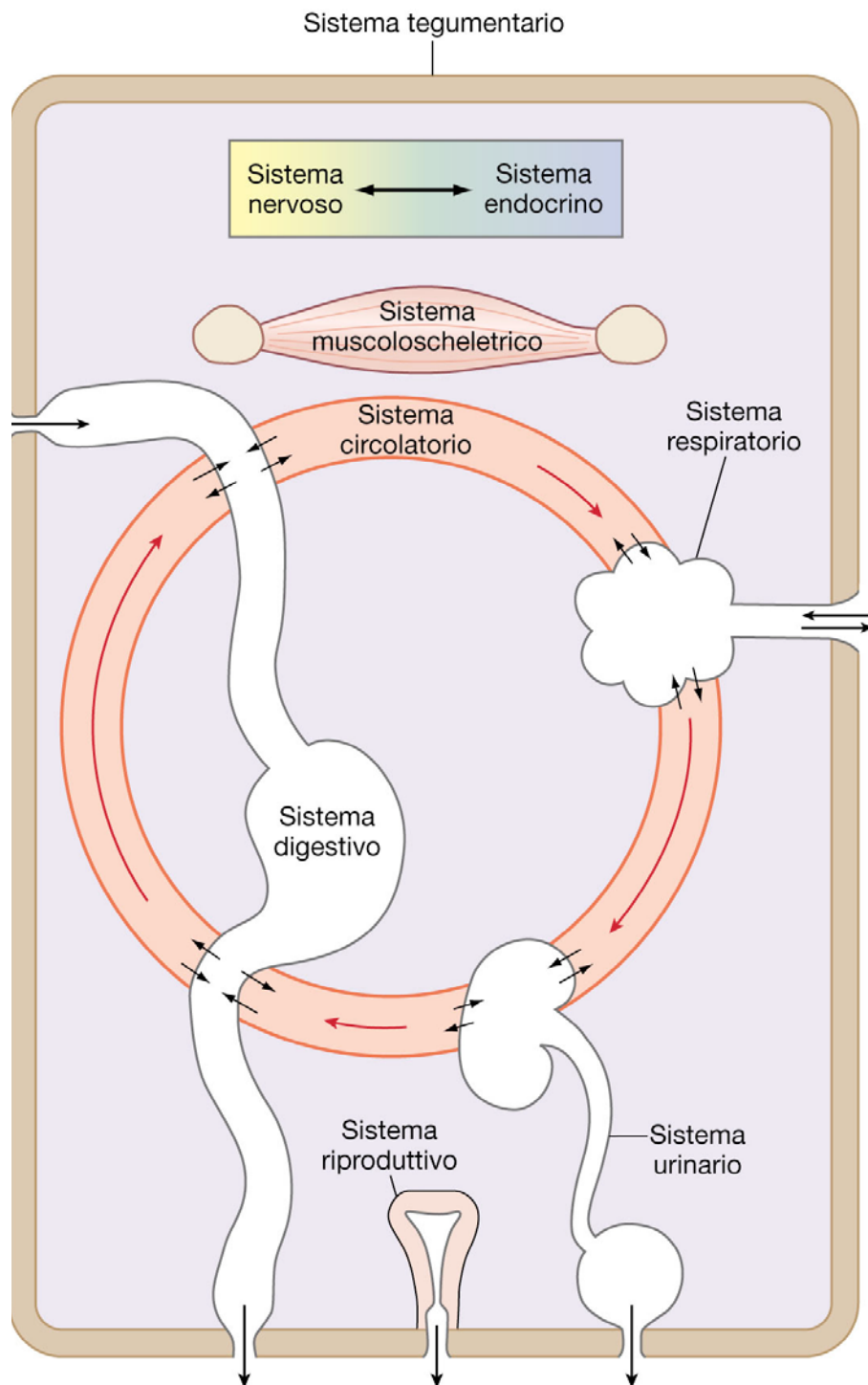
Edises - 70 Euro

FISIOLOGIA

Fisiologia - scienza che studia la vita e le funzioni organiche dei vegetali, degli animali e dell'uomo

φυσιοσ λογος
STUDIO DELLA NATURA





ORGANI E SISTEMI

TABELLA 1-1 Sistemi organici del corpo umano

SISTEMA	ORGANI E TESSUTI	FUNZIONI TIPICHE
Circolatorio	Cuore, vasi, sangue	Trasporto di materiale fra tutte le cellule del corpo
Digerente	Stomaco, intestino, fegato, pancreas	Trasformazione del cibo in particelle che possono essere trasportate nell'organismo; eliminazione di scorie
Endocrino	Tiroide, surrene	Coordinazione delle funzioni corporee attraverso sintesi e rilascio di molecole regolatrici
Immunitario	Timo, milza, linfonodi	Difesa contro agenti esogeni
Tegumentario	Cute	Protezione dall'ambiente esterno
Muscolo-scheletrico	Muscoli, ossa	Sostegno e movimento
Nervoso	Cervello, midollo spinale	Coordinazione delle funzioni attraverso segnali elettrici e rilascio di molecole regolatrici
Riproduttivo	Ovaie e utero, testicoli	Mantenimento della specie
Respiratorio	Polmoni, vie aeree	Scambio di ossigeno e anidride carbonica tra l'ambiente interno ed esterno
Urinario	Reni, vescica	Mantenimento di acqua e soluti nell'ambiente interno; eliminazione di scorie

OMEOSTASI

Claude Bernard introduce il concetto di stabilità dell'ambiente interno dell'organismo

Nel 1929, Walter Cannon coniò il termine

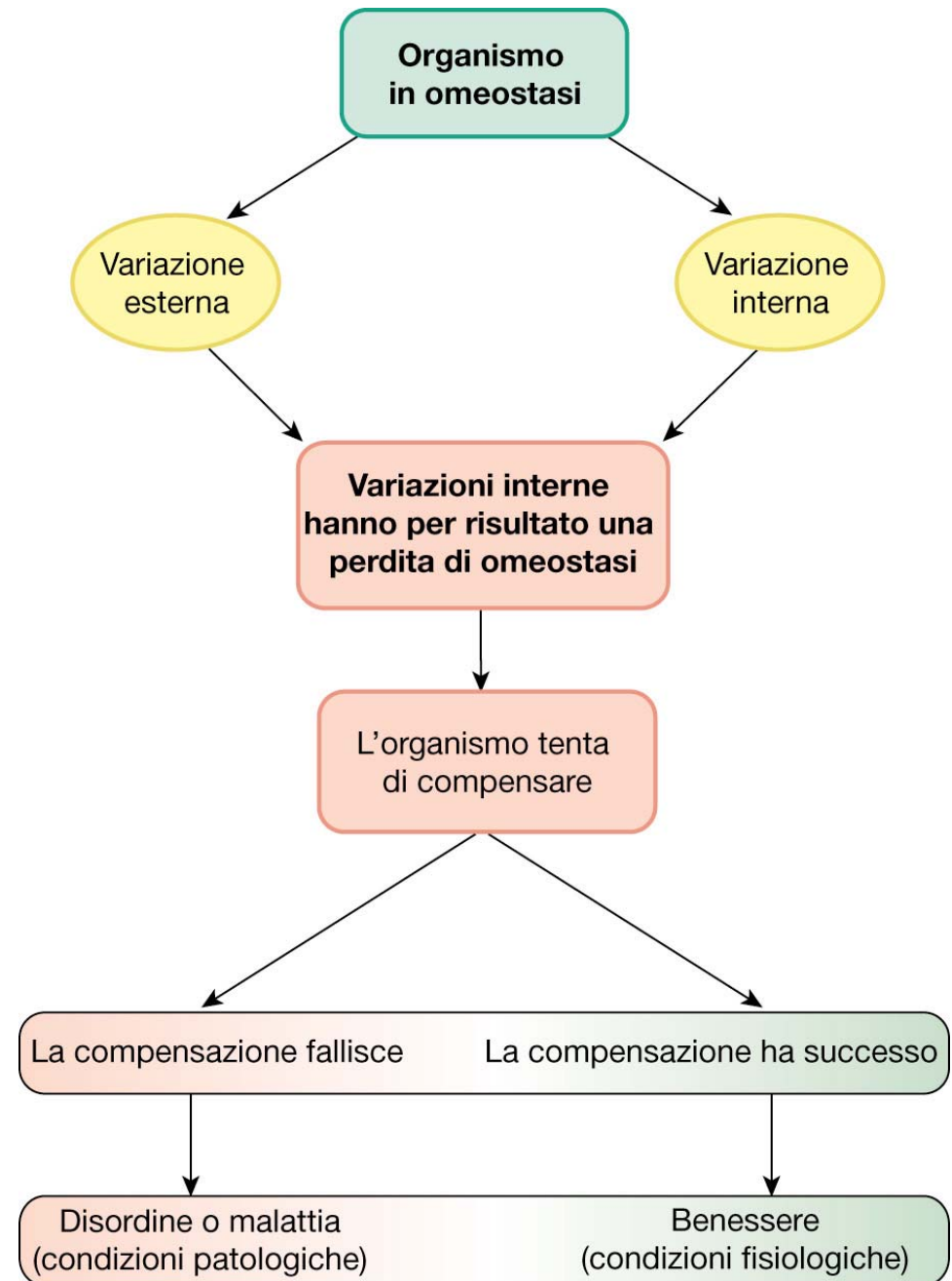
OMEOSTASI

Definita come la tendenza dell'organismo a mantenere
lo “STATO STAZIONARIO”

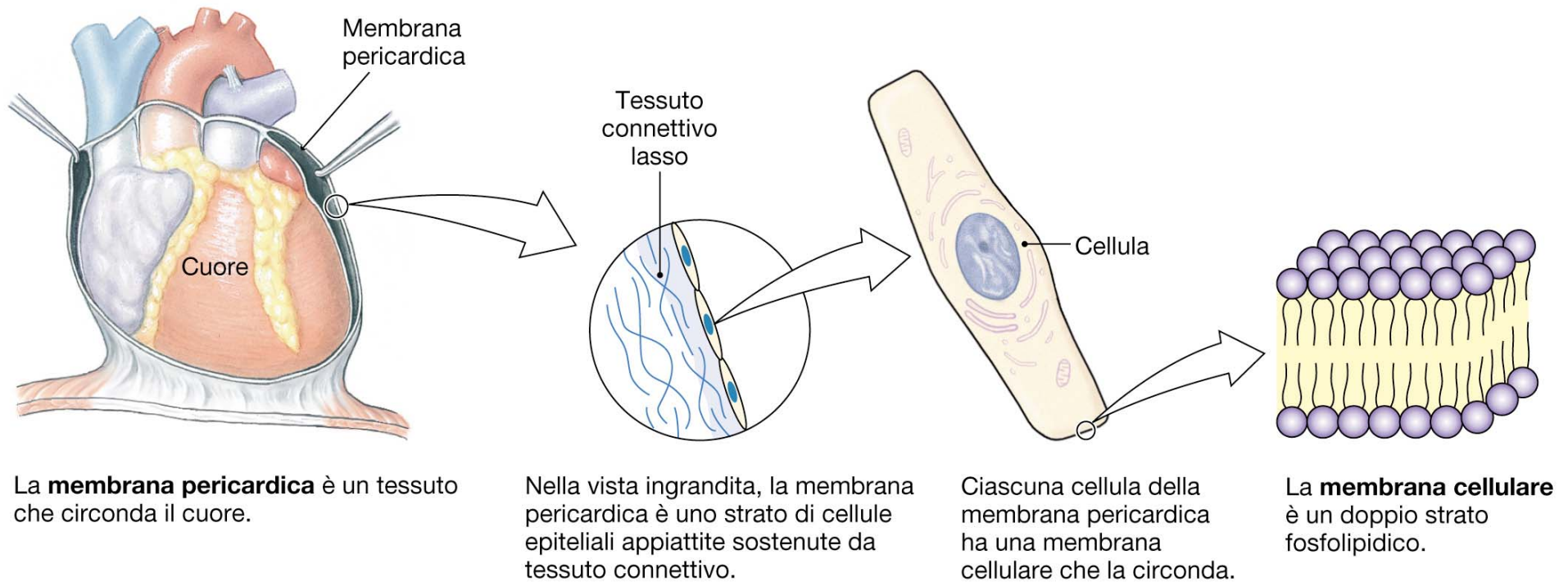
OVVERO

AMBIENTE INTERNO STABILE

Fisiologia come studio della omeostasi ovvero dei processi tramite i quali lo stato stazionario dell'organismo o delle cellule è mantenuto costante

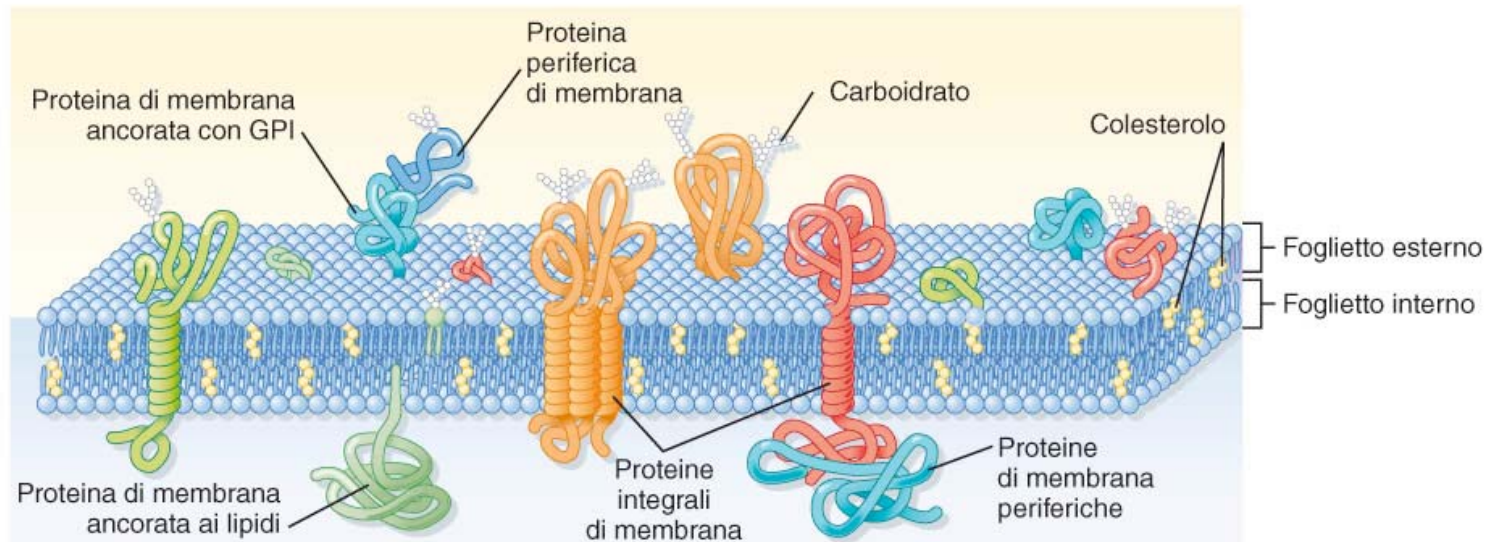


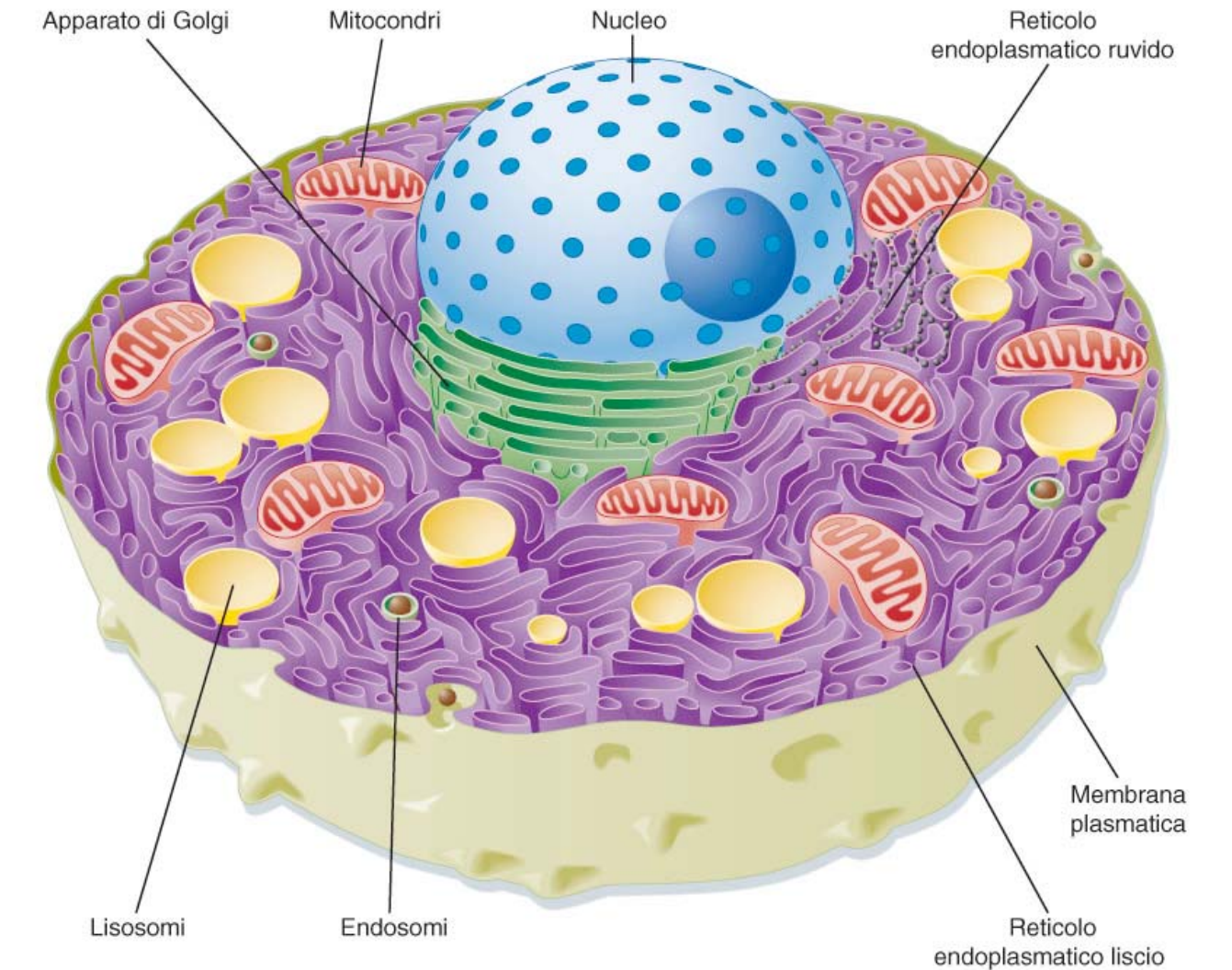
Vari significati della parola “MEMBRANA” in biologia



Funzioni della membrana plasmatica

1. Trasporto selettivo di molecole (trasportatori)
2. Riconoscimento di cellule e substrati (integrine, matrice)
3. Comunicazione intercellulare (recettori e proteine trasduttrici)
4. Attività enzimatica
5. Determinazione della forma cellulare (citoscheletro)



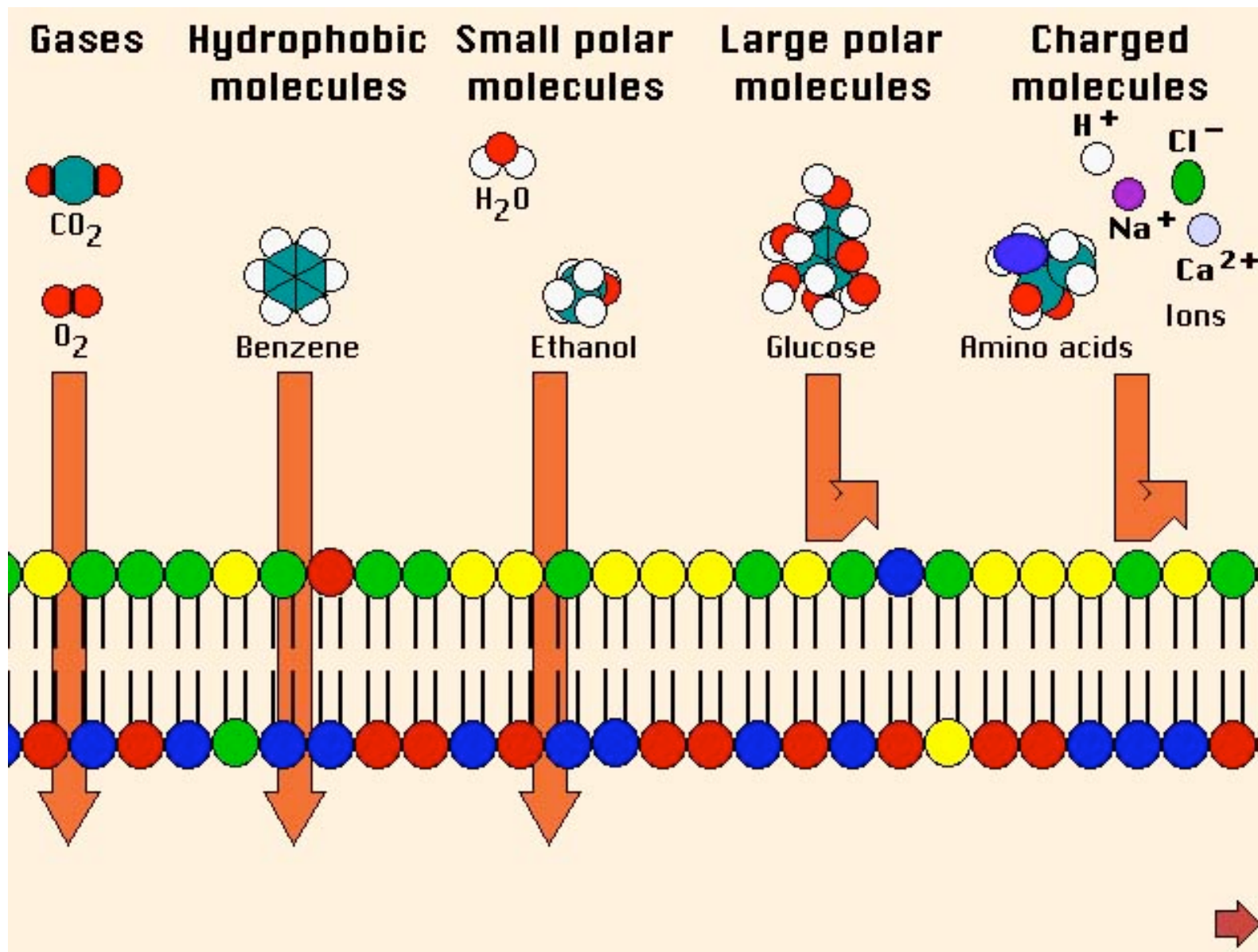


Koeppen, Stanton

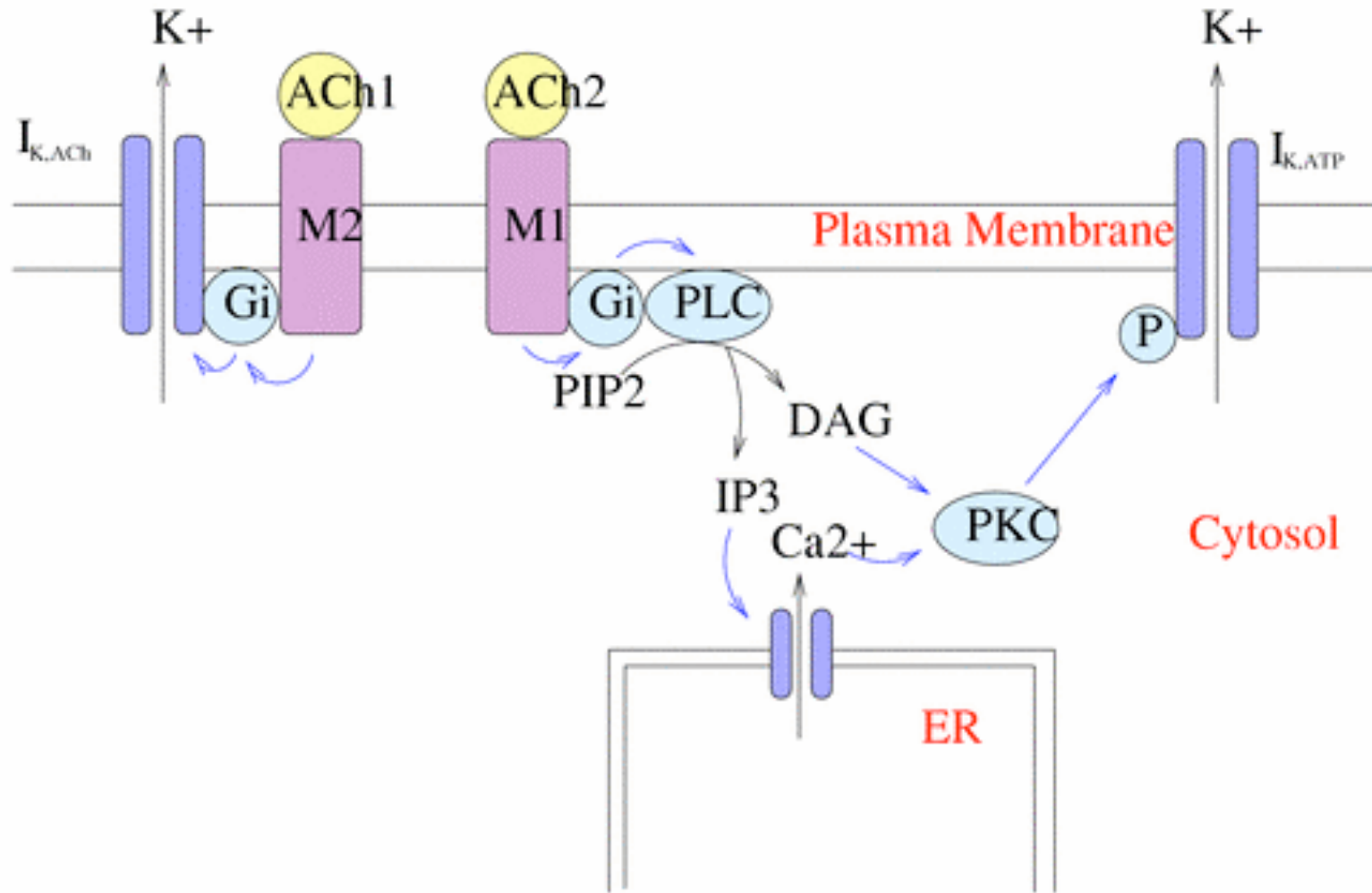
Berne & Levy Fisiologia, VI edizione

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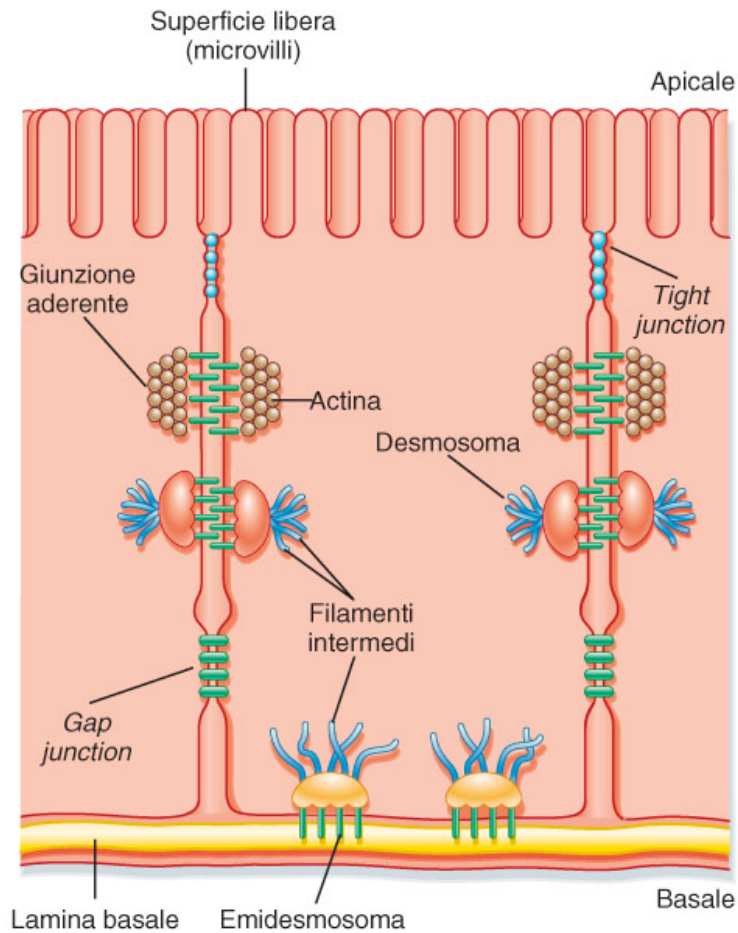
La membrana definisce la cellula e in base alle interazioni con il citoscheletro ne determina la forma.



La membrana è una barriera selettiva che regola il passaggio di molecole e ioni.



La membrana è l'elemento capace di recepire e tradurre i messaggi provenienti da altre cellule.



Koeppen, Stanton

Berne & Levy Fisiologia, VI edizione

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La membrana plasmatica concorre nel riconoscimento cellulare, e nell'organizzazione tissutale dell'organismo

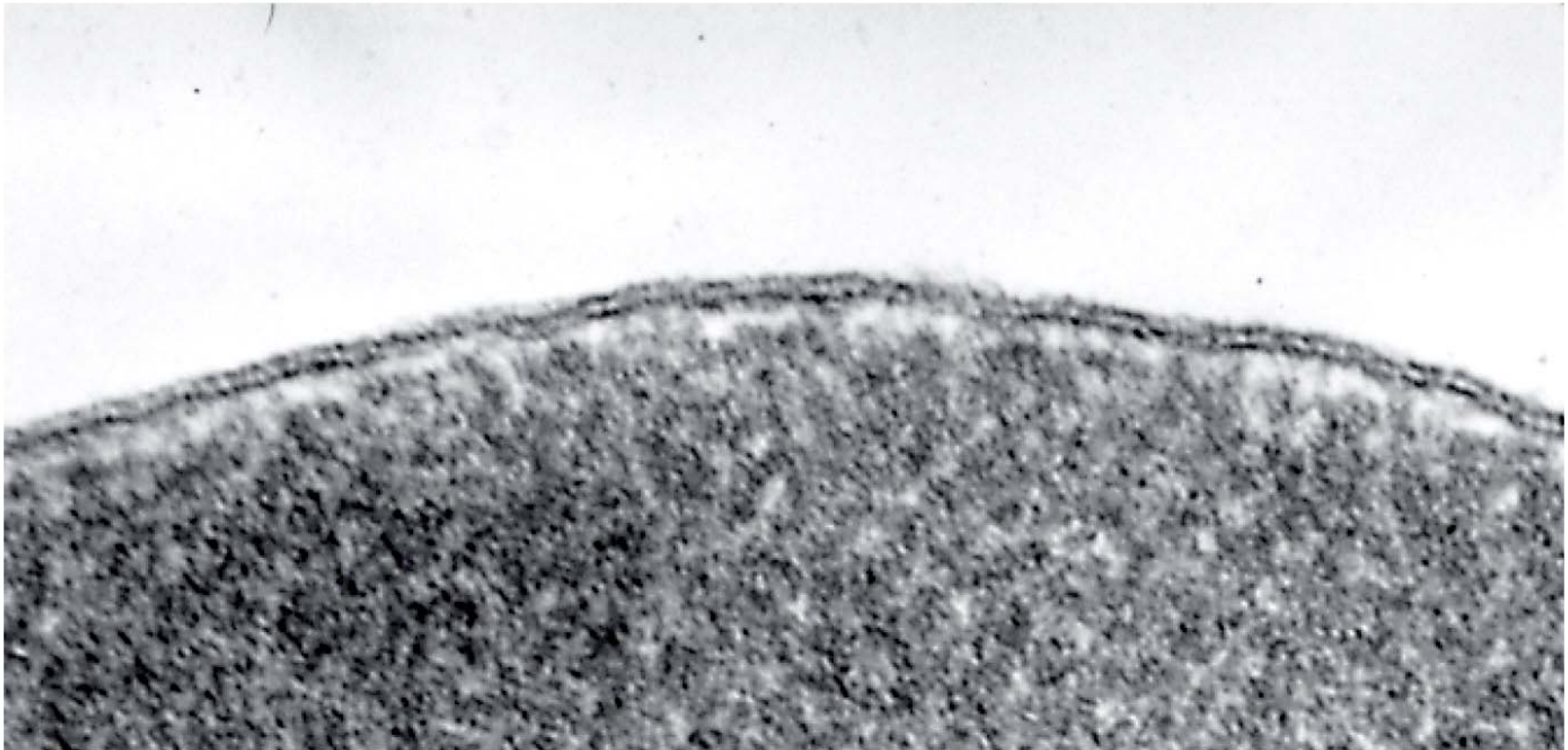
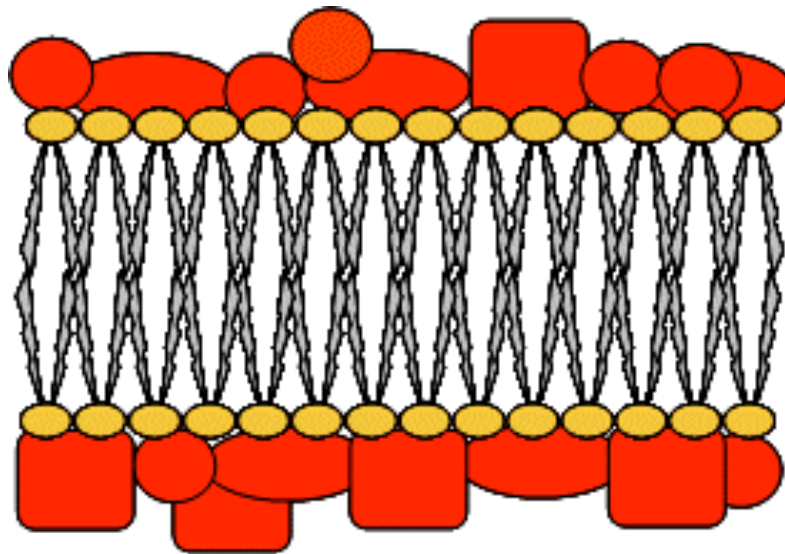
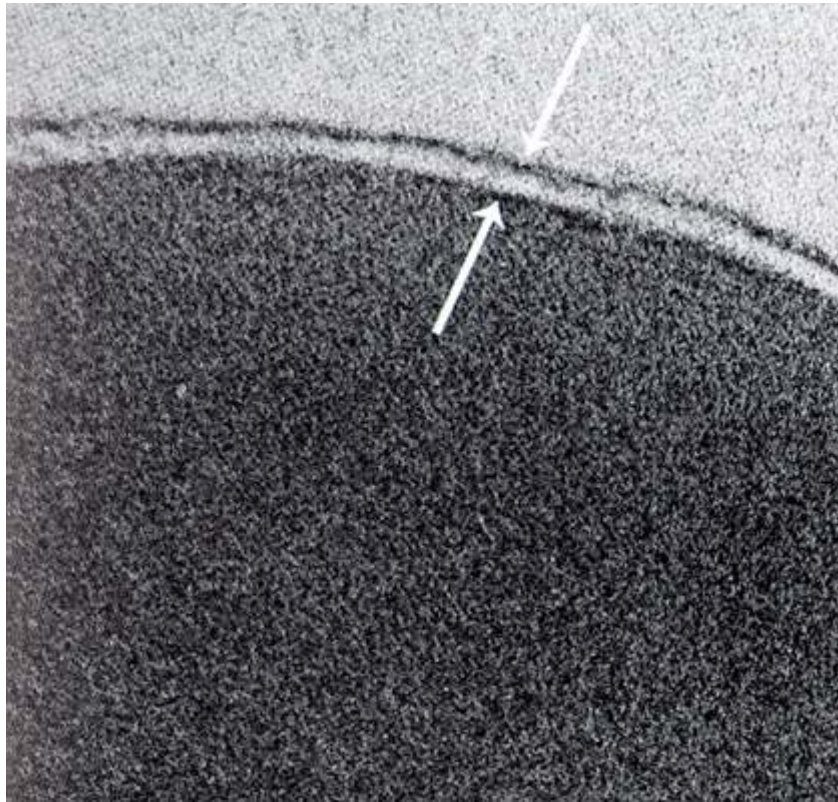


Figure 10-1a *Molecular Biology of the Cell* (© Garland Science 2008)

Source	Protein (%w/w)	Lipid (%w/w)	Carbohydrate(%w/w)
Myelin nerve sheath	18	79	3
Erythrocyte	49	43	8
Chloroplast	70	30	0
Mitochondrion (inner)	76	24	0

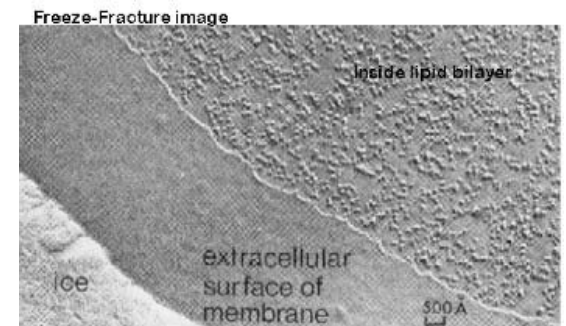


Davison & Danielli's sandwich (1935)



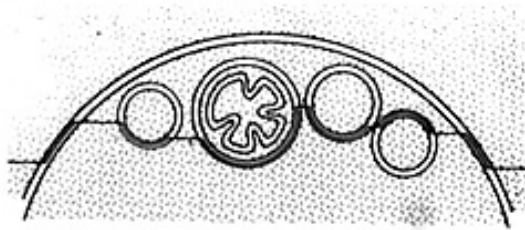
Robertson's unit membrane

Under the electron micrograph, this model appears acceptable: 7 nm thick, with lipid in the middle (white) and protein on outside (black)

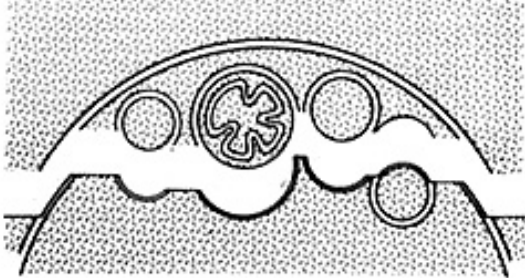


FREEZE-FRACTURE AND ETCHING

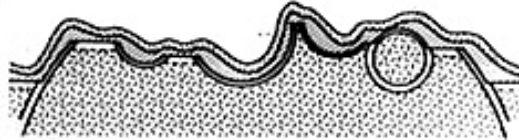
Frozen Cell



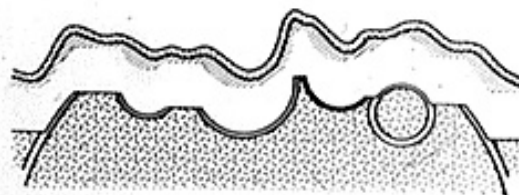
Fracturing and Etching



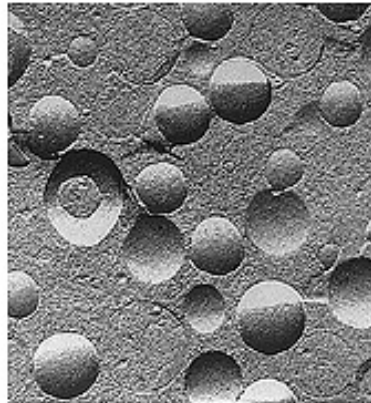
Replication of Fractured Surface



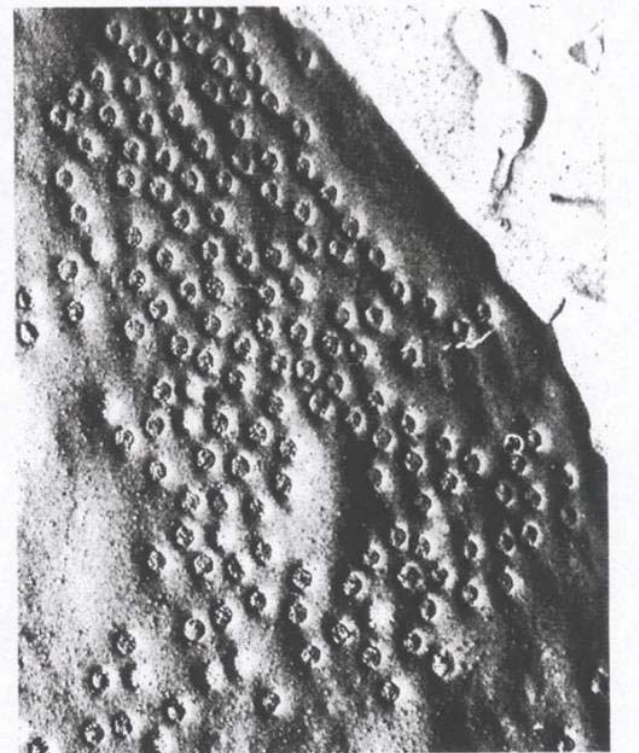
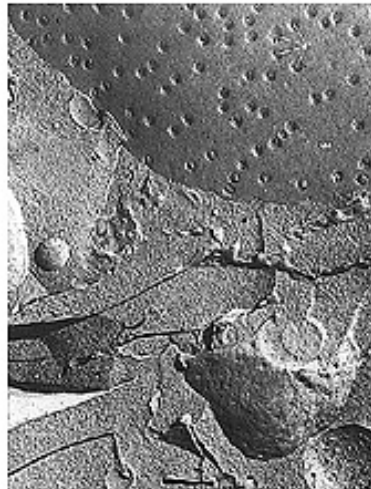
Clearing of Replica



Replica of
Fractured Membraneous
Vacuoles

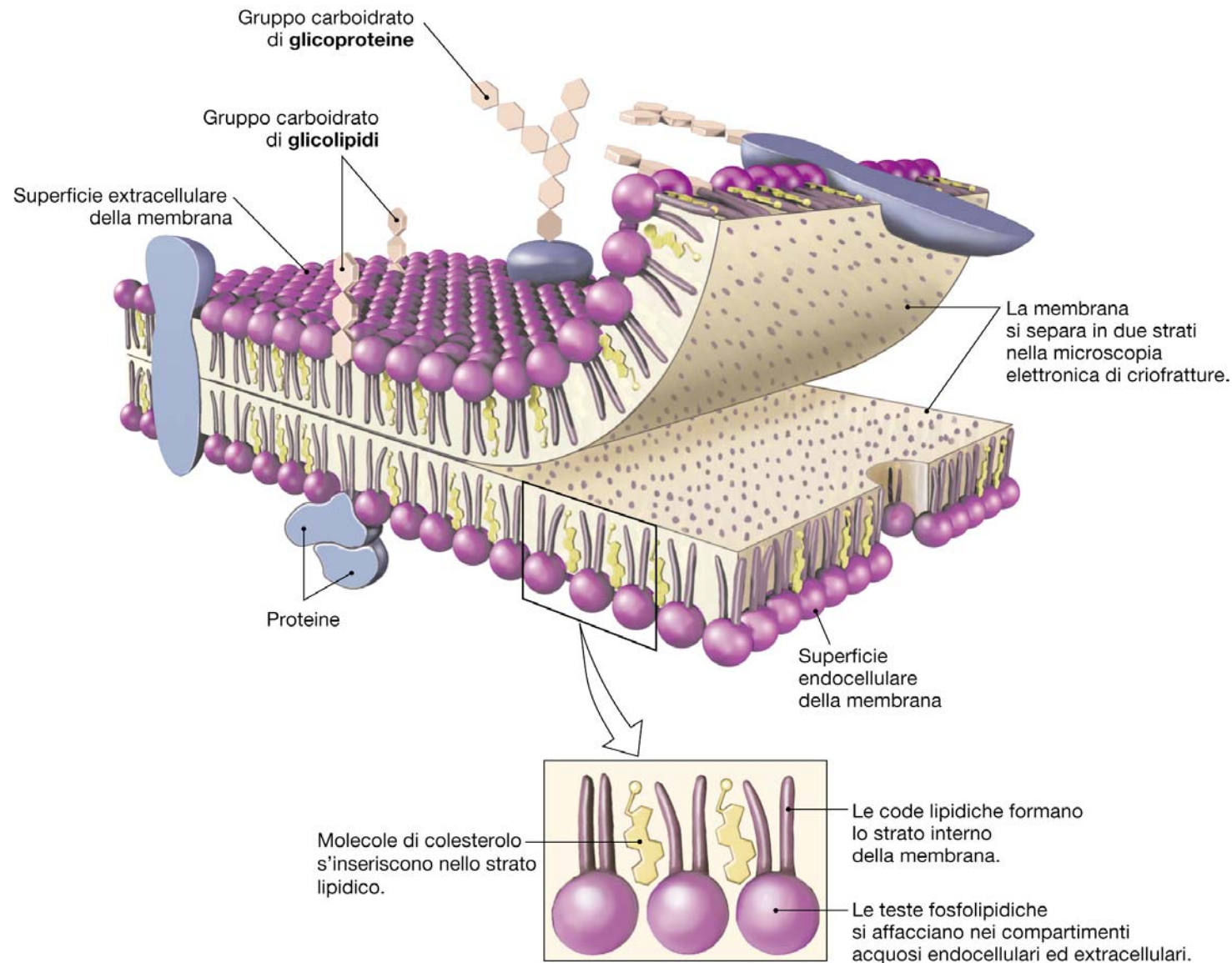


Replica of Fractured
Eukaryotic Cell



IL MODELLO DI SINGER AND NICHOLSON

MOSAICO fluido



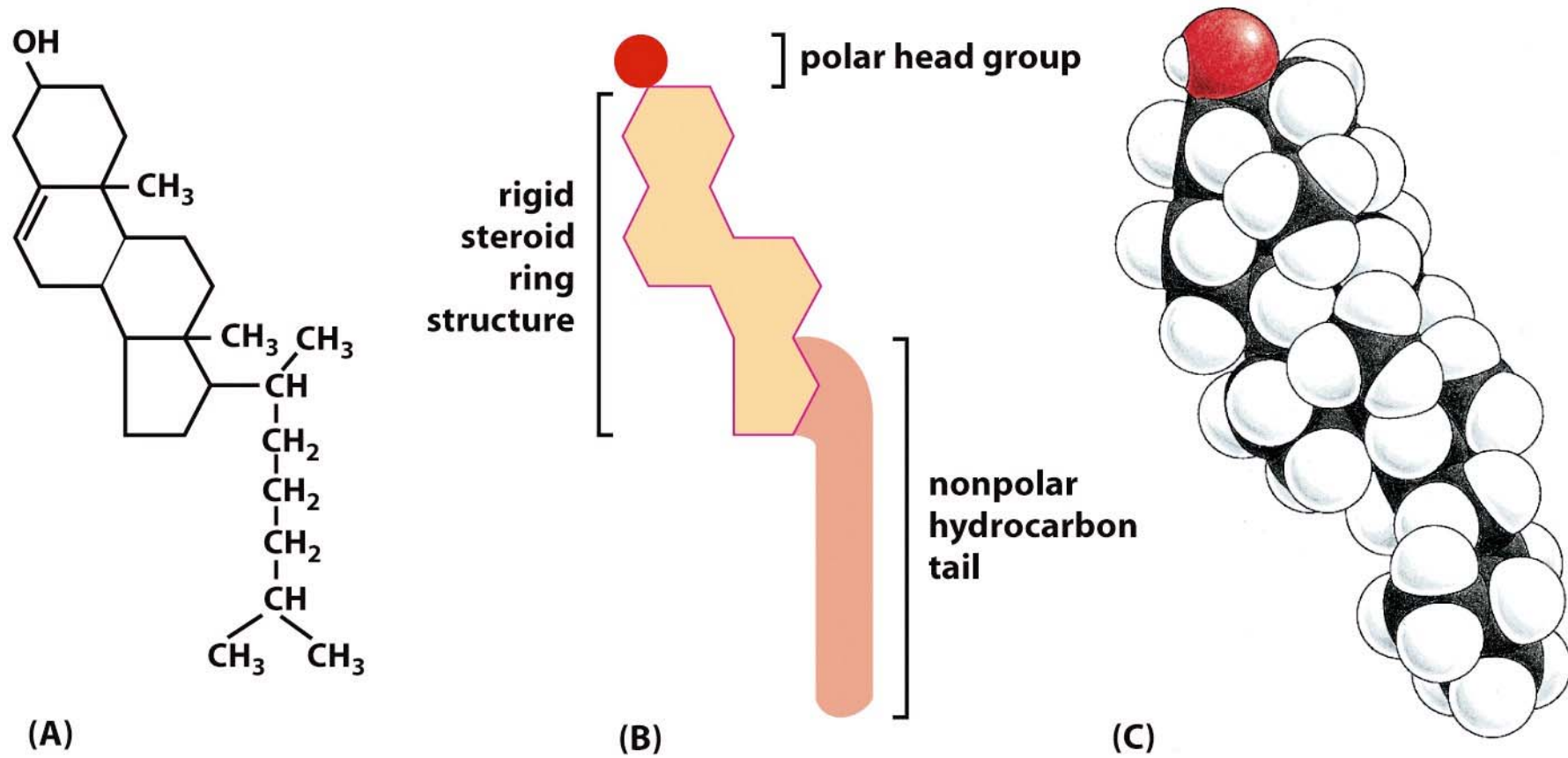


Figure 10-4 *Molecular Biology of the Cell* (© Garland Science 2008)

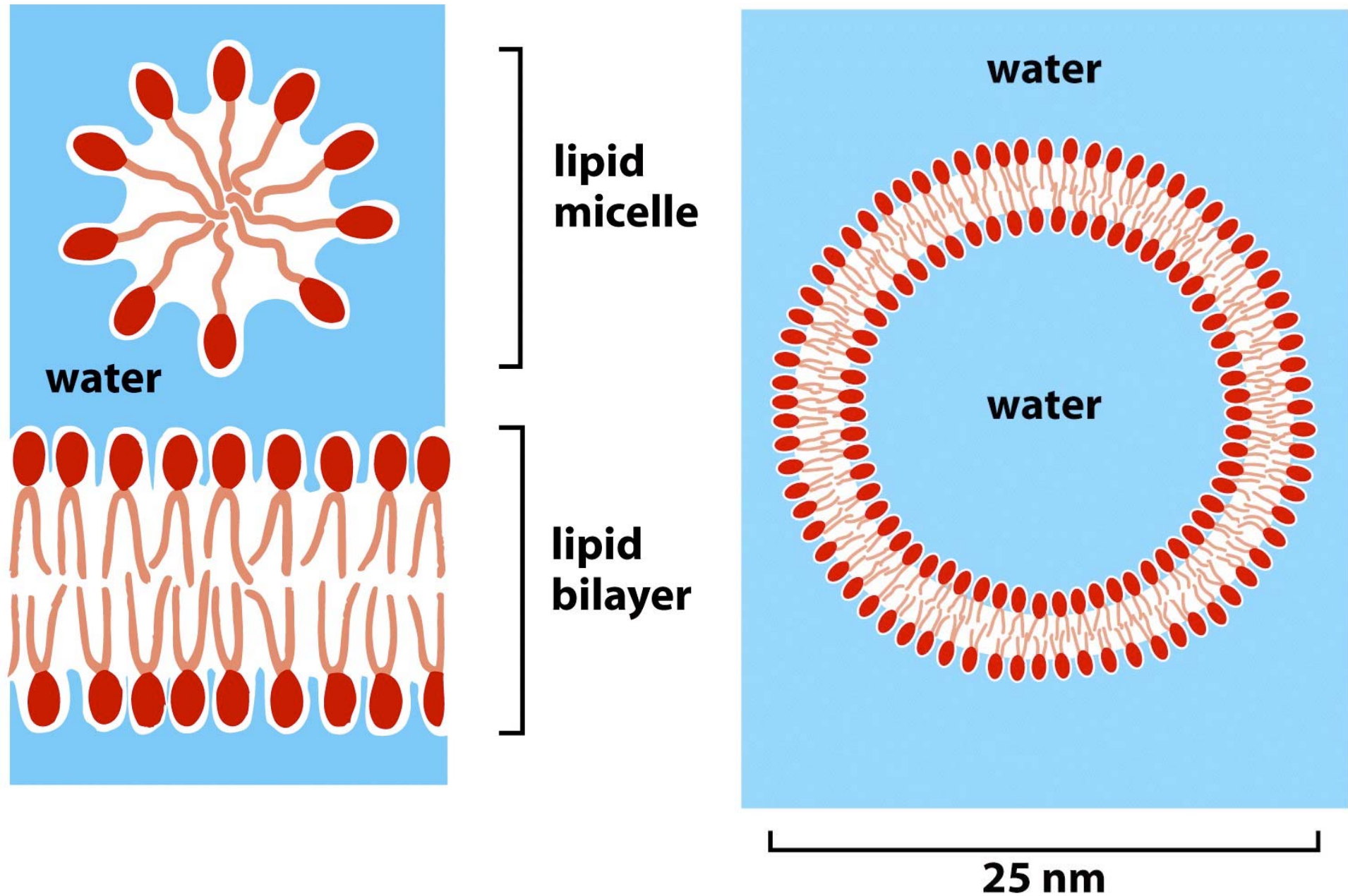


Figure 10-7b *Molecular Biology of the Cell* (© Garland Science 2008)

phosphatidylcholine

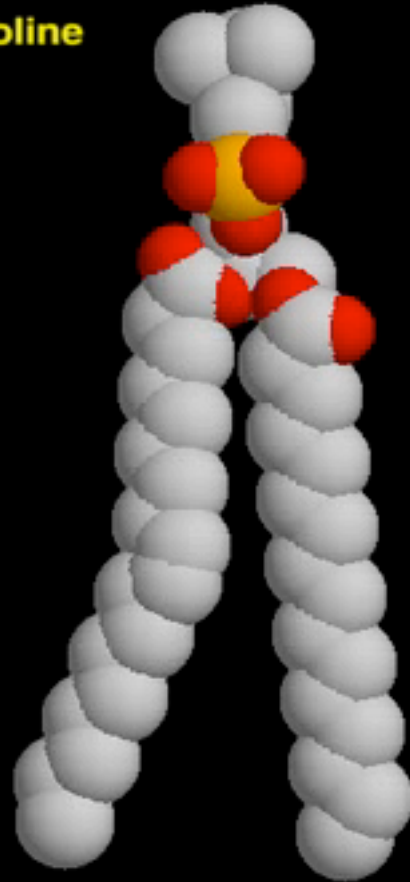


Table 10–1 Approximate Lipid Compositions of Different Cell Membranes

LIPID	PERCENTAGE OF TOTAL LIPID BY WEIGHT					
	LIVER CELL PLASMA MEMBRANE	RED BLOOD CELL PLASMA MEMBRANE	MYELIN	MITOCHONDRION (INNER AND OUTER MEMBRANES)	ENDOPLASMIC RETICULUM	<i>E. COLI</i> BACTERIUM
Cholesterol	17	23	22	3	6	0
Phosphatidylethanolamine	7	18	15	28	17	70
Phosphatidylserine	4	7	9	2	5	trace
Phosphatidylcholine	24	17	10	44	40	0
Sphingomyelin	19	18	8	0	5	0
Glycolipids	7	3	28	trace	trace	0
Others	22	13	8	23	27	30

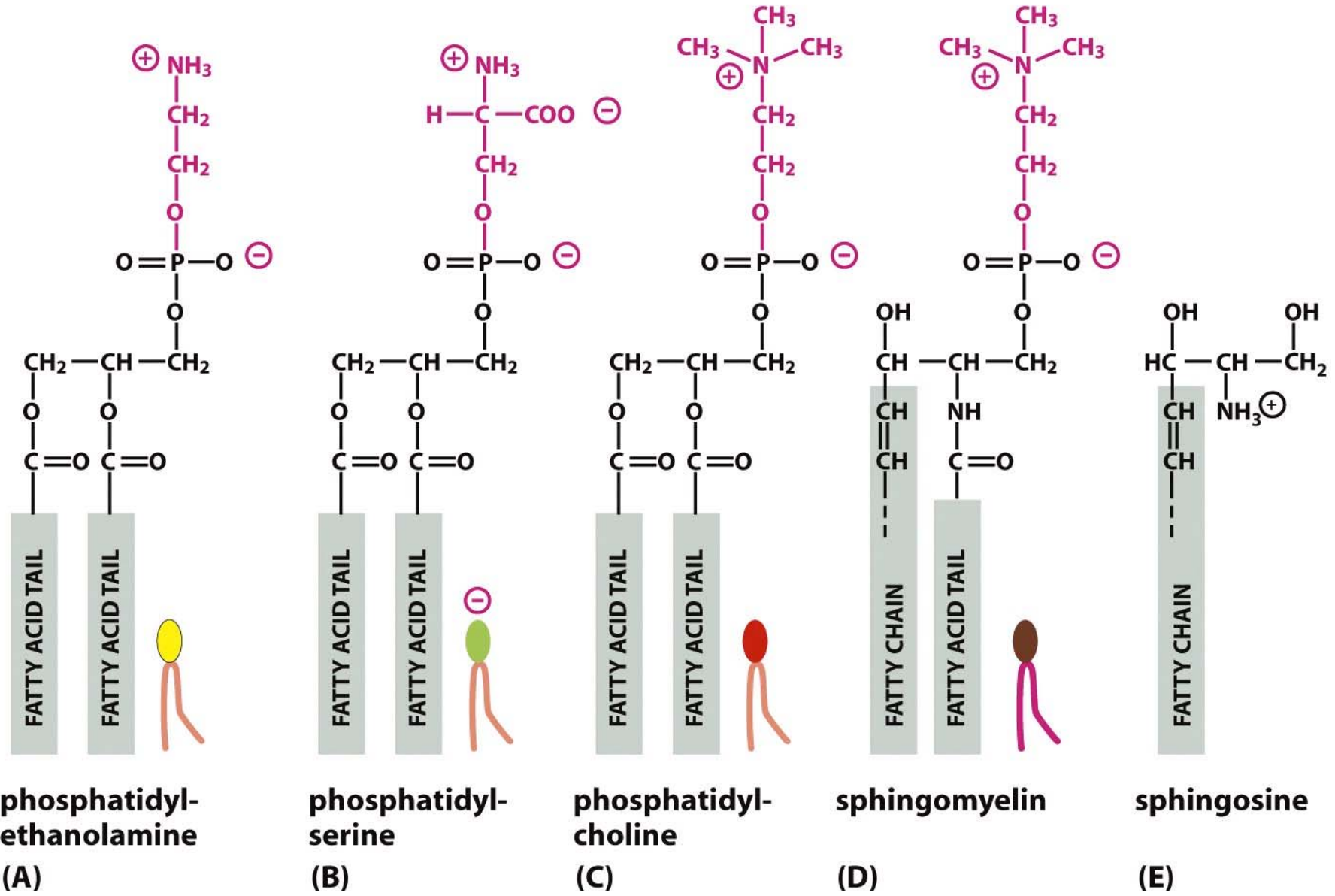
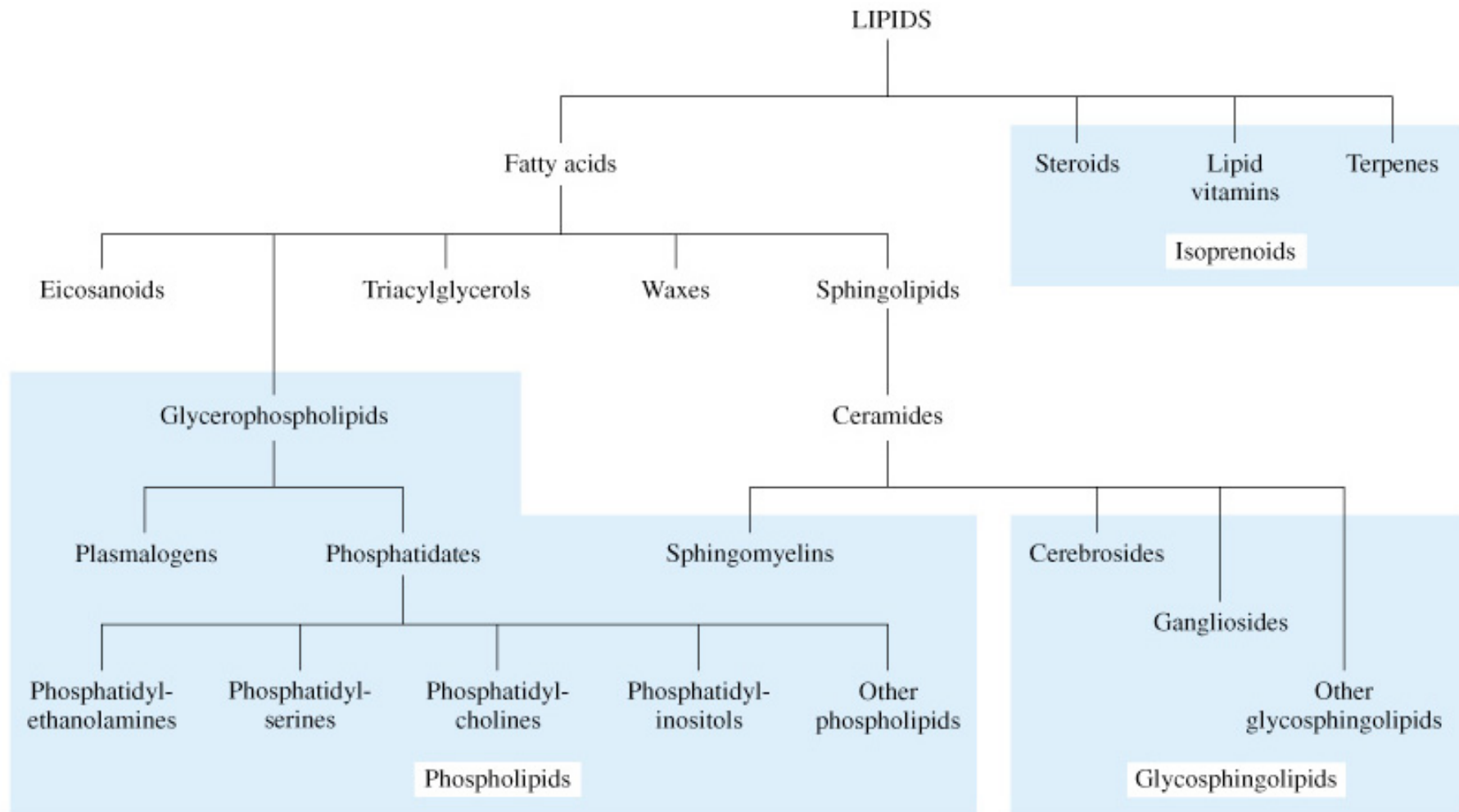


Figure 10-3 *Molecular Biology of the Cell* (© Garland Science 2008)



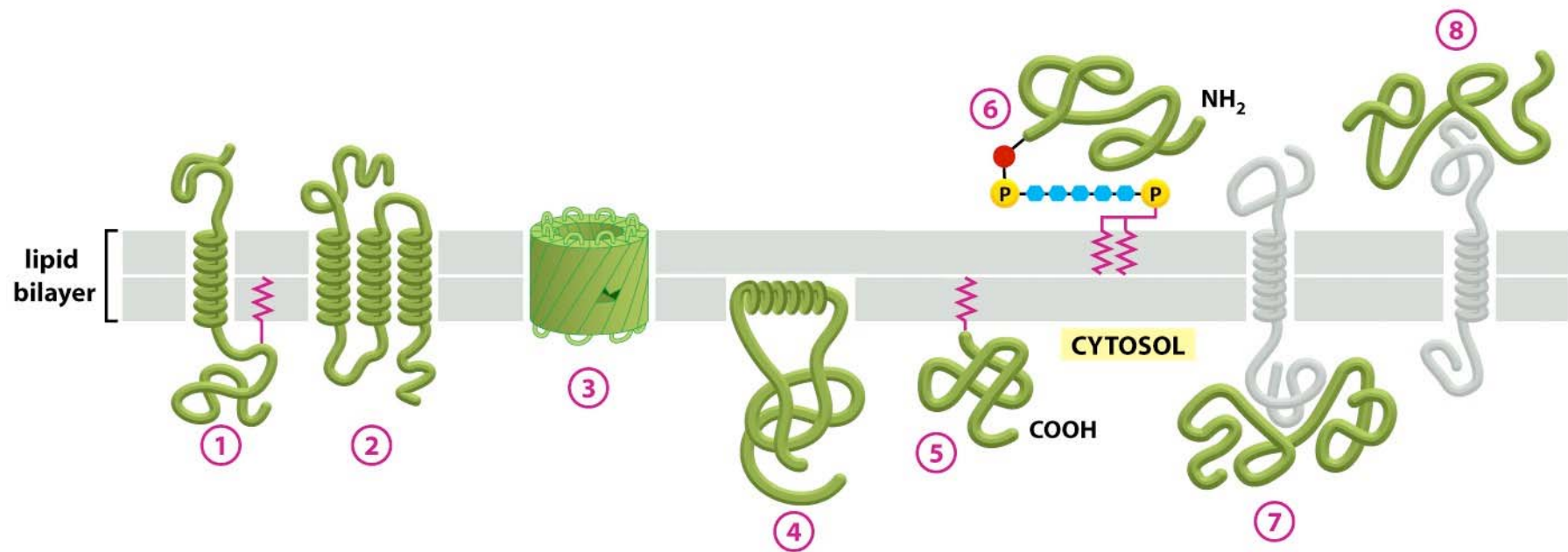


Figure 10-19 *Molecular Biology of the Cell* (© Garland Science 2008)

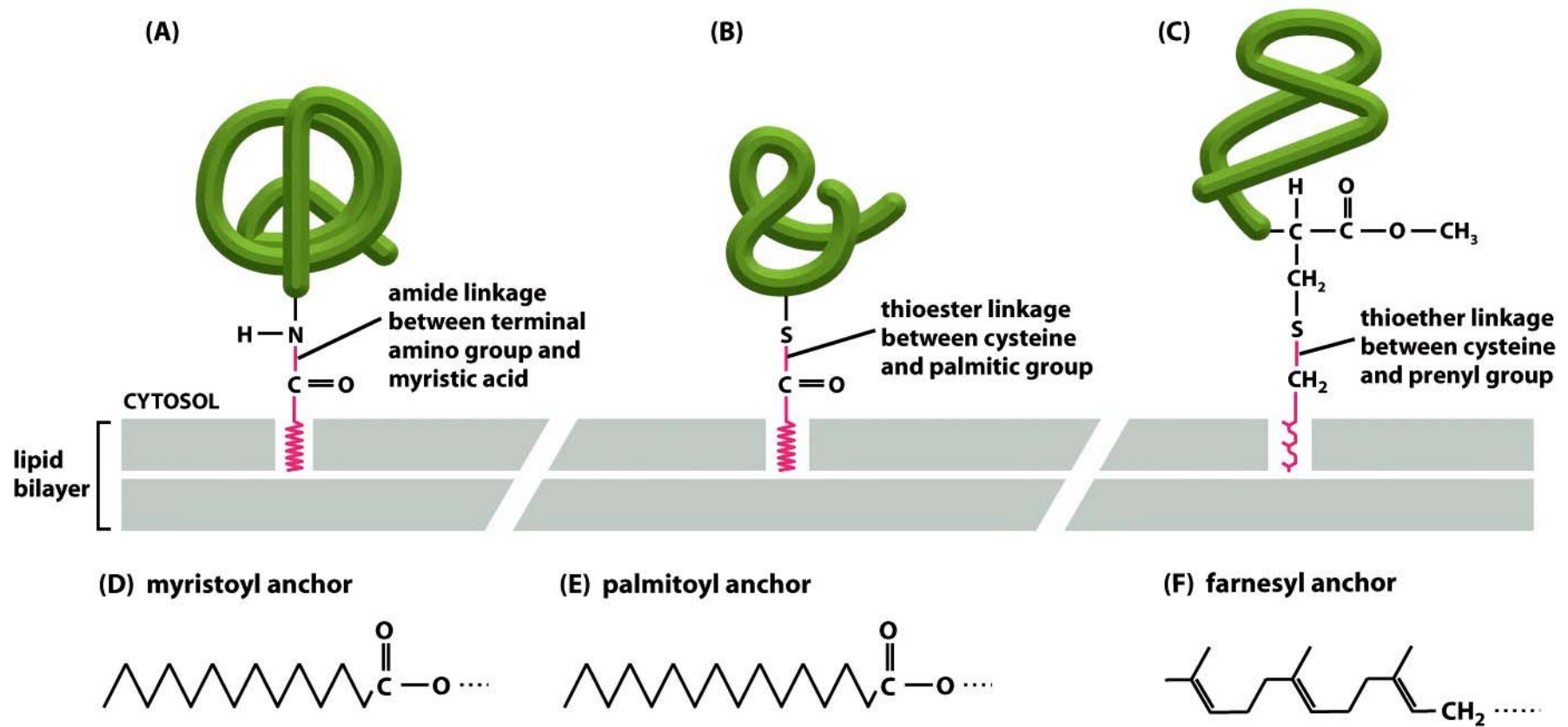
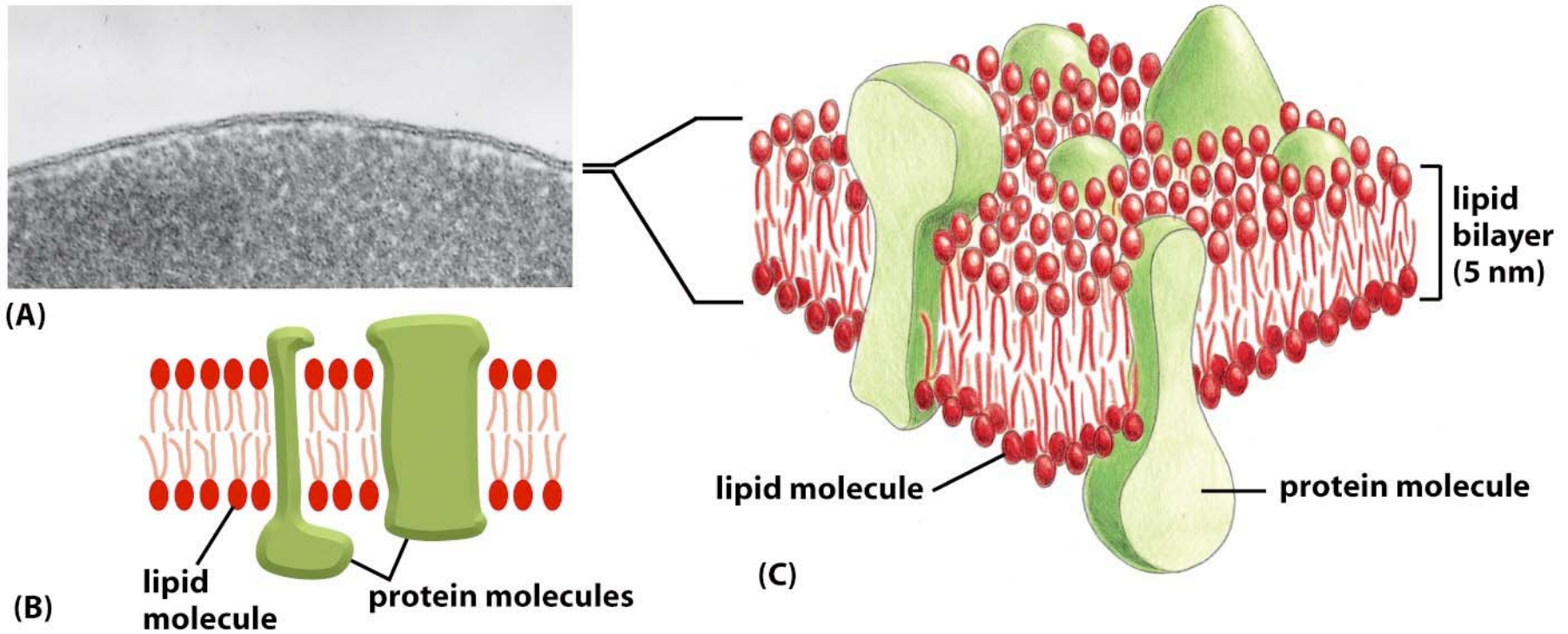
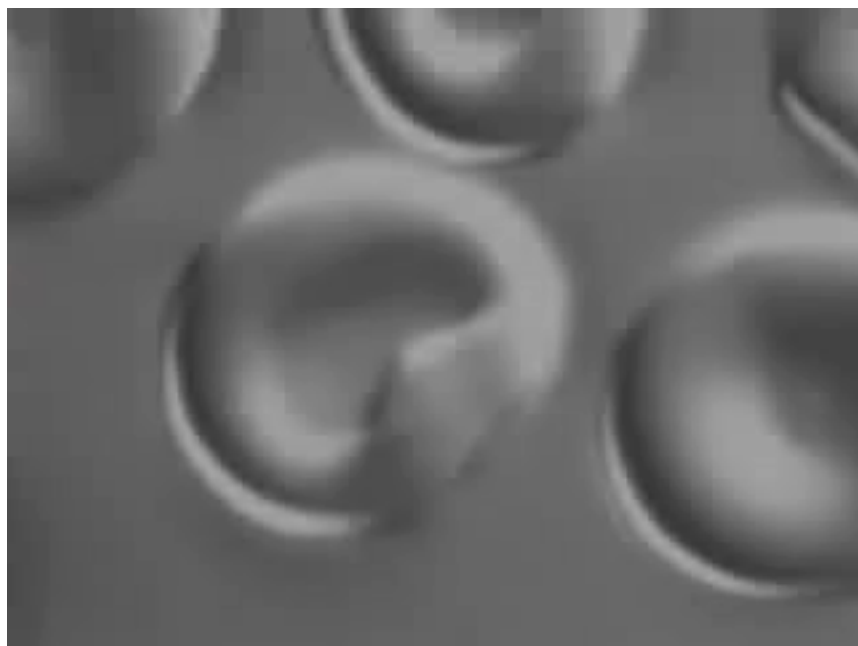


Figure 10-20 *Molecular Biology of the Cell* (© Garland Science 2008)

Mosaico FLUIDO





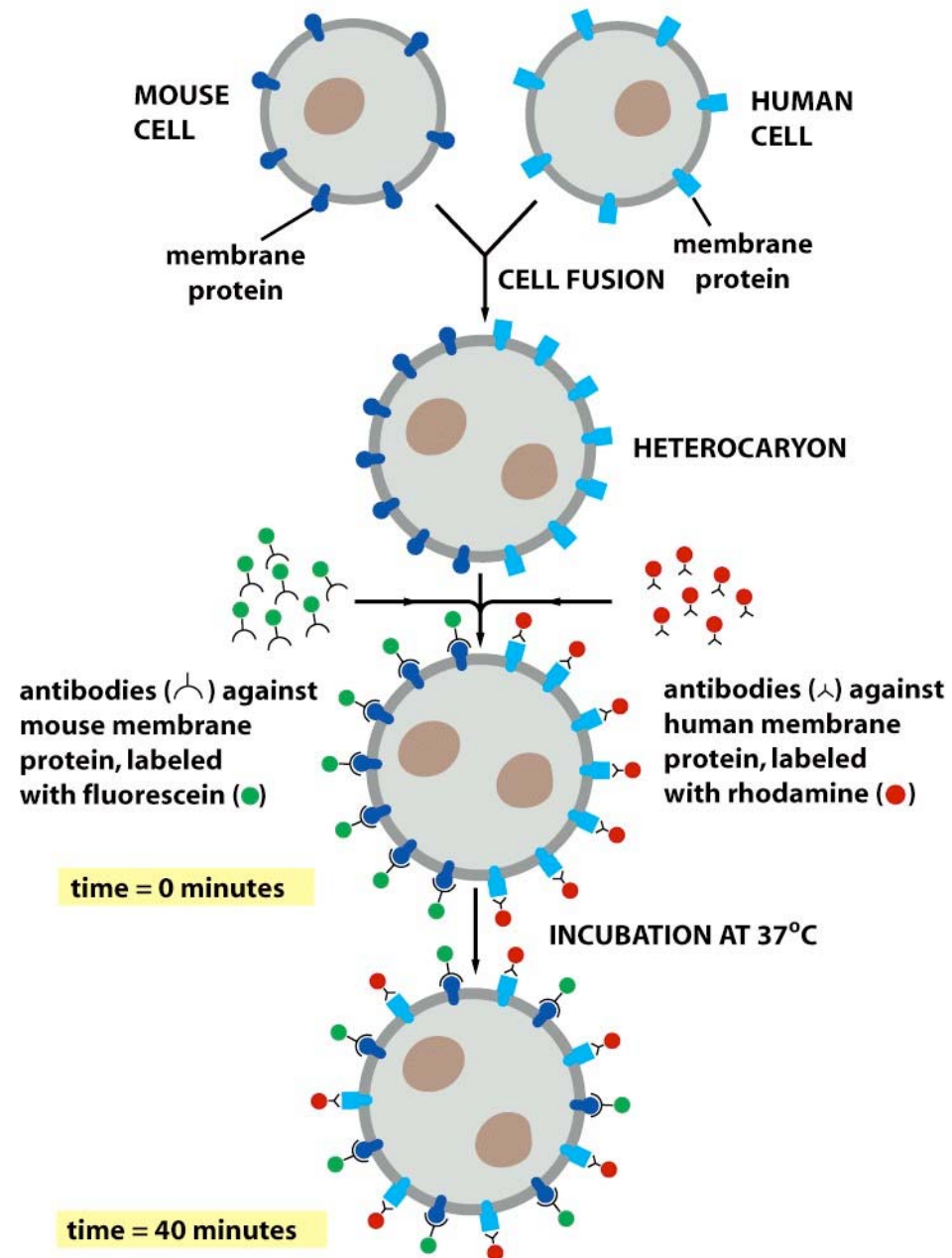


Figure 10-35 *Molecular Biology of the Cell* (© Garland Science 2008)

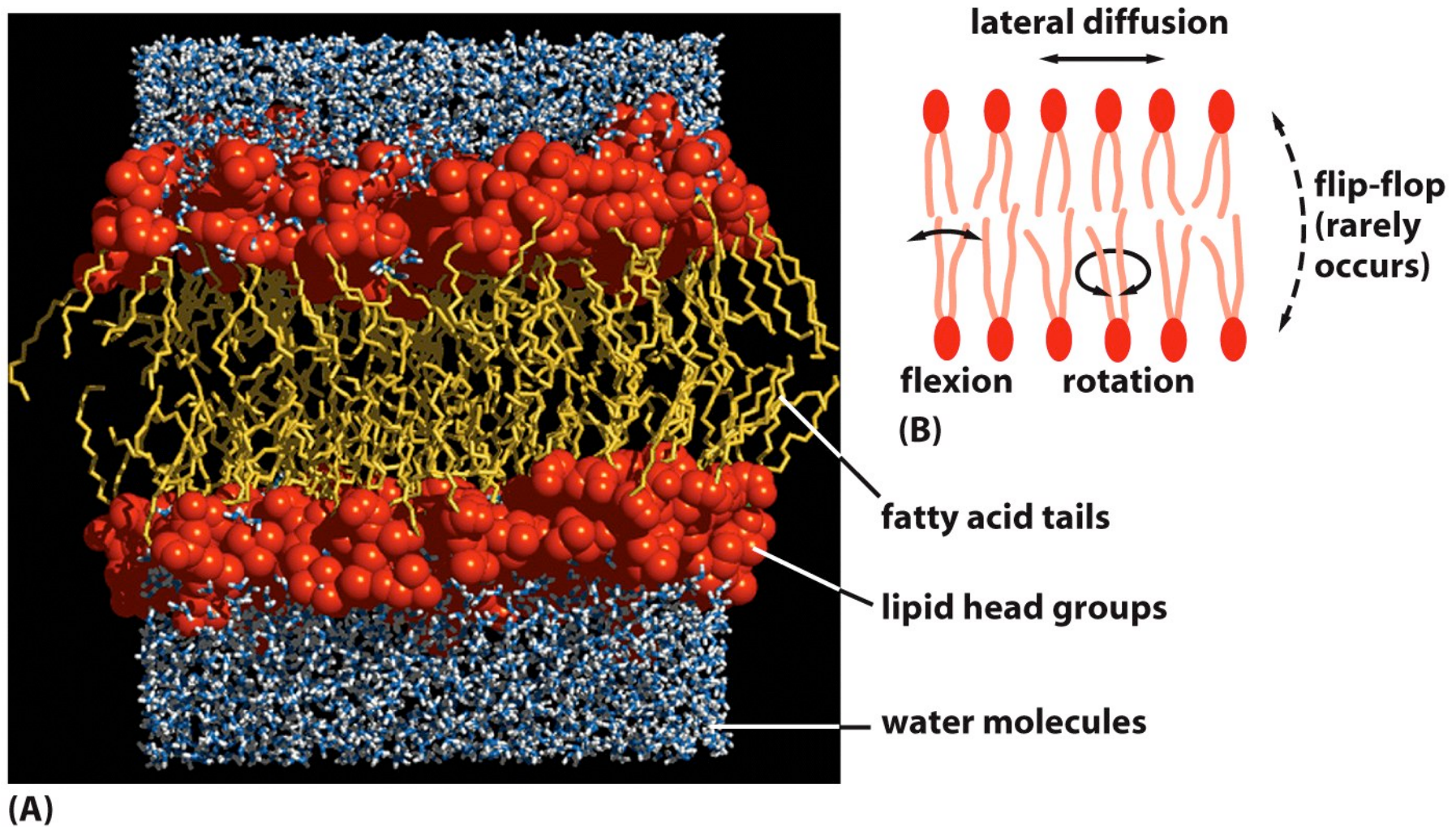
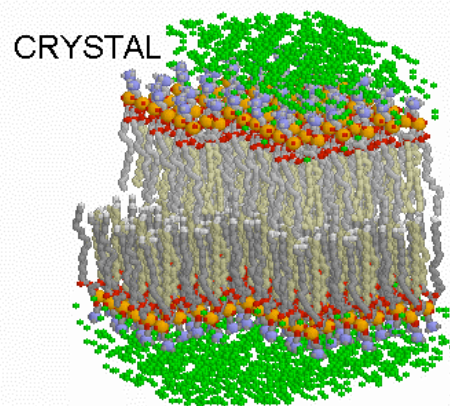


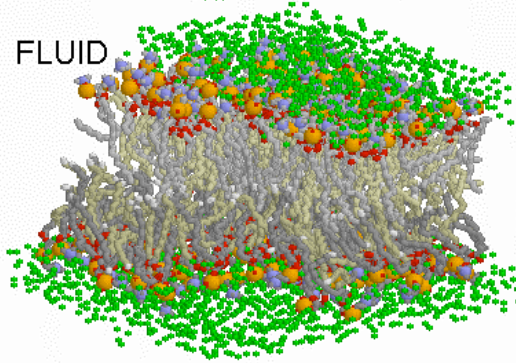
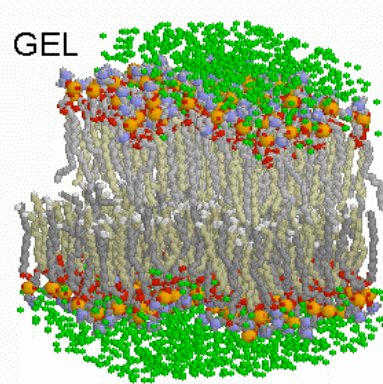
Figure 10-11 *Molecular Biology of the Cell* (© Garland Science 2008)



Molecular Dynamics Simulation
of Phosphatidyl Choline Bilayer

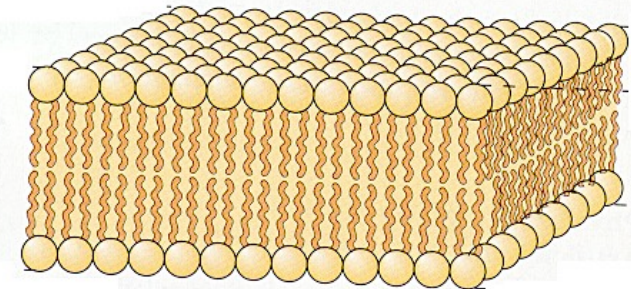
Carbon/Palmitic **Water Oxygens**
 Nitrogen **Oleic Phosphorus**
 Oxygen

H Heller, M Schaefer, K Schulten,
 J Phys Chem 97:8343, 1993.
 RasMol Image by E Martz

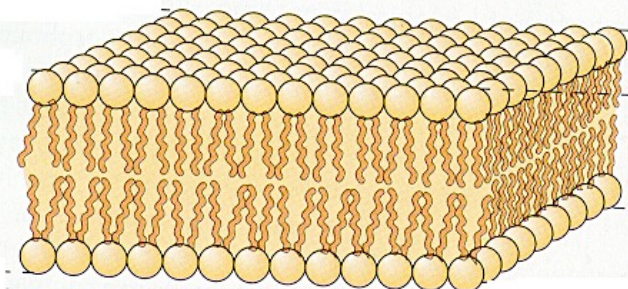


gel phase--low temperatures

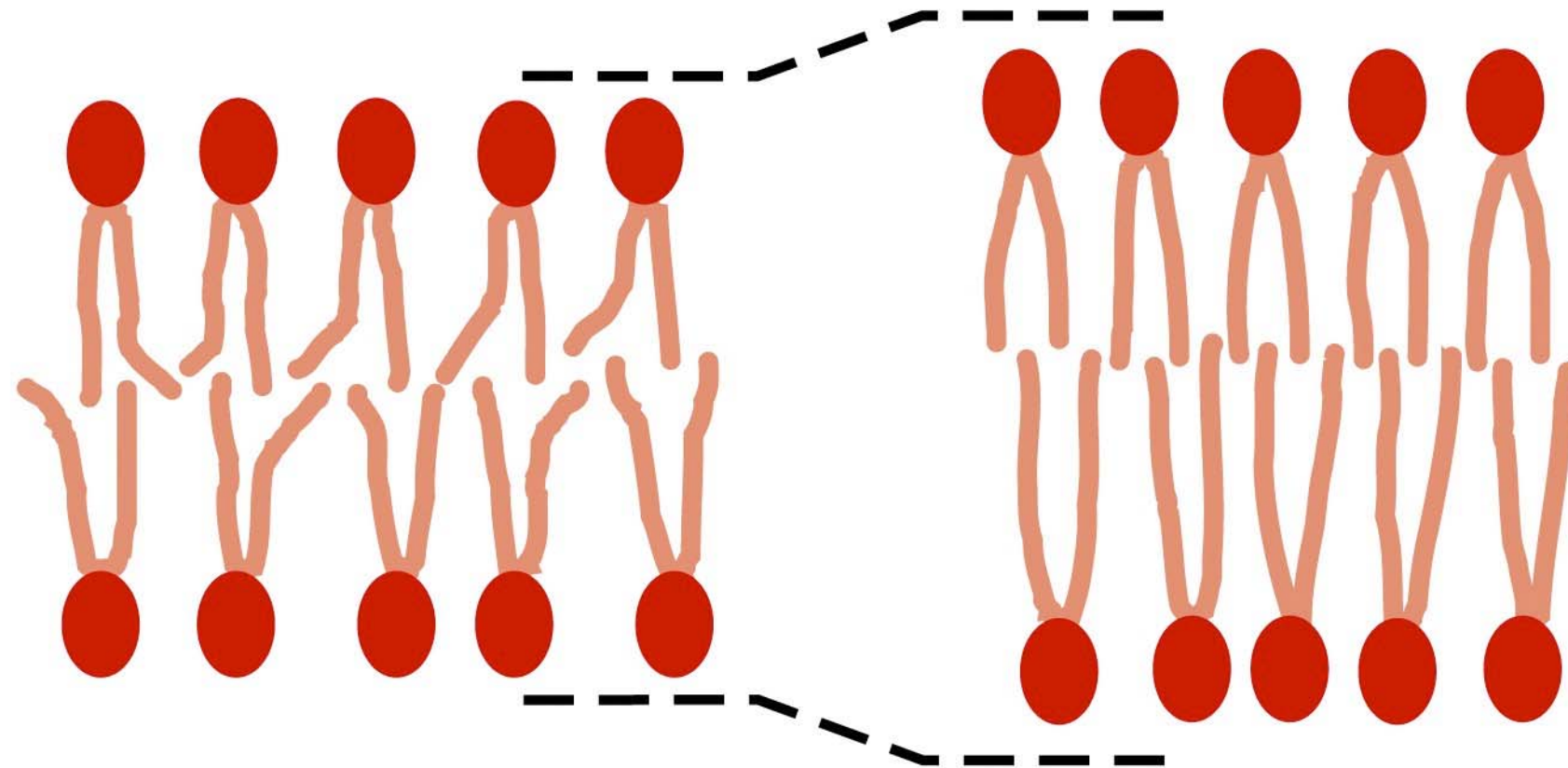
hydrocarbons are tightly packed



at higher temperatures--moves to fluid phase



bilayer "melts", movement is allowed



**unsaturated
hydrocarbon chains
with *cis*-double bonds**

**saturated
hydrocarbon chains**

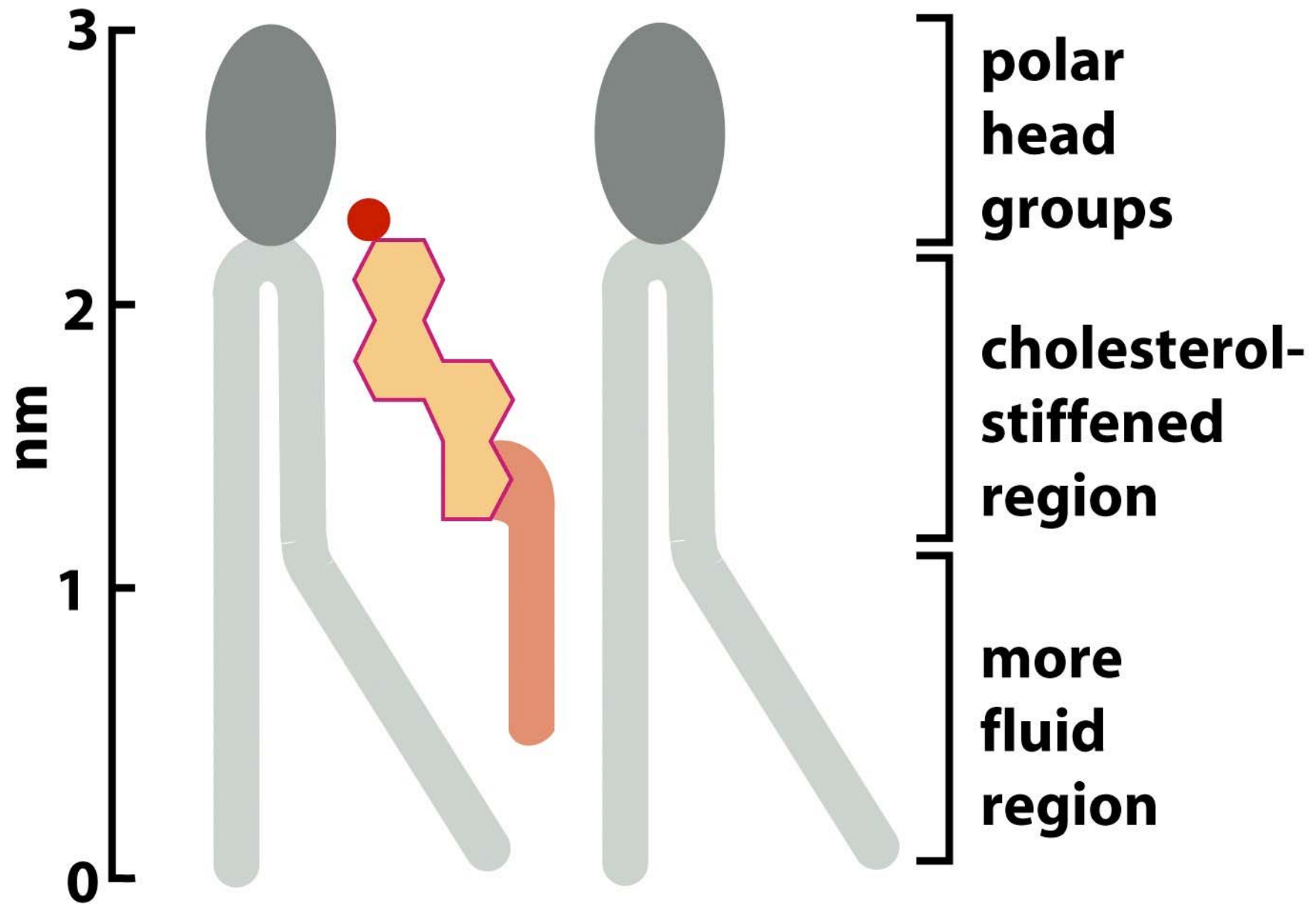


Figure 10-5 *Molecular Biology of the Cell* (© Garland Science 2008)

Il doppio strato lipidico mostra un diverso grado di fluidità nelle diverse membrane e (nella membrana plasmatica) anche all'interno della stessa membrana.

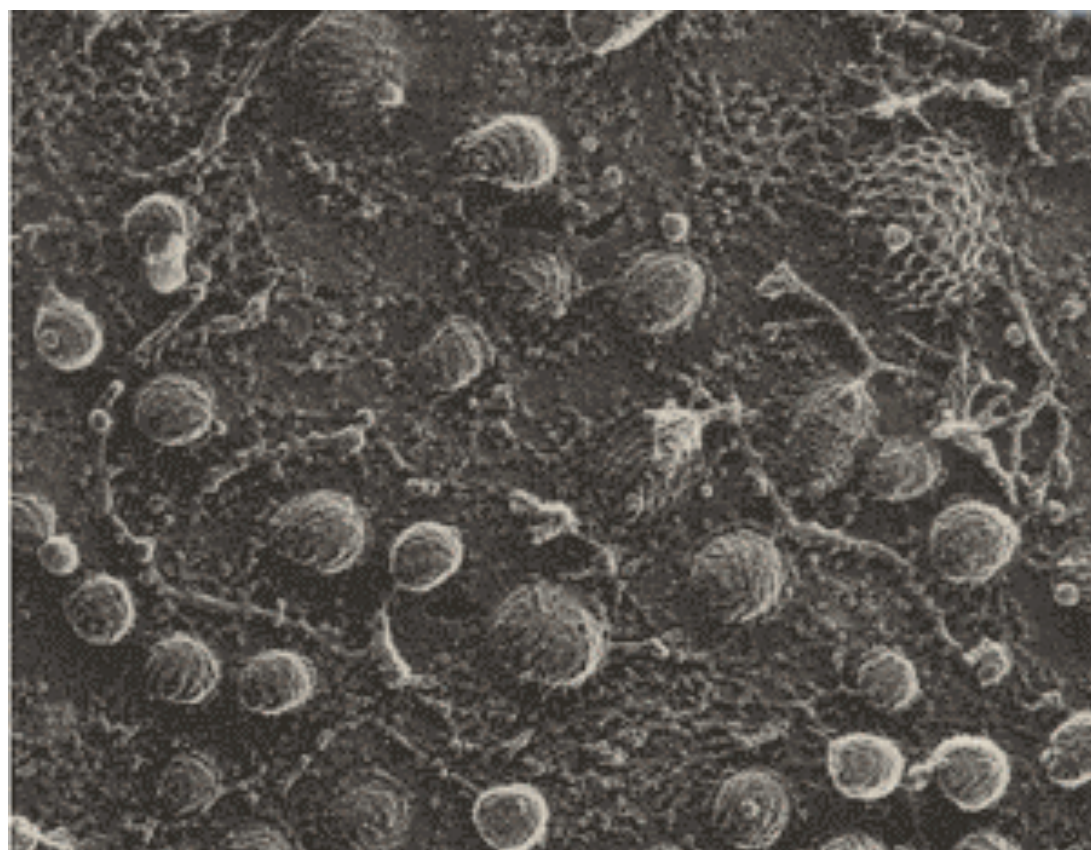
Questo causa una diversa mobilità delle proteine intrinseche nel piano della membrana, funzionale al ruolo fisiologico della membrana stessa.

I fattori che influiscono (a parità di temperatura, pH e pressione) sulla fluidità del doppio strato sono i rapporti:

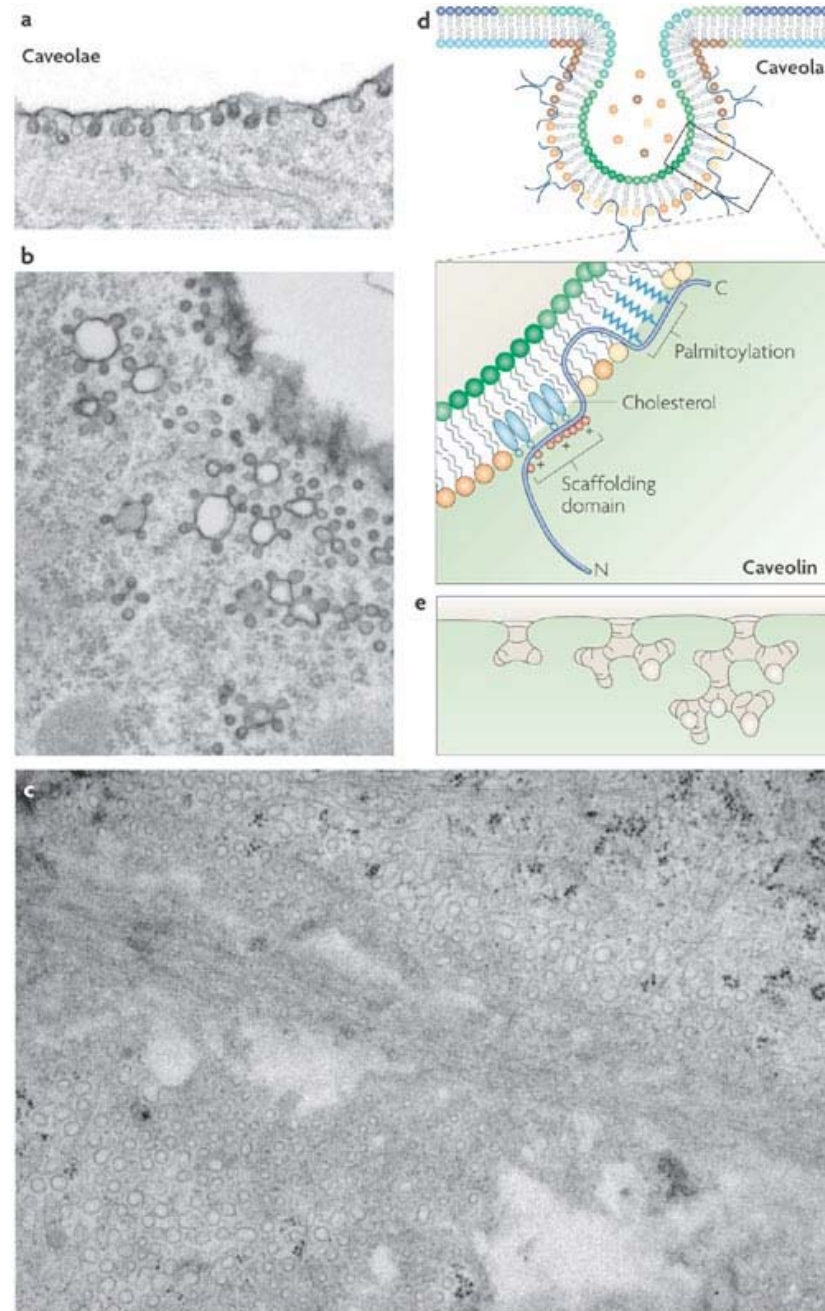
Colesterolo/Glicerofosfolipidi

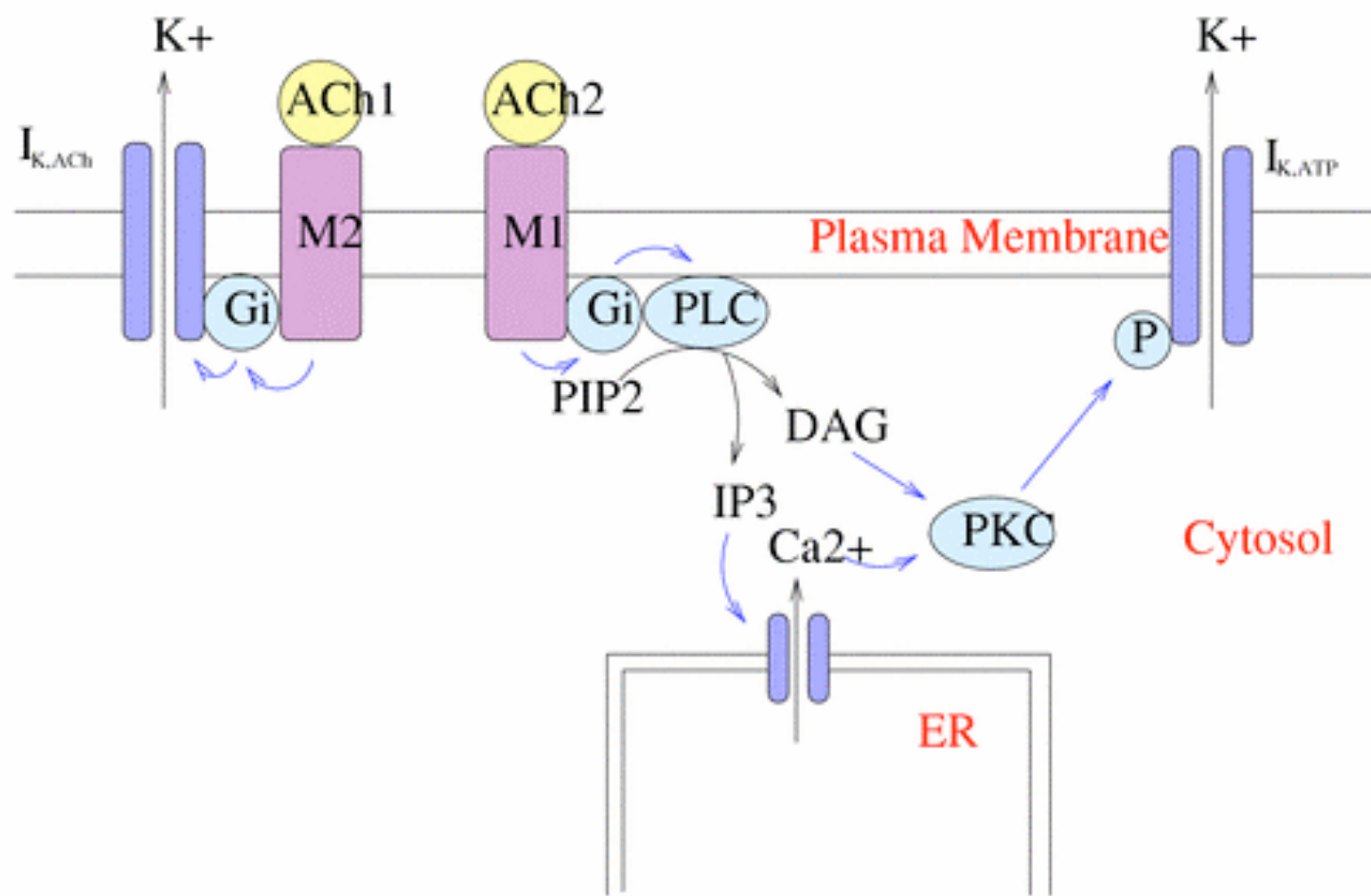
Catene aciliche sature/insature

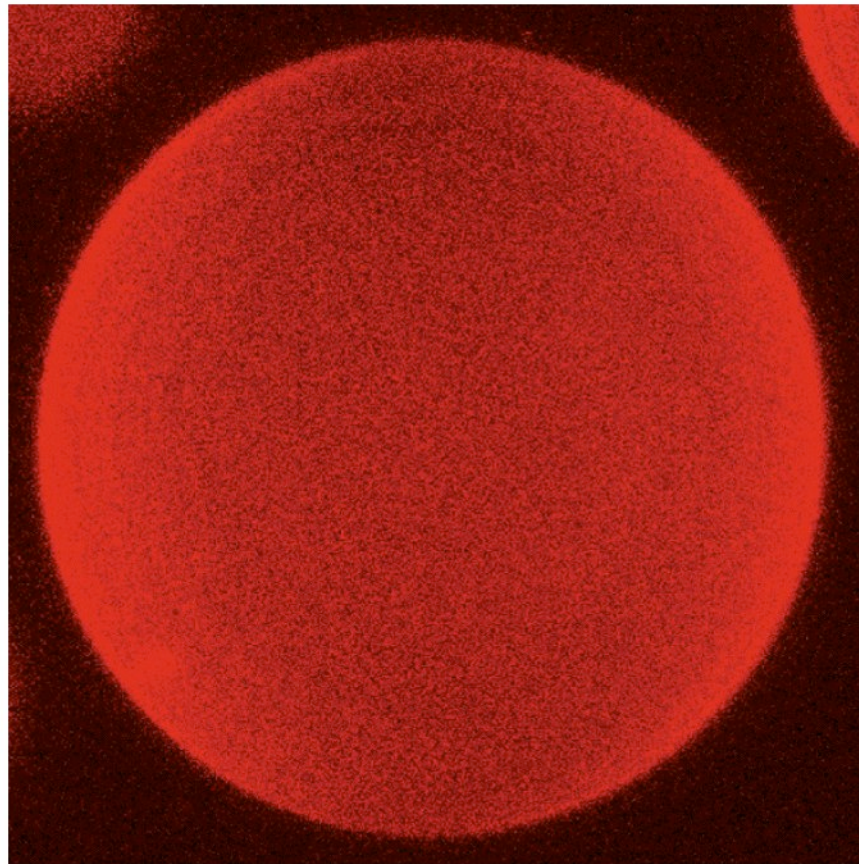
Proteine/Lipidi



RAPID-FREEZE DEEP-ETCH PICTURE OF CAVEOLAE on the innersurface of the plasma membrane, from Rothberg et al. (1992) Cell **68**, 673-682. The rope-like coat contains closely-packed caveolin molecules. Note clathrin-coated pit (upper right) for comparison.

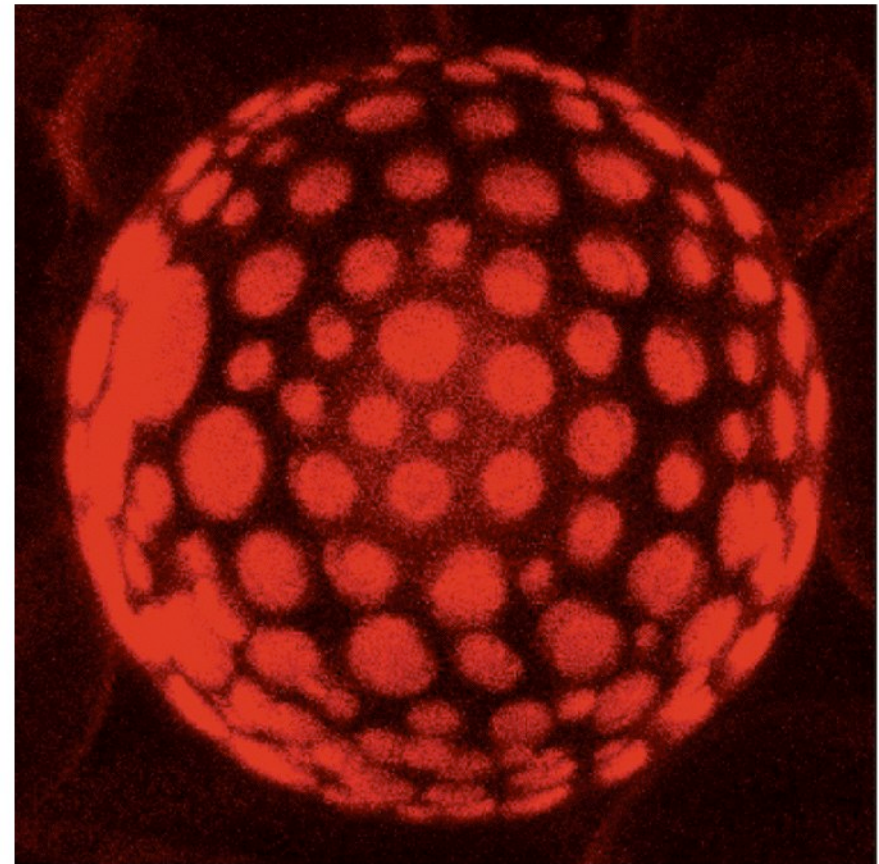






(A)

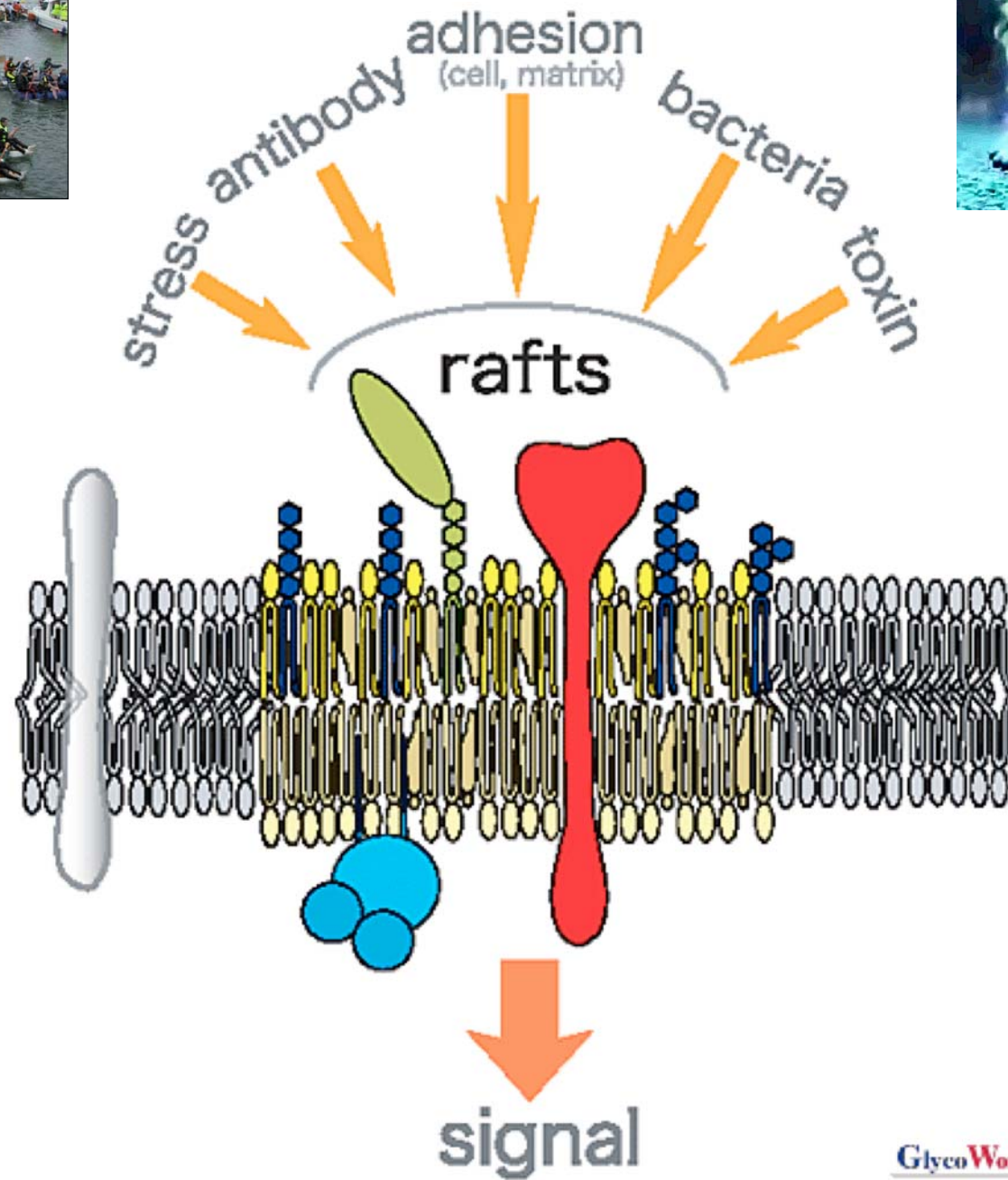
10 μm

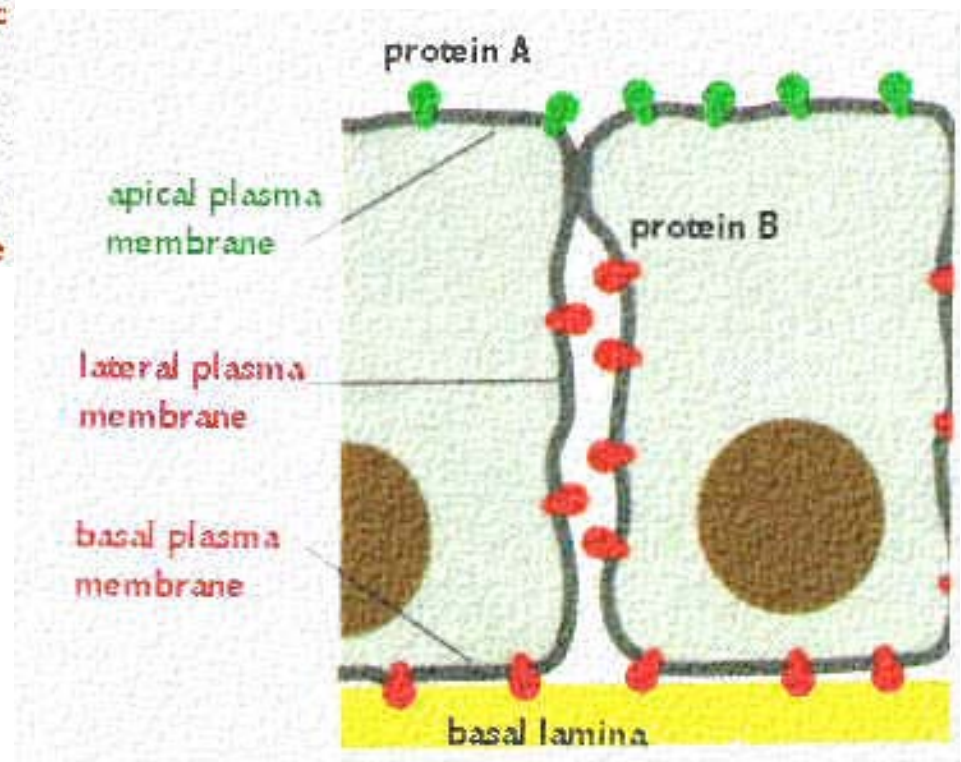
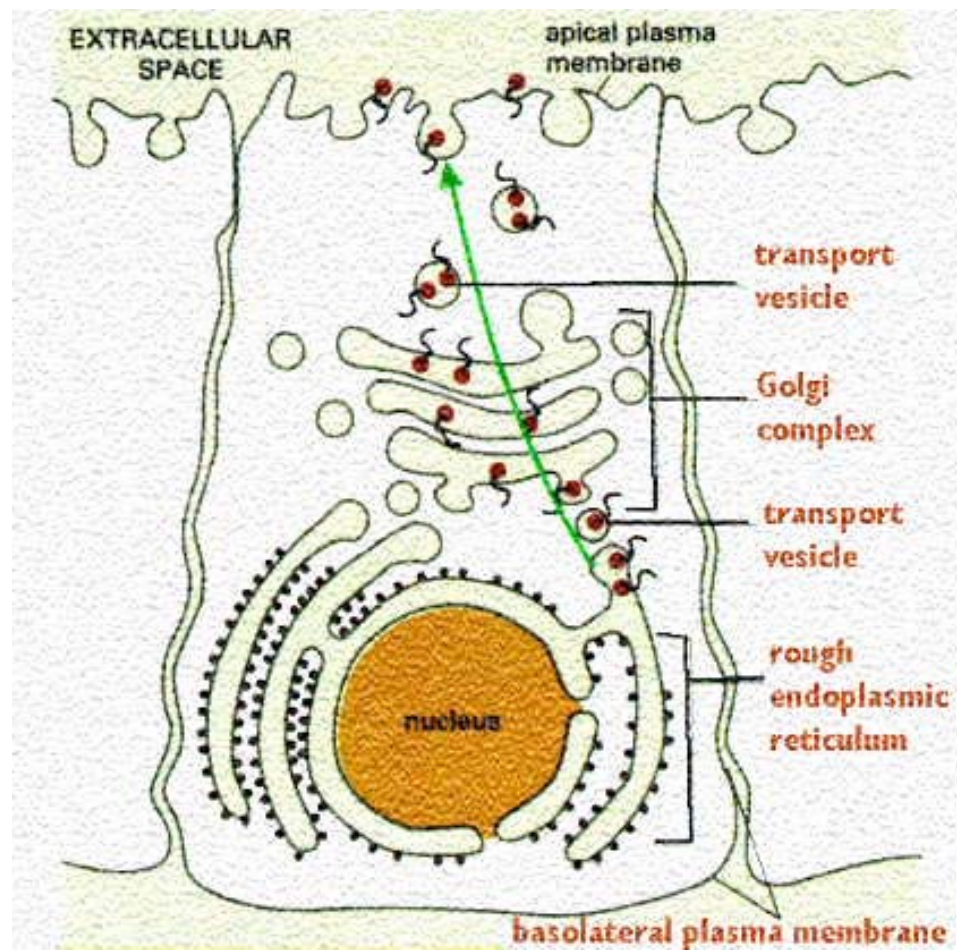


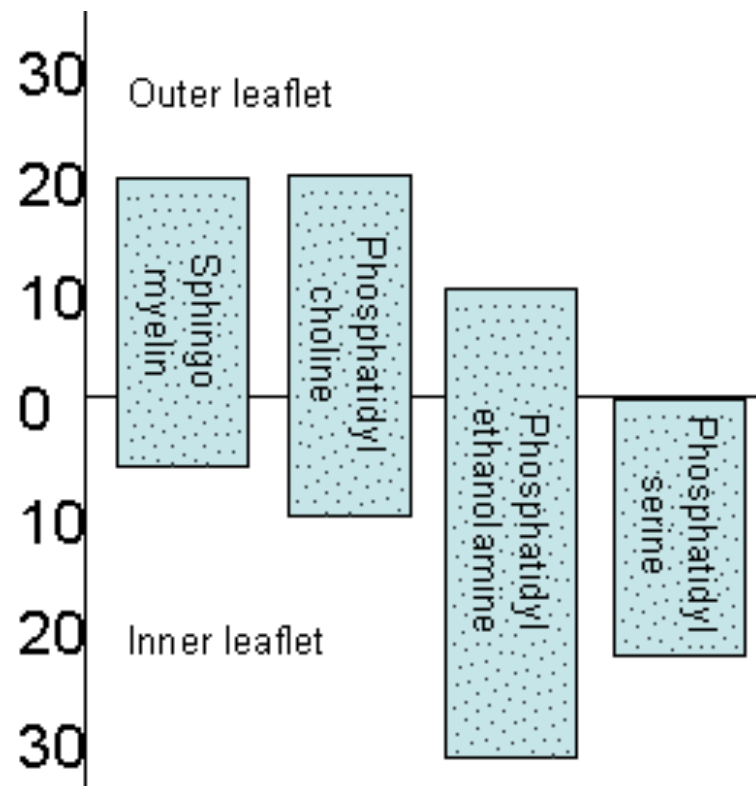
(B)

5 μm

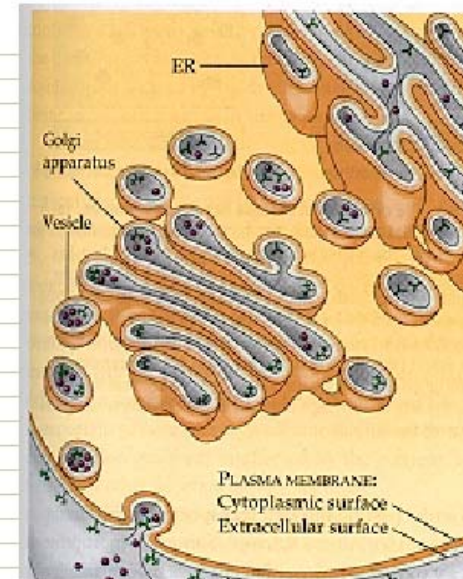
Figure 10-13 *Molecular Biology of the Cell* (© Garland Science 2008)







Sidedness of Plasma Membranes



COSA DOBBIAMO RICORDARE:
1. STRUTTURA DELLA MEMBRANA

1. Funzioni principali della membrana
2. Modelli proposti e validità del modello di S&N
3. Modi in cui sono ancorate le proteine al doppio strato
4. Principali funzioni delle proteine di membrana
5. Principali componenti lipidici del doppio strato
6. Concetto di fluidità di membrana e fattori che la influenzano
7. I “raft” di membrana
8. Altre disimmetrie della membrana