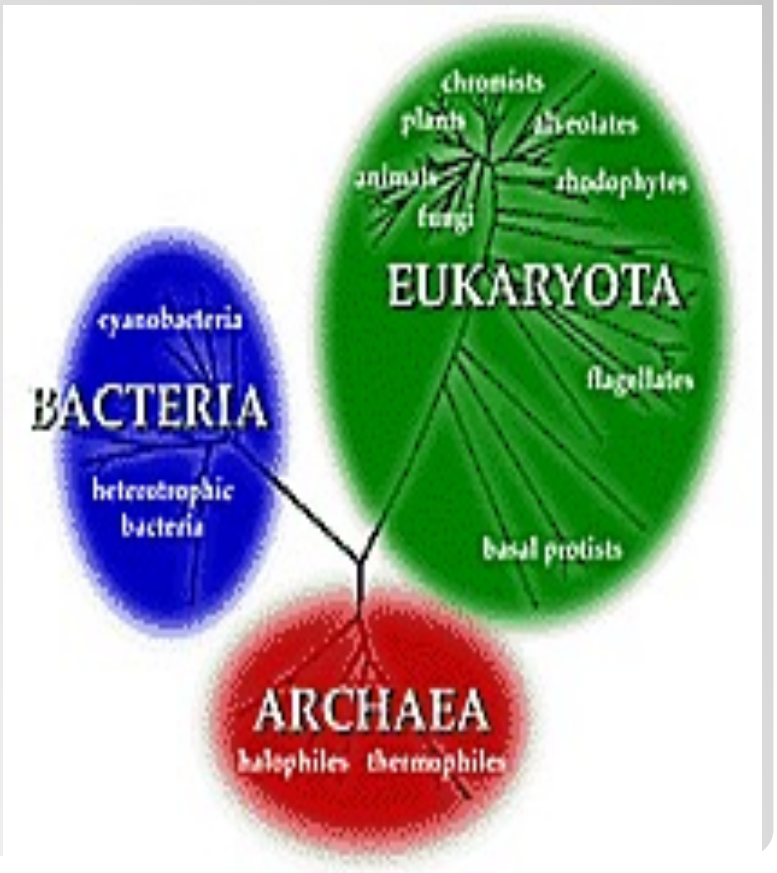
MICROBIOLOGIA : La forme e le strutture (1)

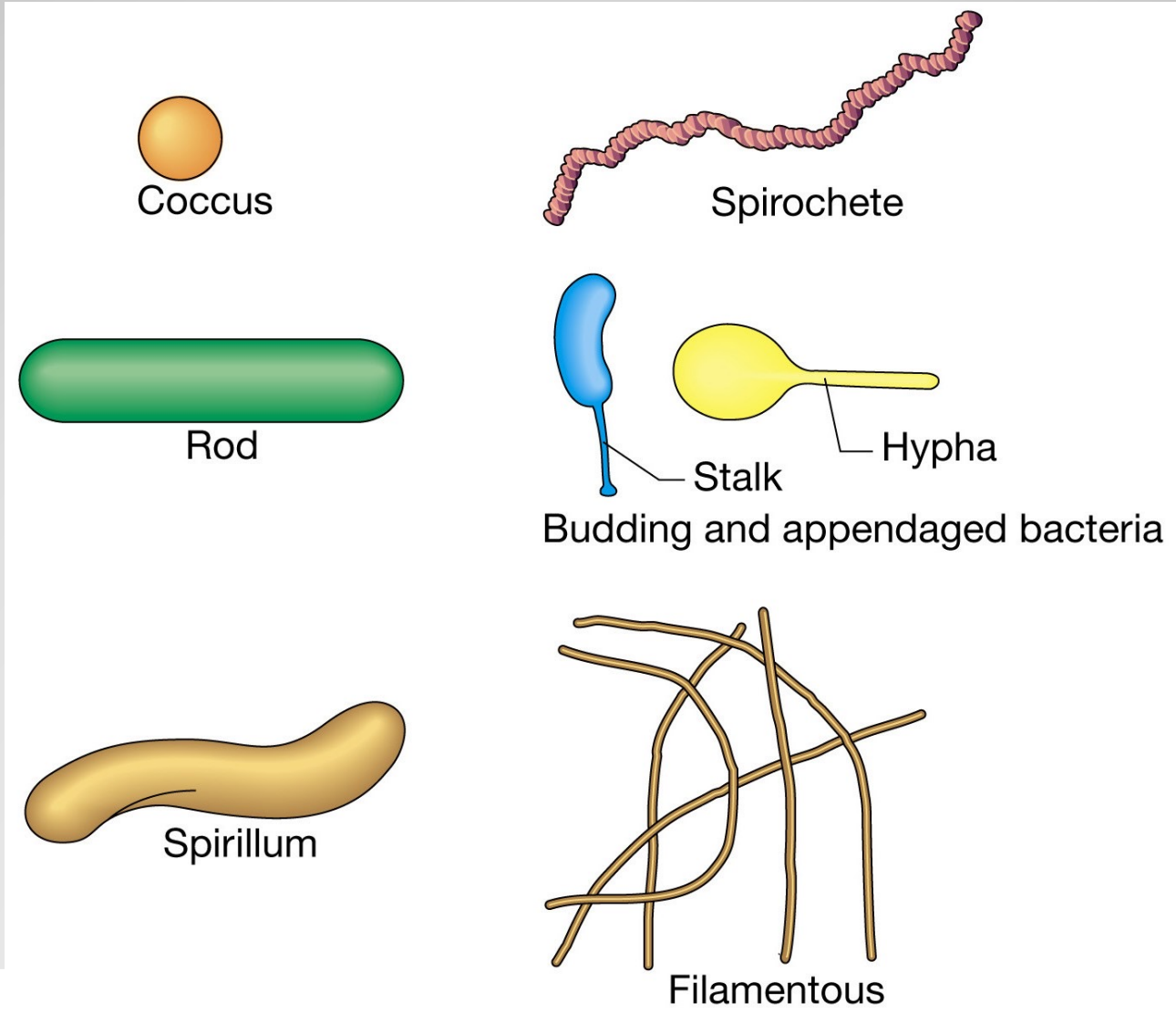
Il mondo delle Cellule

Cellula Procariotica—mancanza del nucleo, DNA circolari, ribosomi

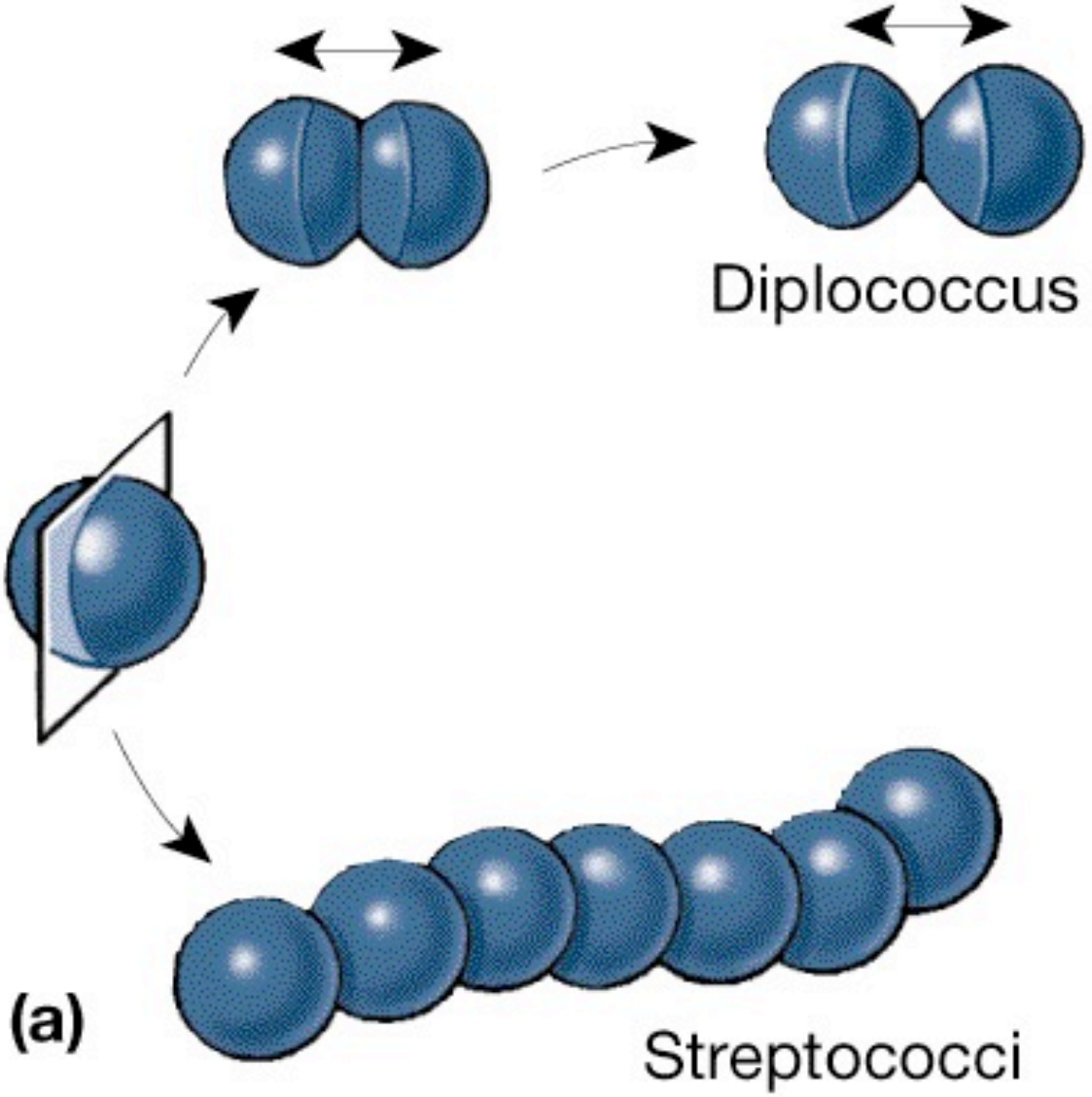
Cellula Eucariotica—più grande, nucleo, cromosomi lineari, organelli membranosi

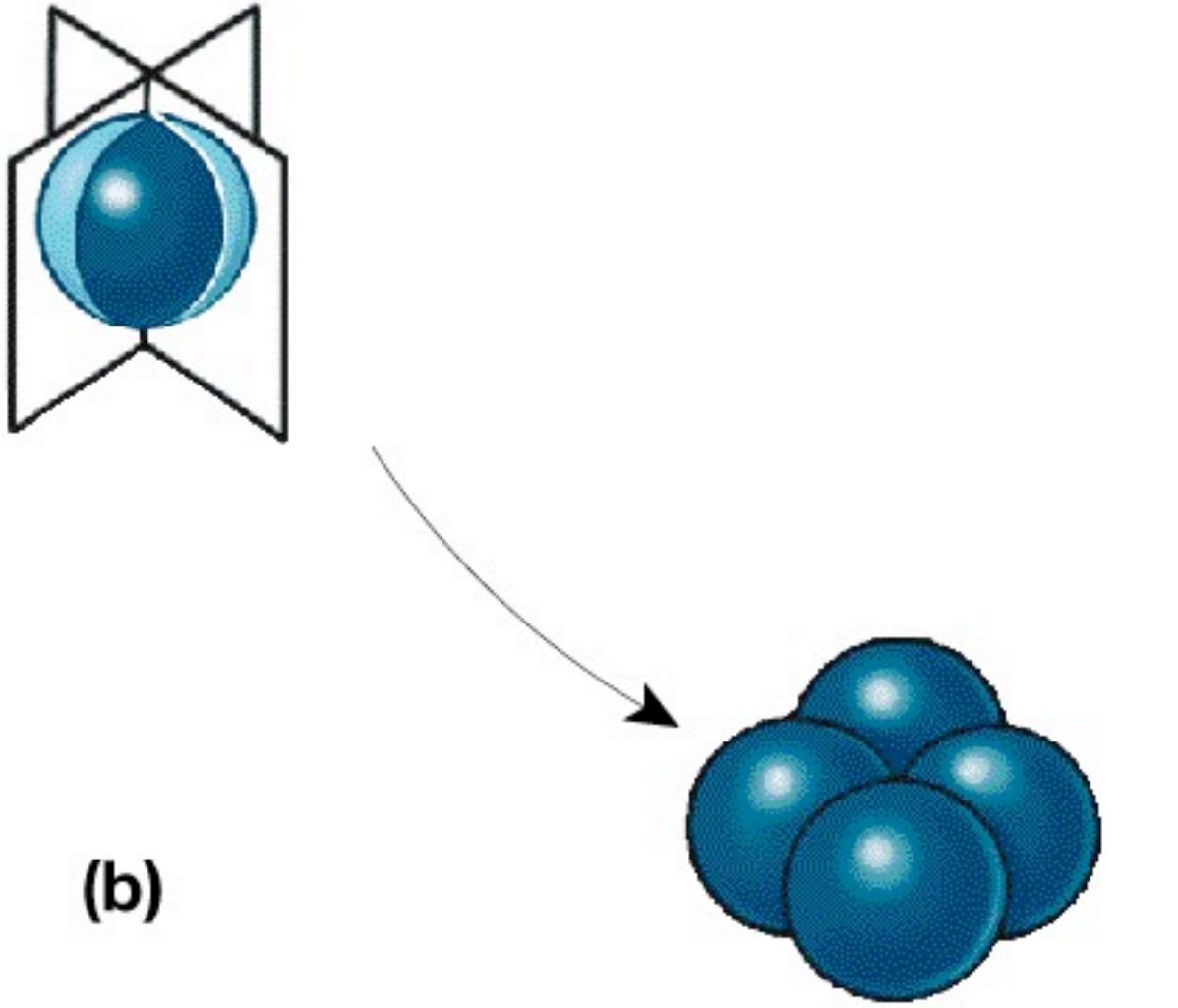


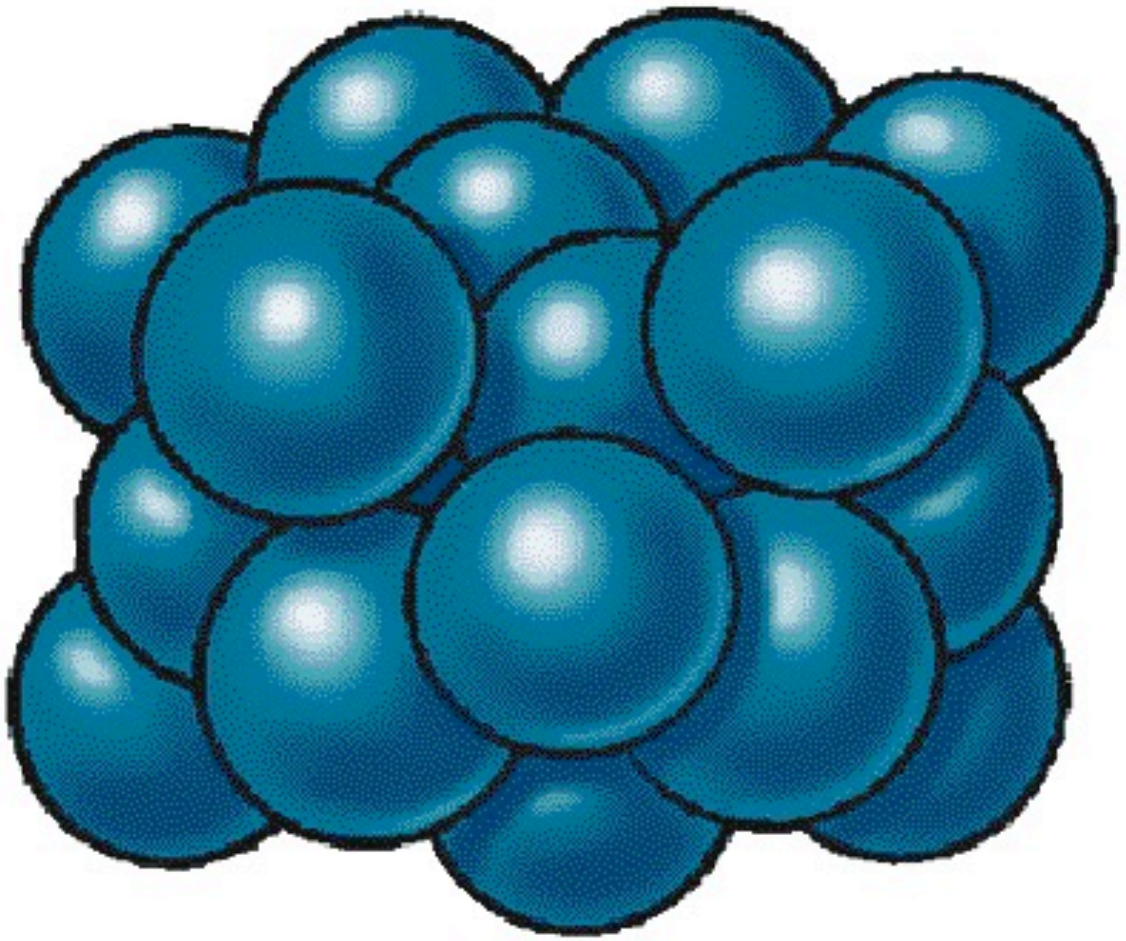
LE FORME DEI BATTERI SONO MOLTEPLICI...



Le forme dipendono dai piani di moltiplicazione..

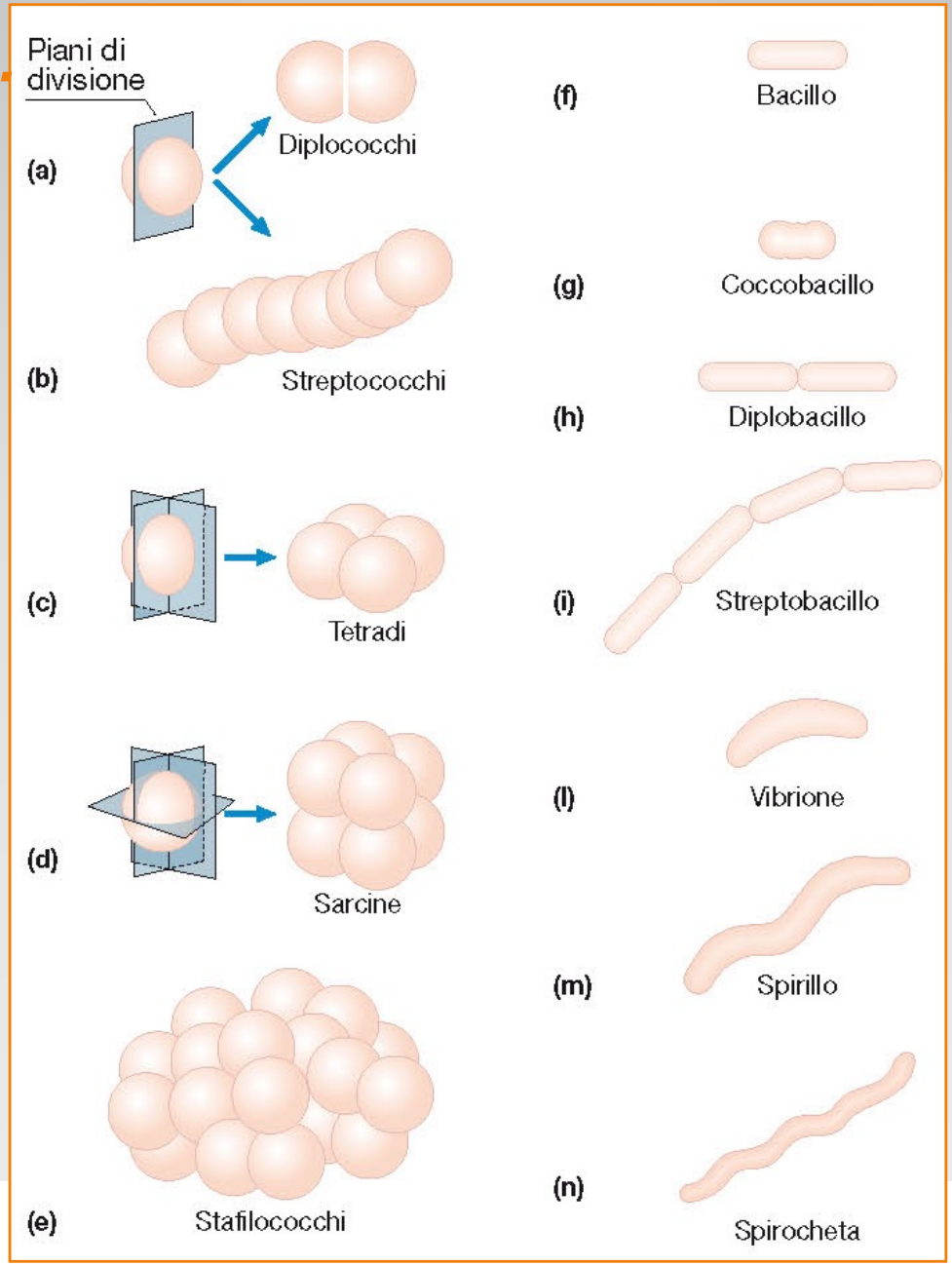



(b)
Tetrad

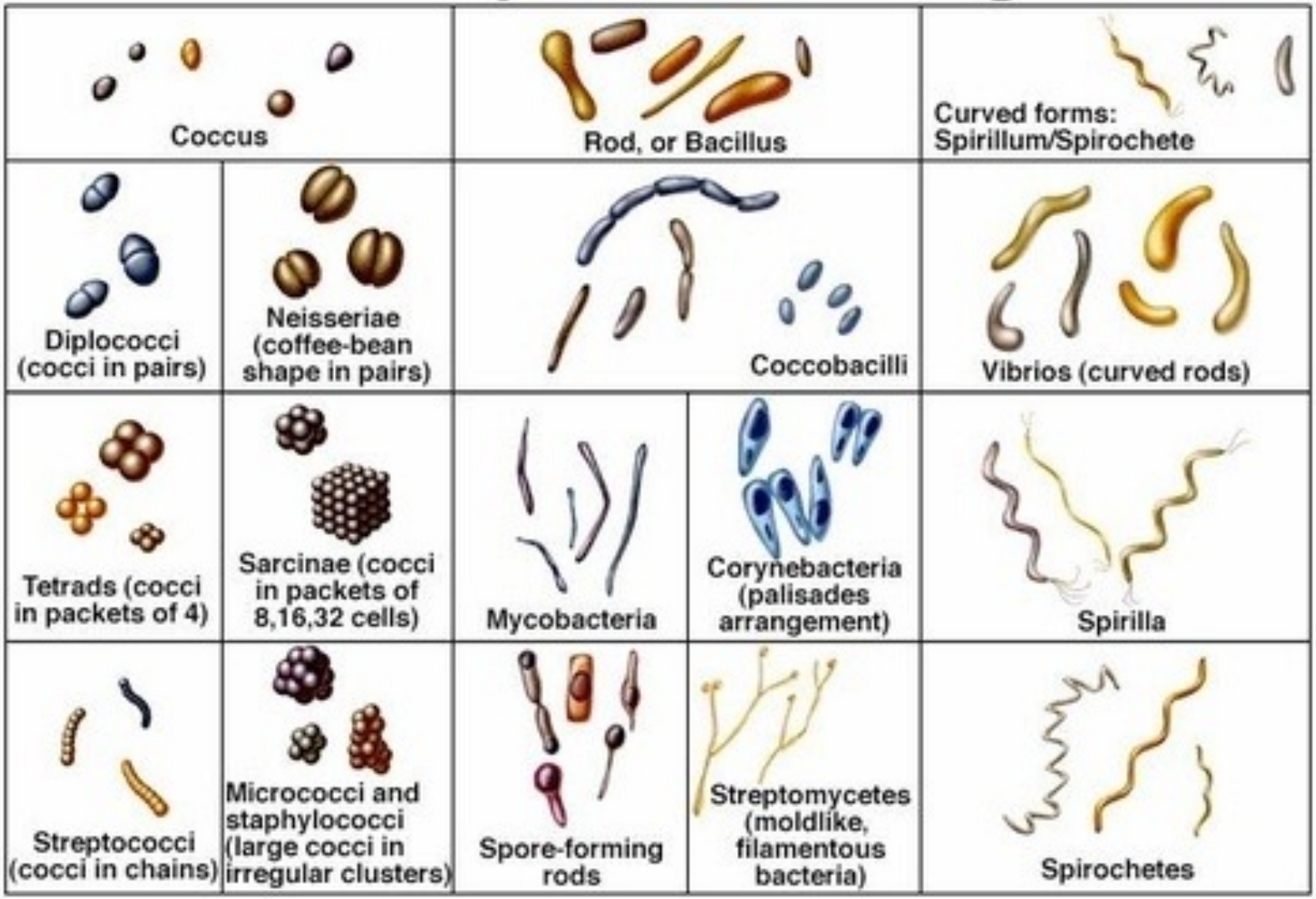


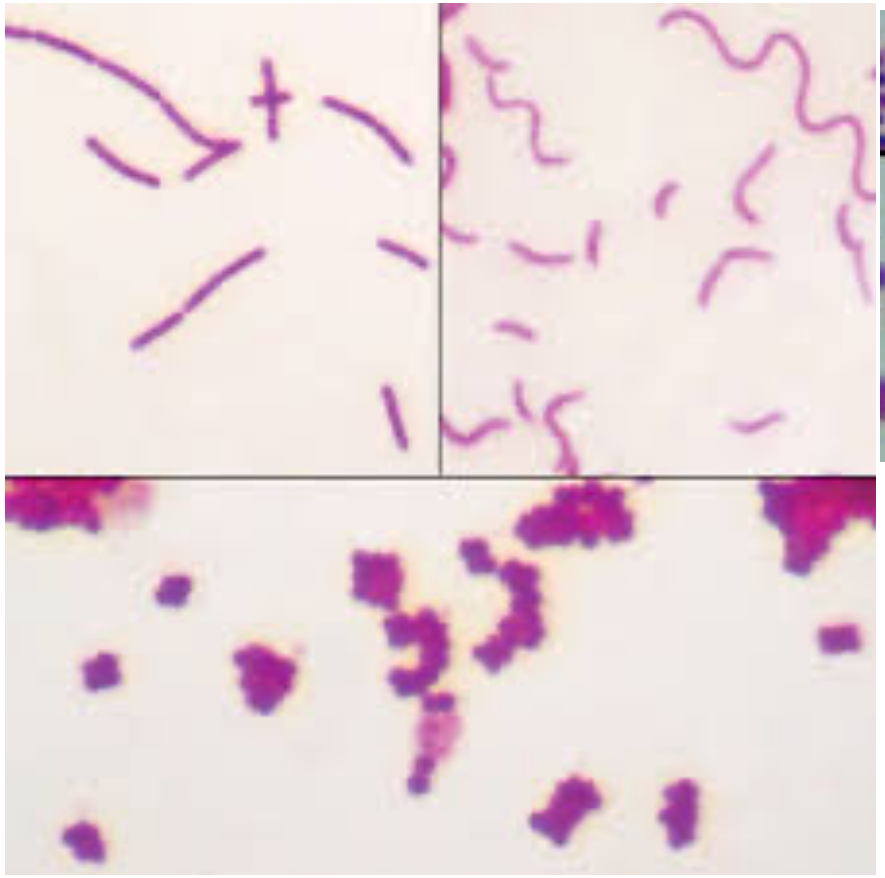
(d) Staphylococci

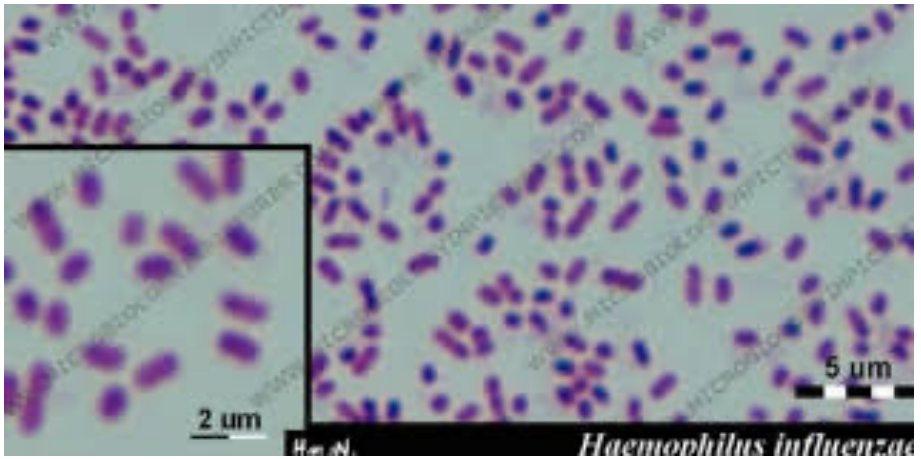
Riassumendo…..

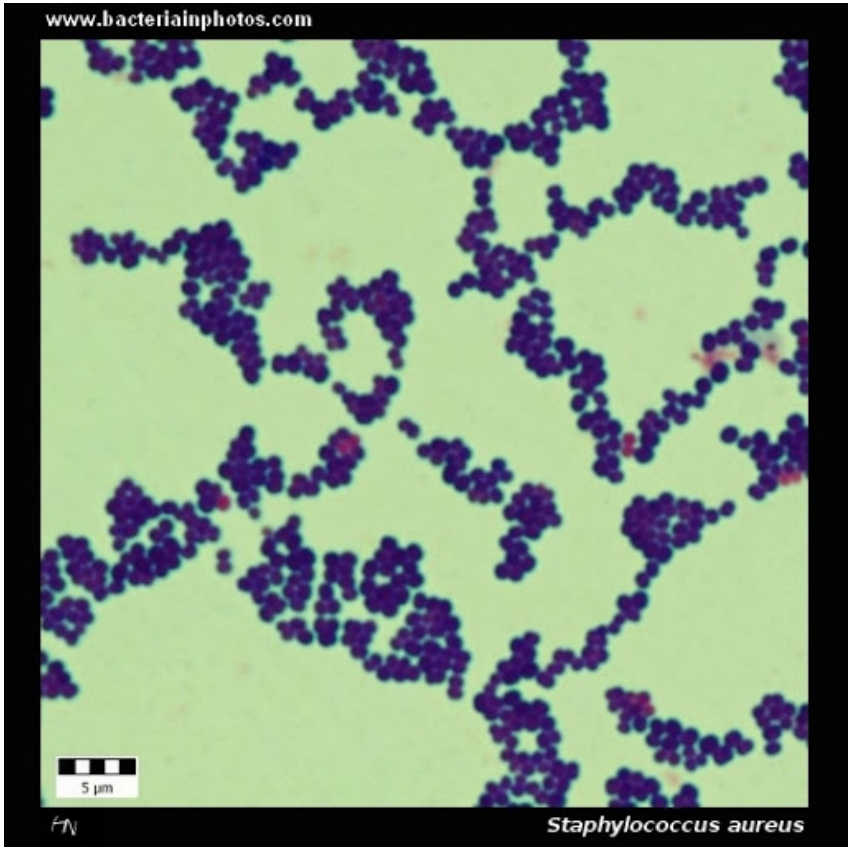


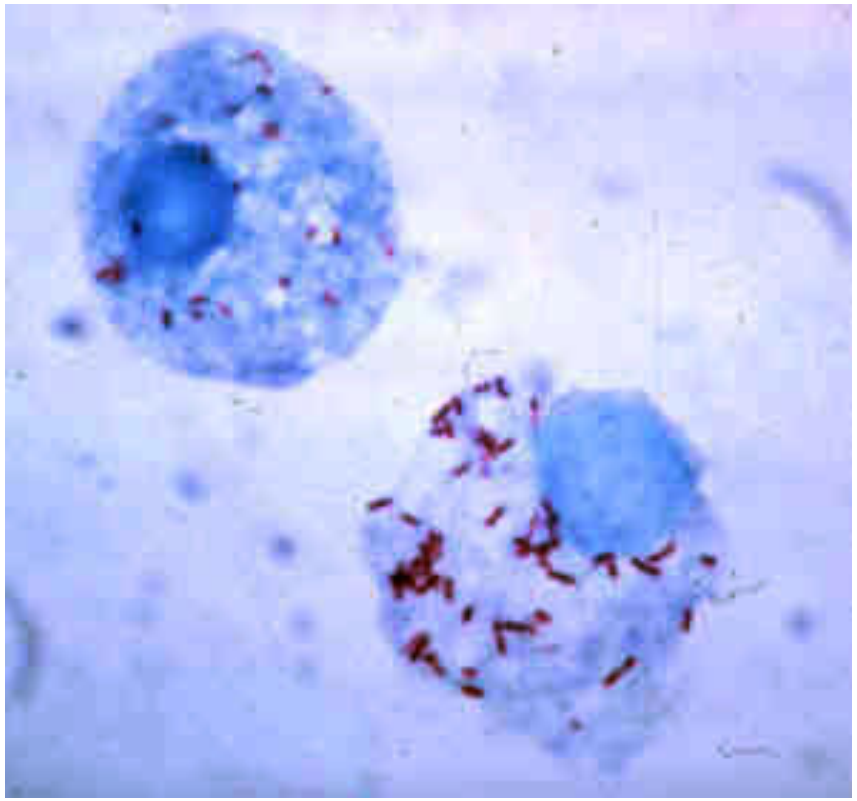
Bacterial shapes and arrangements



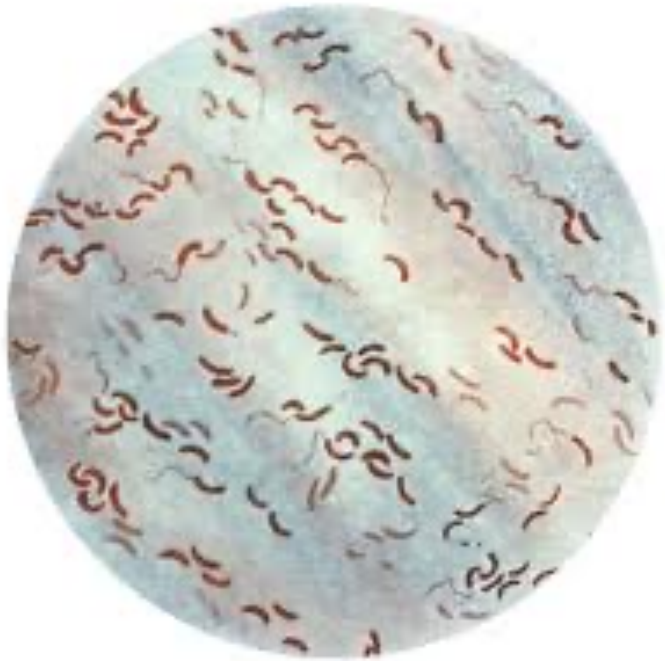



2 um
5 um
Haemophilus influenzae


www.bacteriainphotos.com
5 µm
Staphylococcus aureus

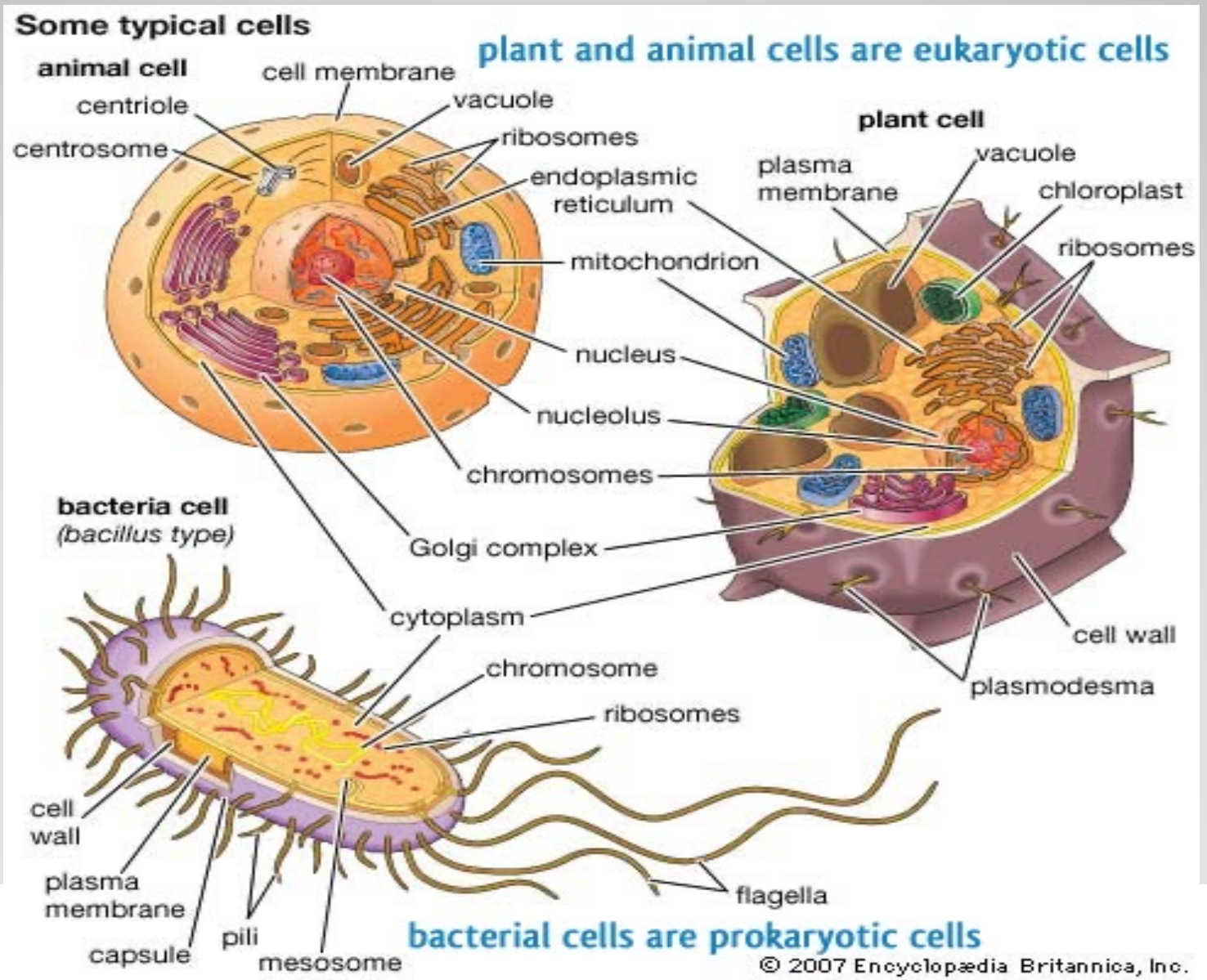


Rickettsiae

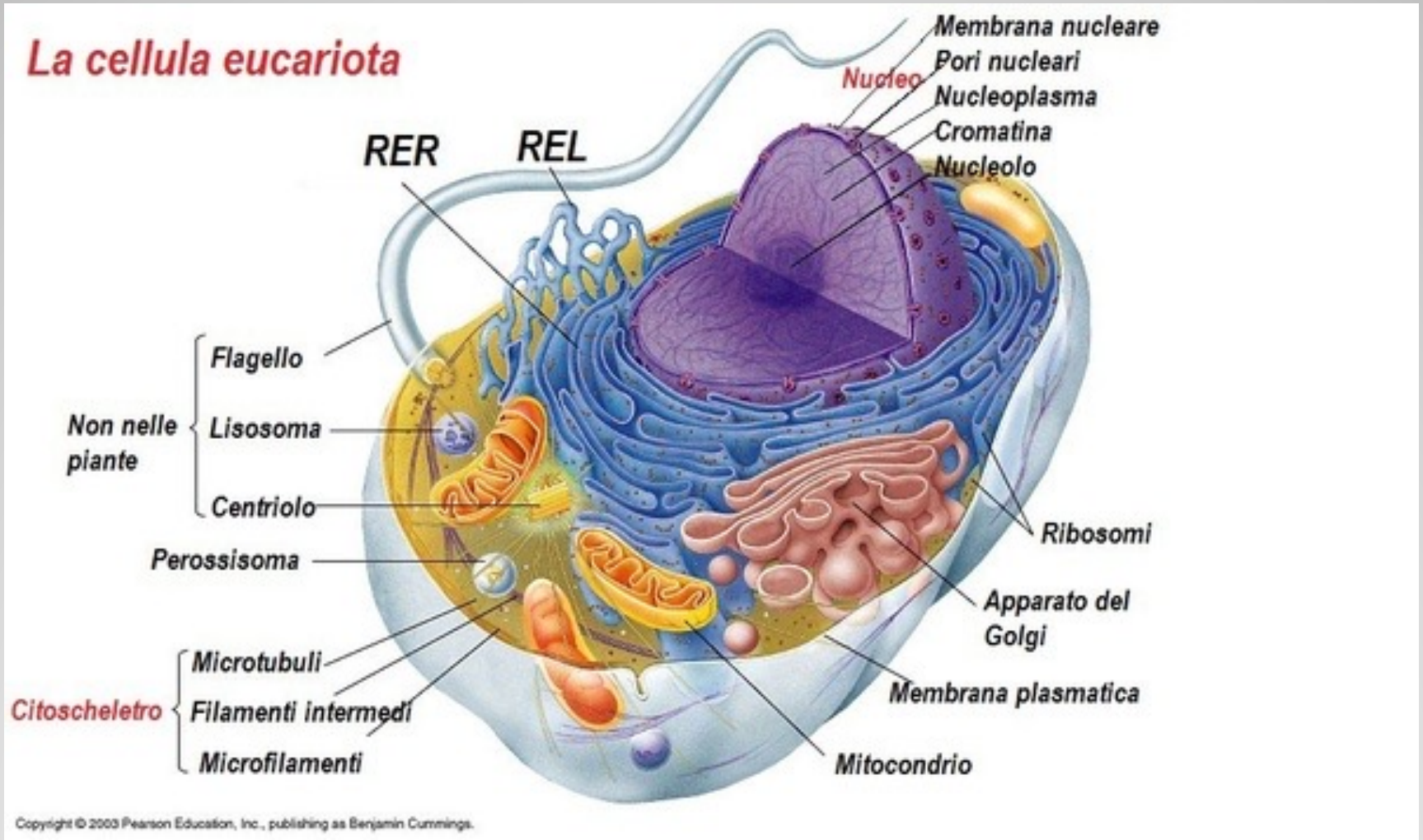


Vibrio cholera

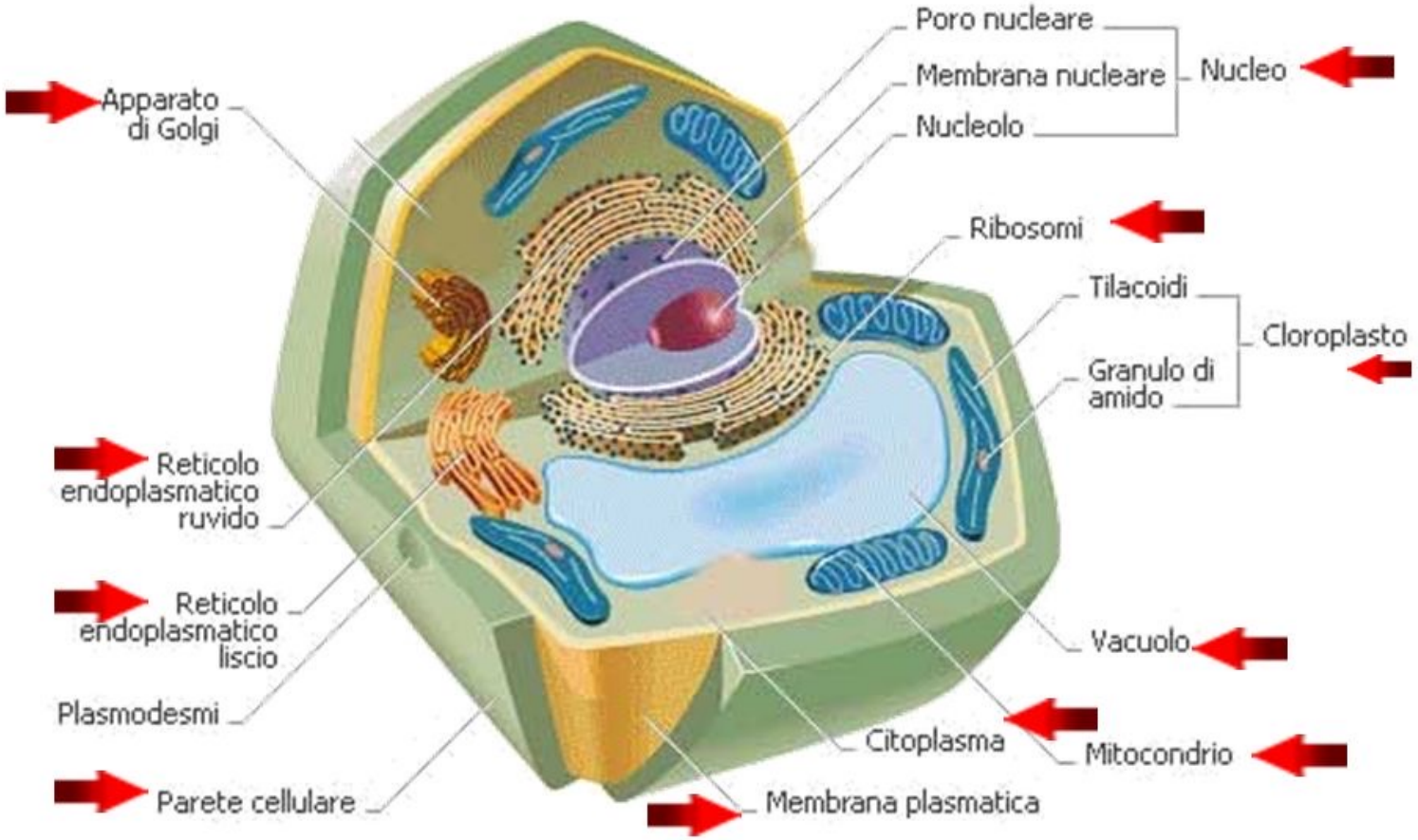
SEMPLICI E COMPLESSE…



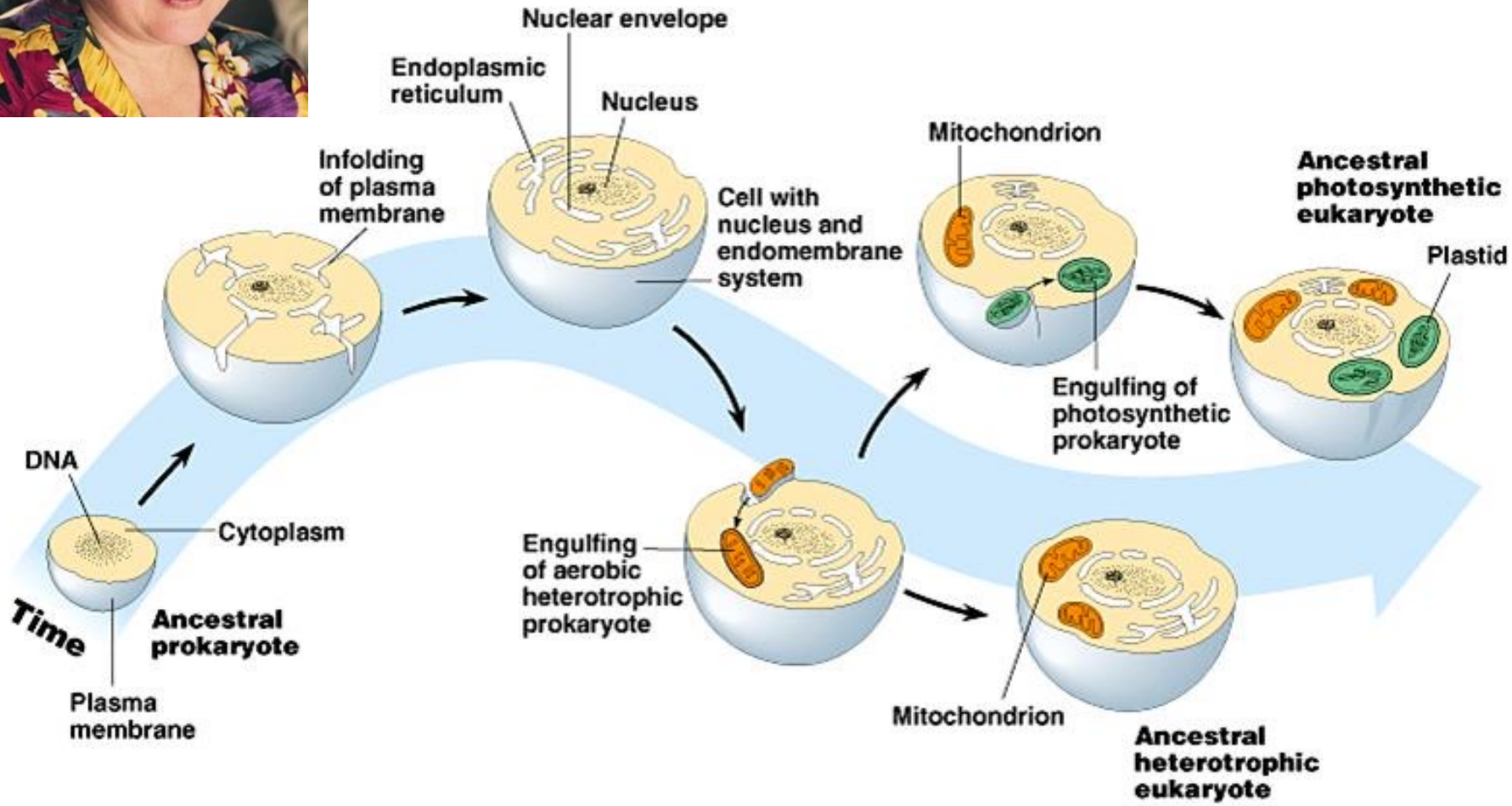
- La Cellula animale: un'elevata complessità



Cellula Eucariotica Vegetale: differentemente compartimentalizzata..

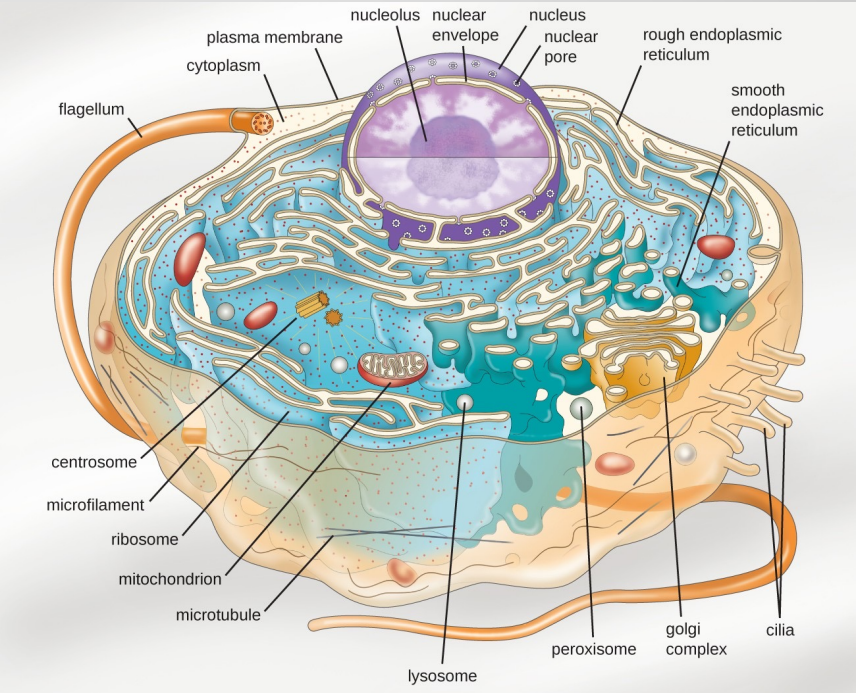


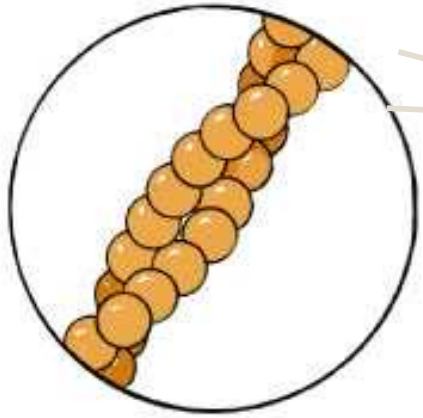
L'origine dei mitocondri e cloroplasti: ipotesi di Lynn Margulis (e di altri)



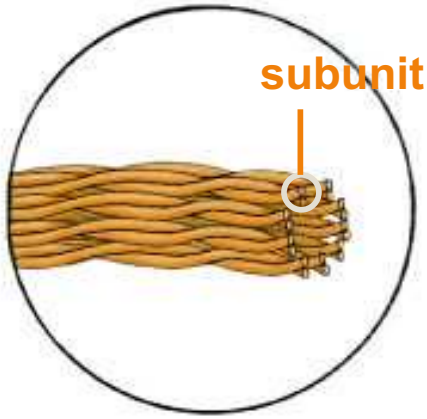
GLI "HALLMARKS" DELLA CELLULA EUCARIOTICA ANIMALE

- IL NUCLEO, NUCLEOLO E LA MEMBRANA NUCEARE
- IL SISTEMA DELLE MEMBRANE INTERNE
  - IL RETICOLO ENDOPLASMICO
  - L'APPARATO DI GOLGI

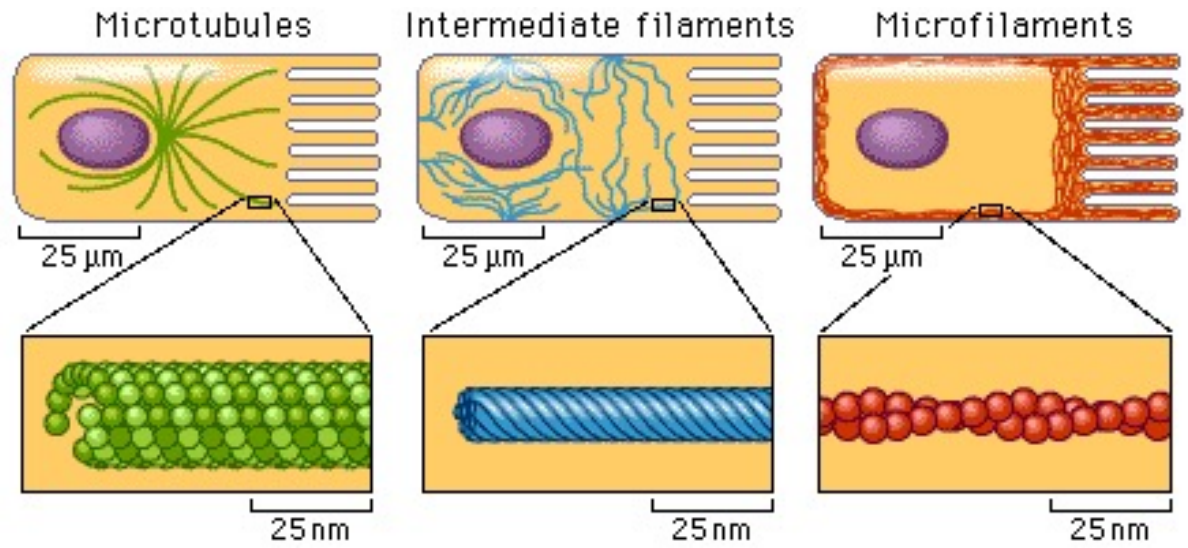


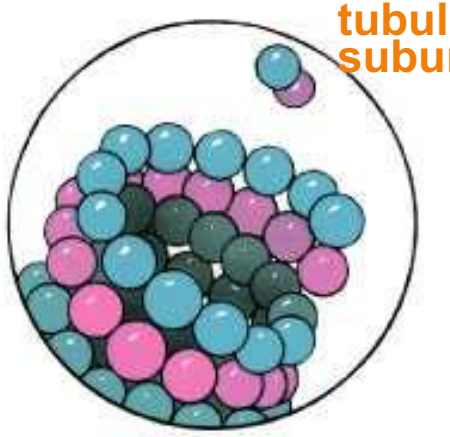


actin subunits

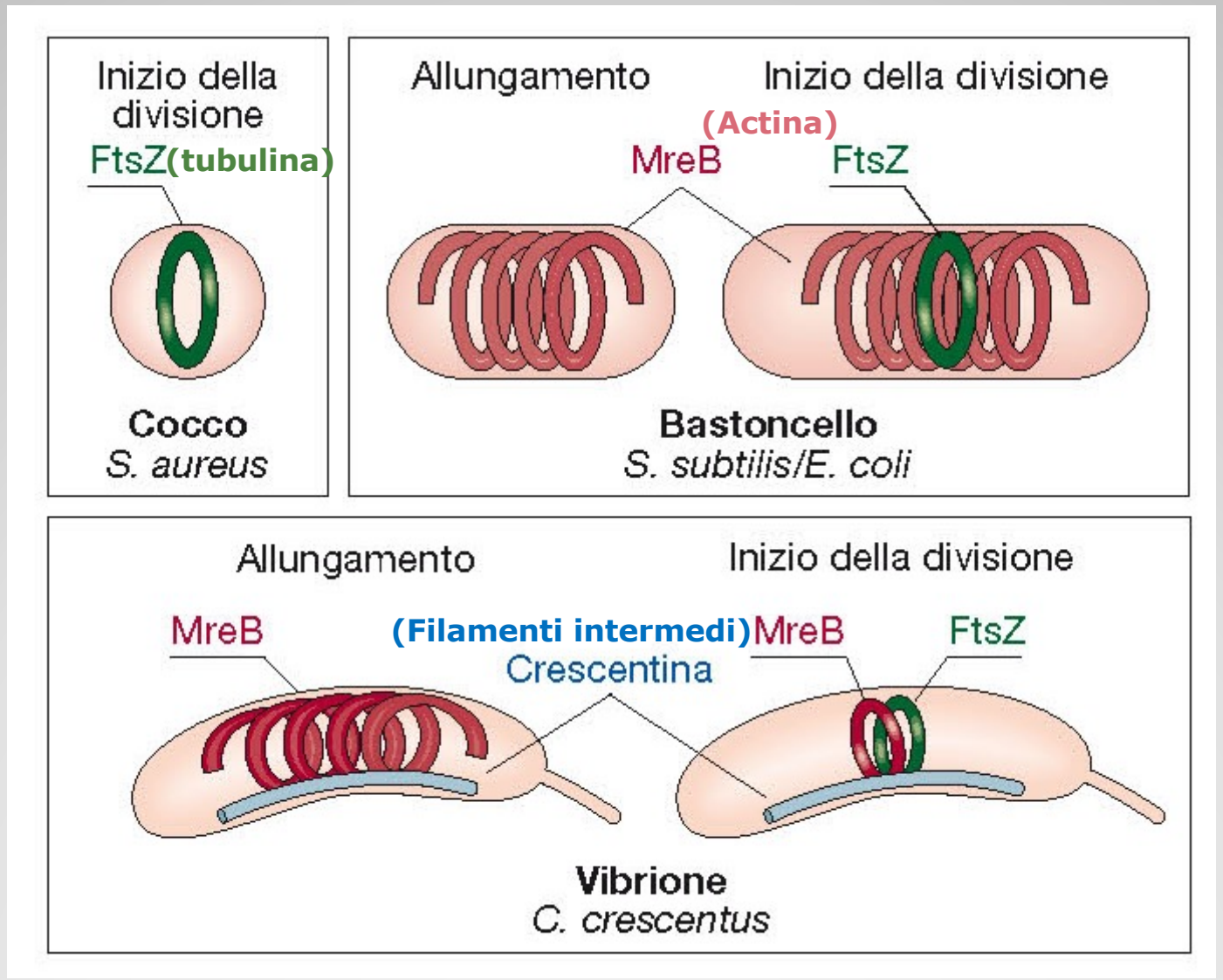


subunit

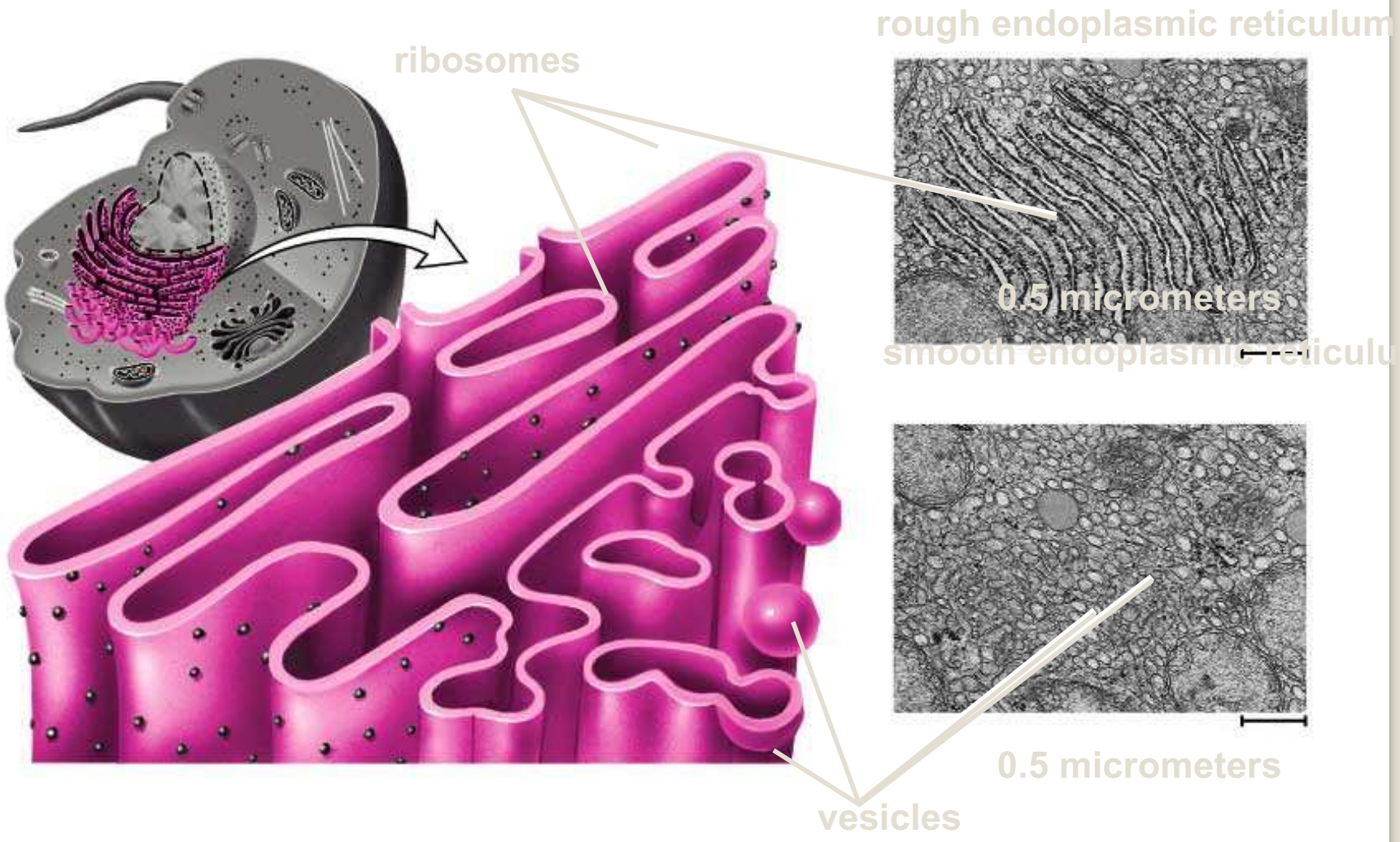




tubulin subunit



Le membrane interne nella cellula eucariotica scandiscono i compartimenti



Cellula procariotica

Pili: strutture di adesione presenti sulla superficie di alcuni batteri

Nucleoide: regione dove è localizzato il DNA (non Incluso in una membrana)

Ribosomi: organelli dove Avviene ls isntesi delle proteine

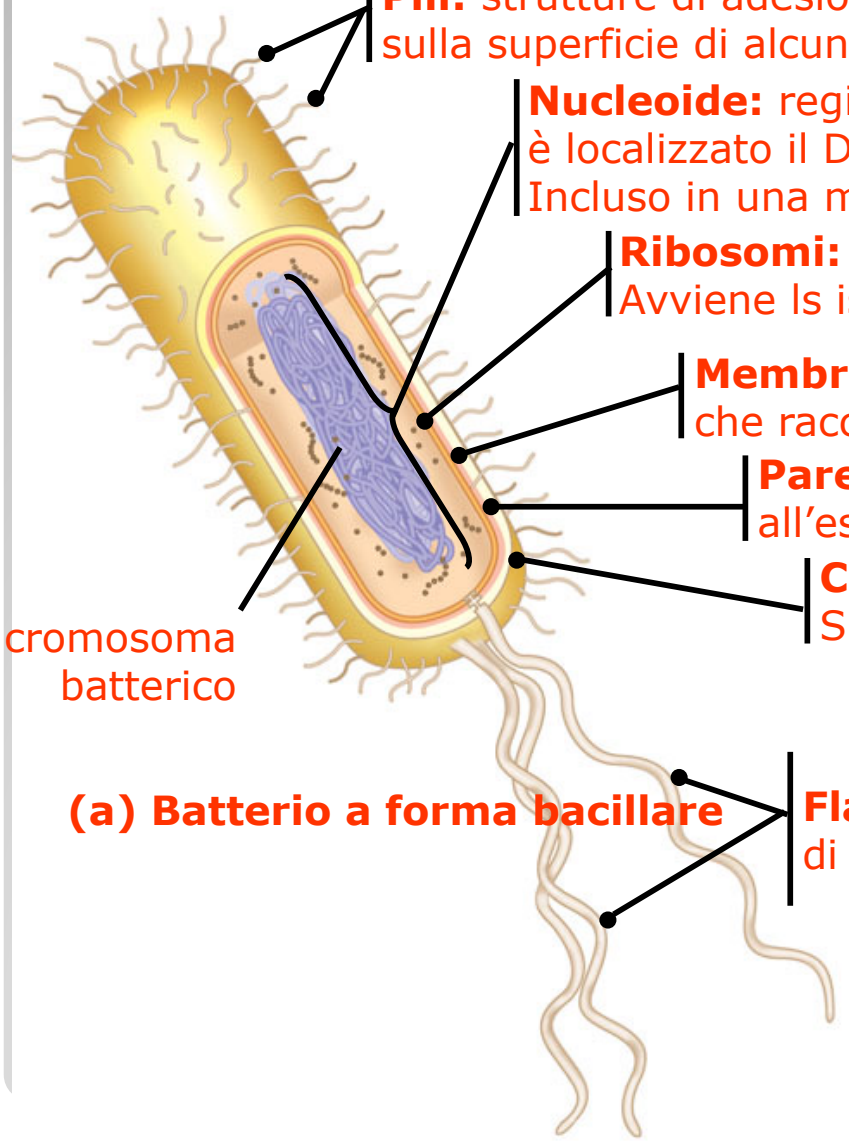
Membrana plasmatica: membrana che racchiude il citoplasma

Parete cellulare: struttura rigida all'esterno della membrana plasmatica

Capsula: strato gelatinoso presente Sulla supericie di alcuni procarioti

cromosoma batterico

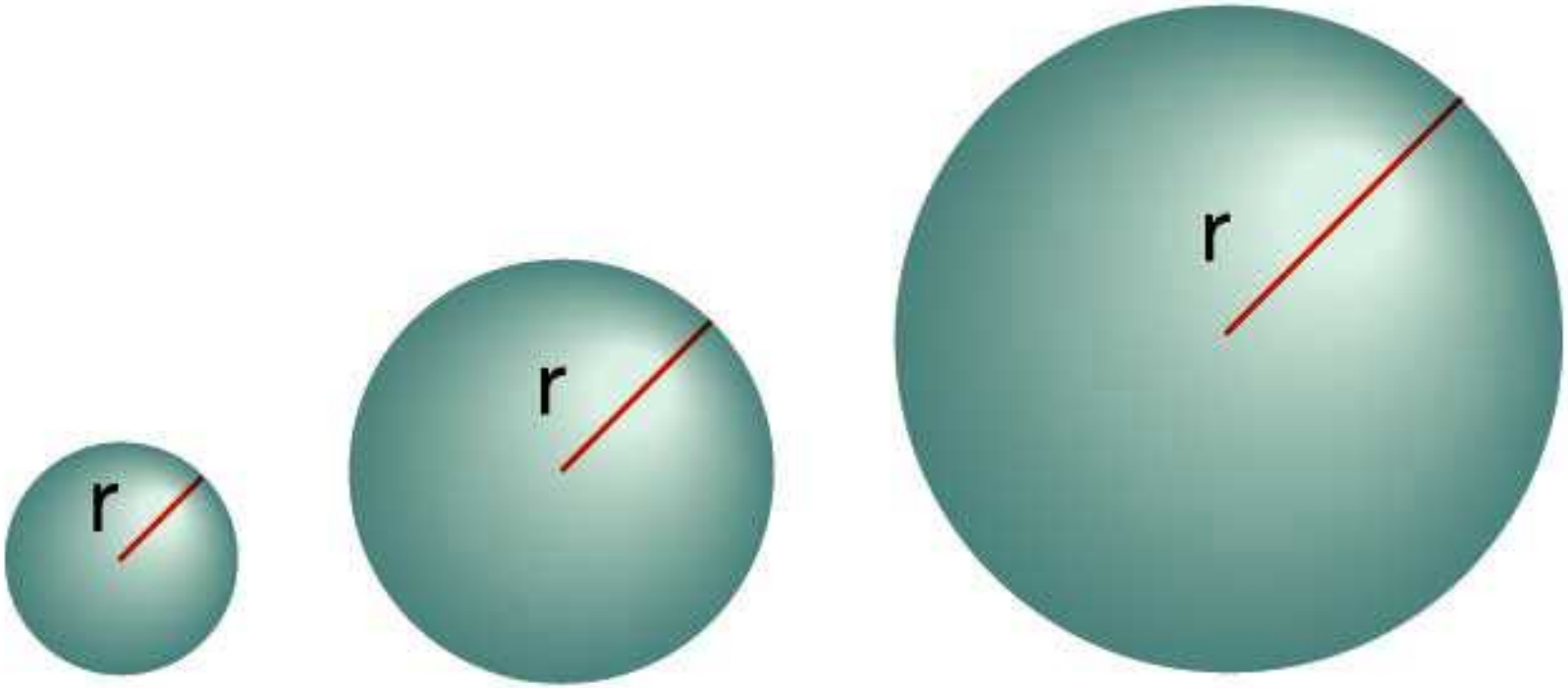
Flagelli: organelli di locomozione



(a) Batterio a forma bacillare

(b) Sezione sottile di *Bacillus coagulans* (TEM)

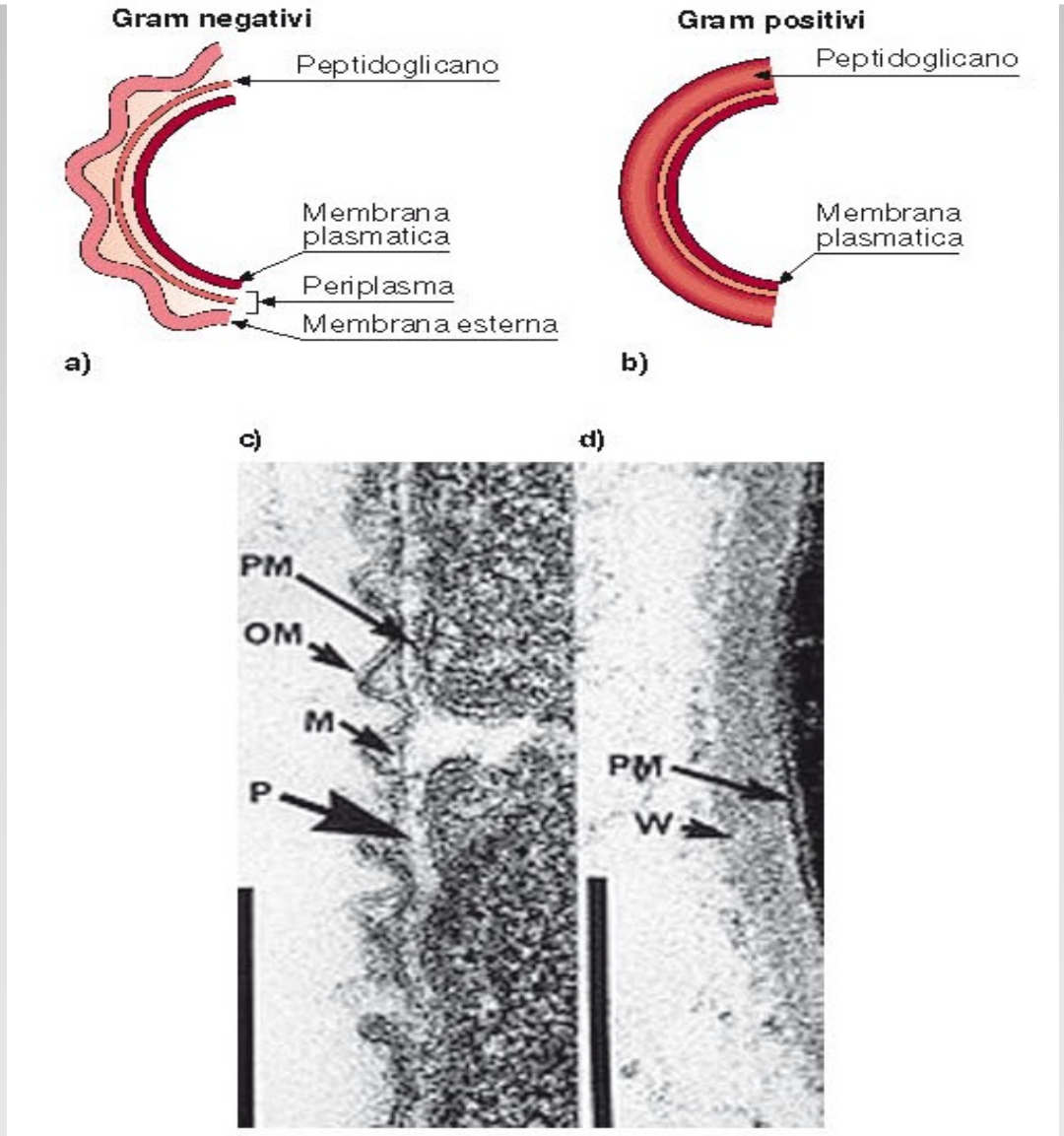
- **Nella cellula procariotica la maggiore complessità risiede nell'involucro…**
- **Ma perché???**



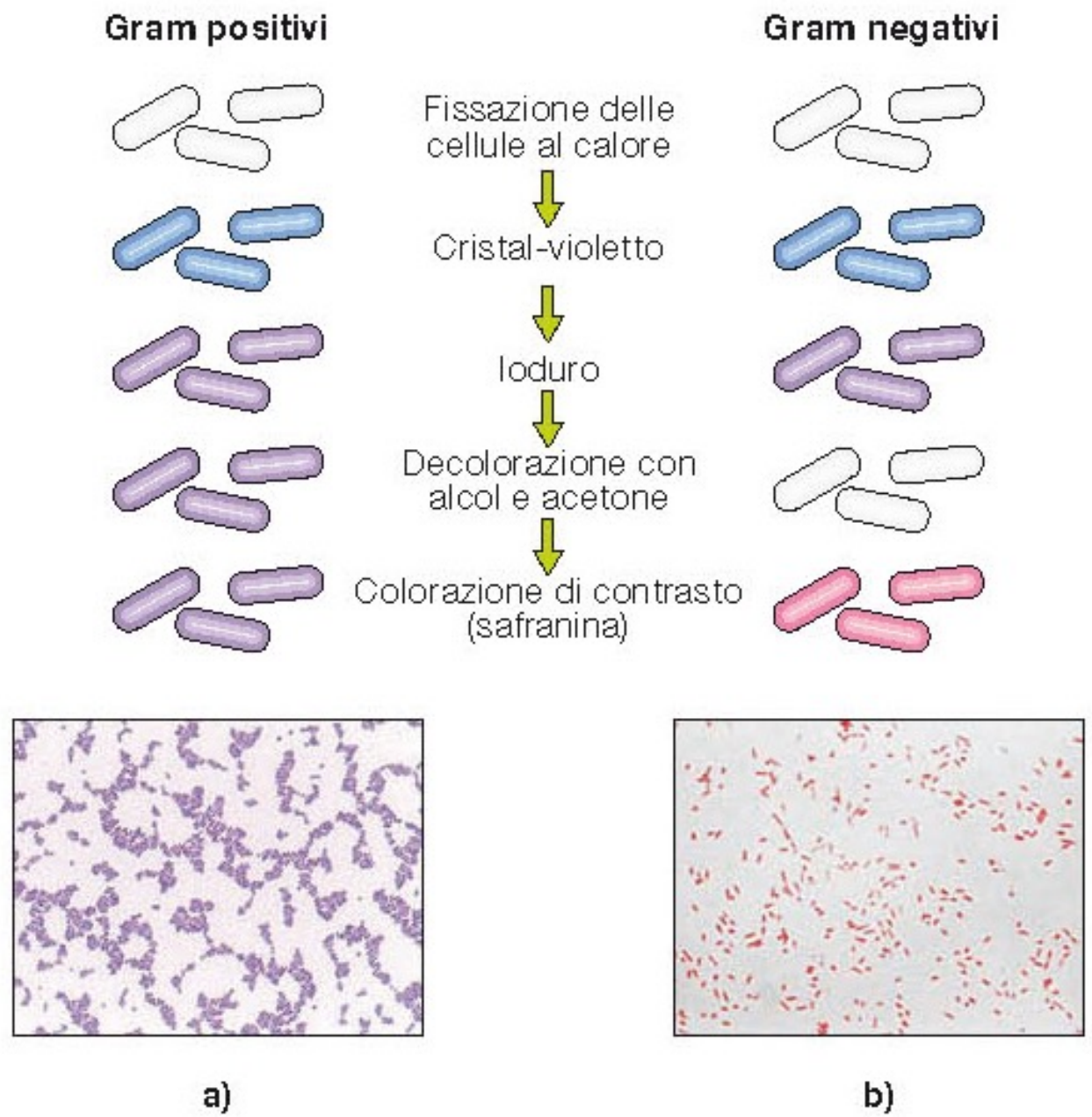
distance to center (r)	1.0	2.0	3.0
surface area ($4\pi r^2$)	12.6	50.3	113.1
volume ($4/3\,\pi\,r^3$)	4.2	33.5	113.1
area/volume	3.0	1.5	1.0

DIMENSIONI DEI BATTERI

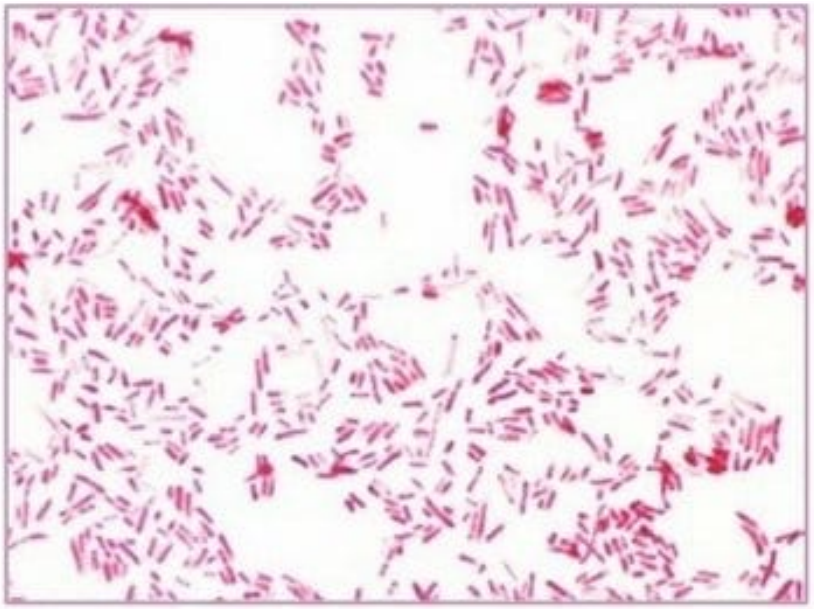
- 0.5 - 2.0 μm di diametro
- Volume è ~4 μm
- Rapporto Area-Superficie / Volume è 3 : 1
- Nelle cellule eucariotiche SA / Vol è 0.3 : 1
- Le sostanze nutrienti entrano attraverso la SA, e quindi raggiungono ogni parte del batterio
- Gli eucarioti necessitano di strutture e di organelli



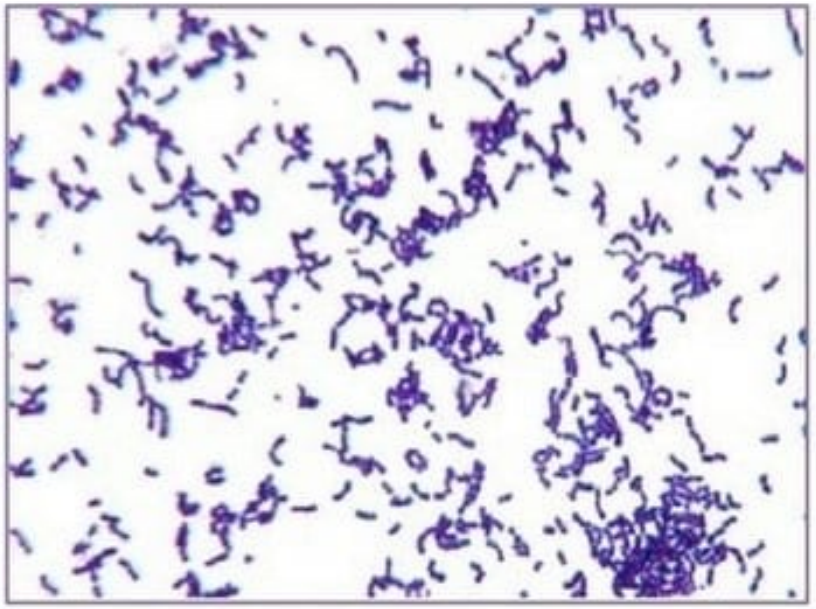
Il concetto di involucro



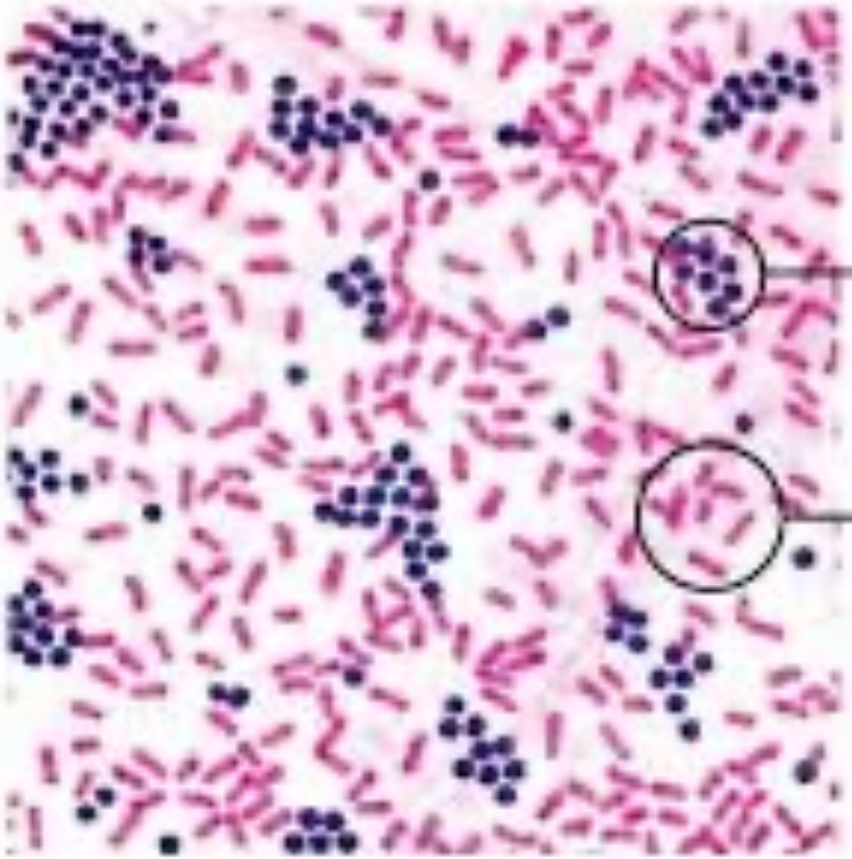
La colorazione di Gram discrimina fra batteri Gram-positivi e Gram-negativi

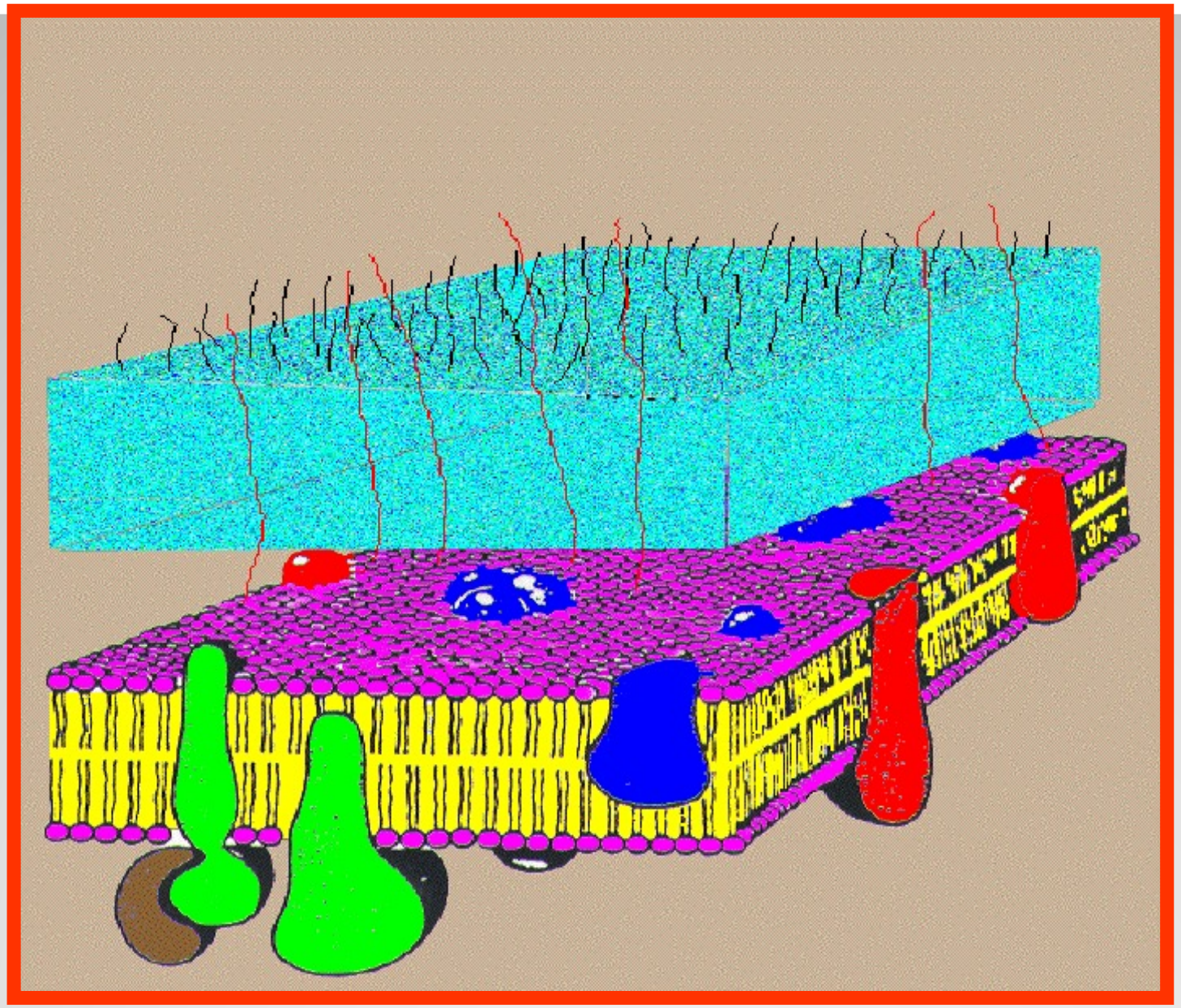


Batteri Gram Negativi

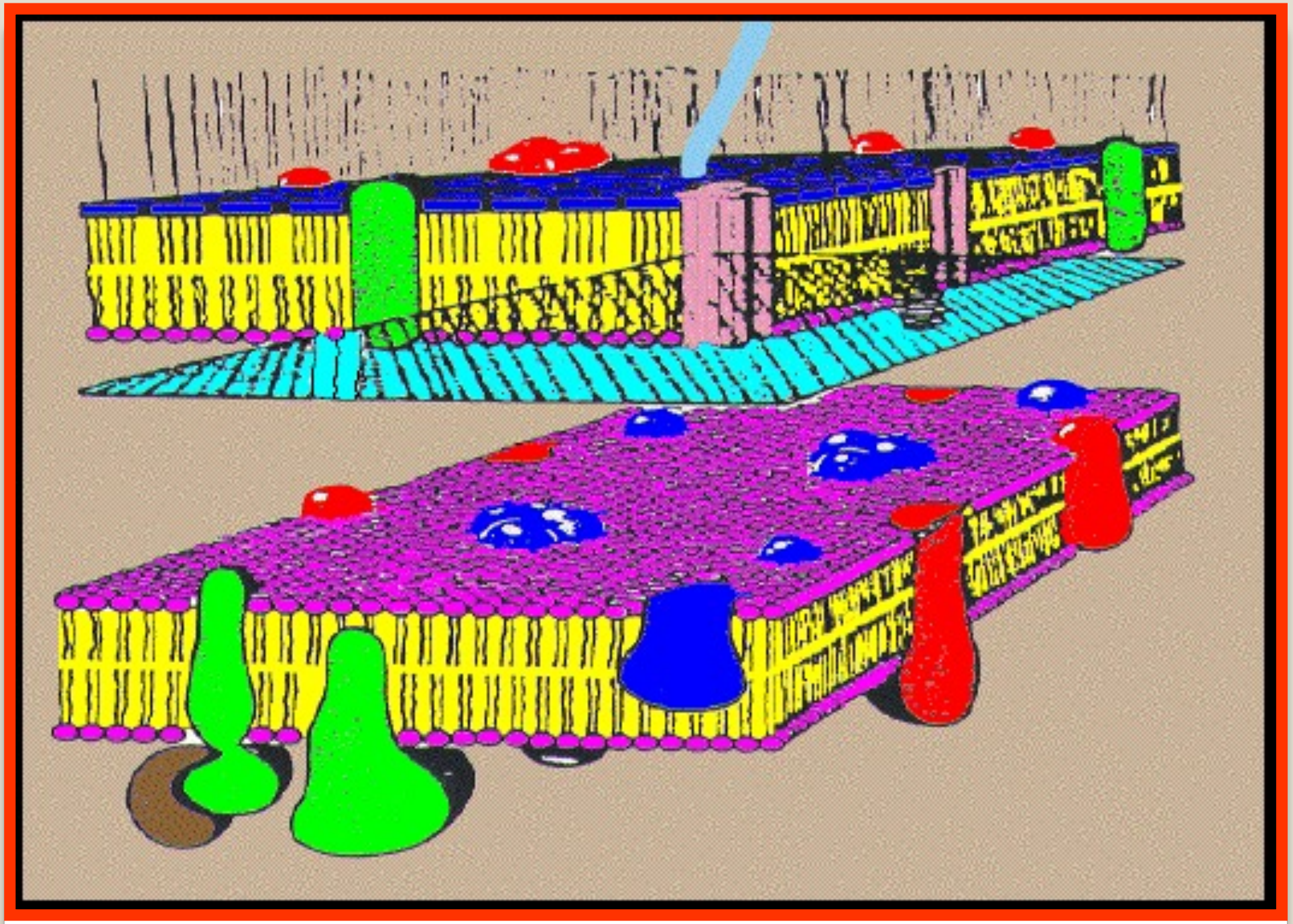


Batteri Gram Positivi


Gram-positive
Cocci (spherical)
Gram-negative
Bacilli (rod-shaped)



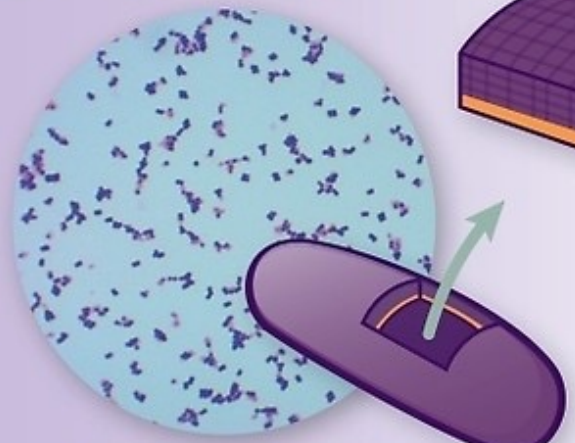
Involucro di un batterio Gram-positivo



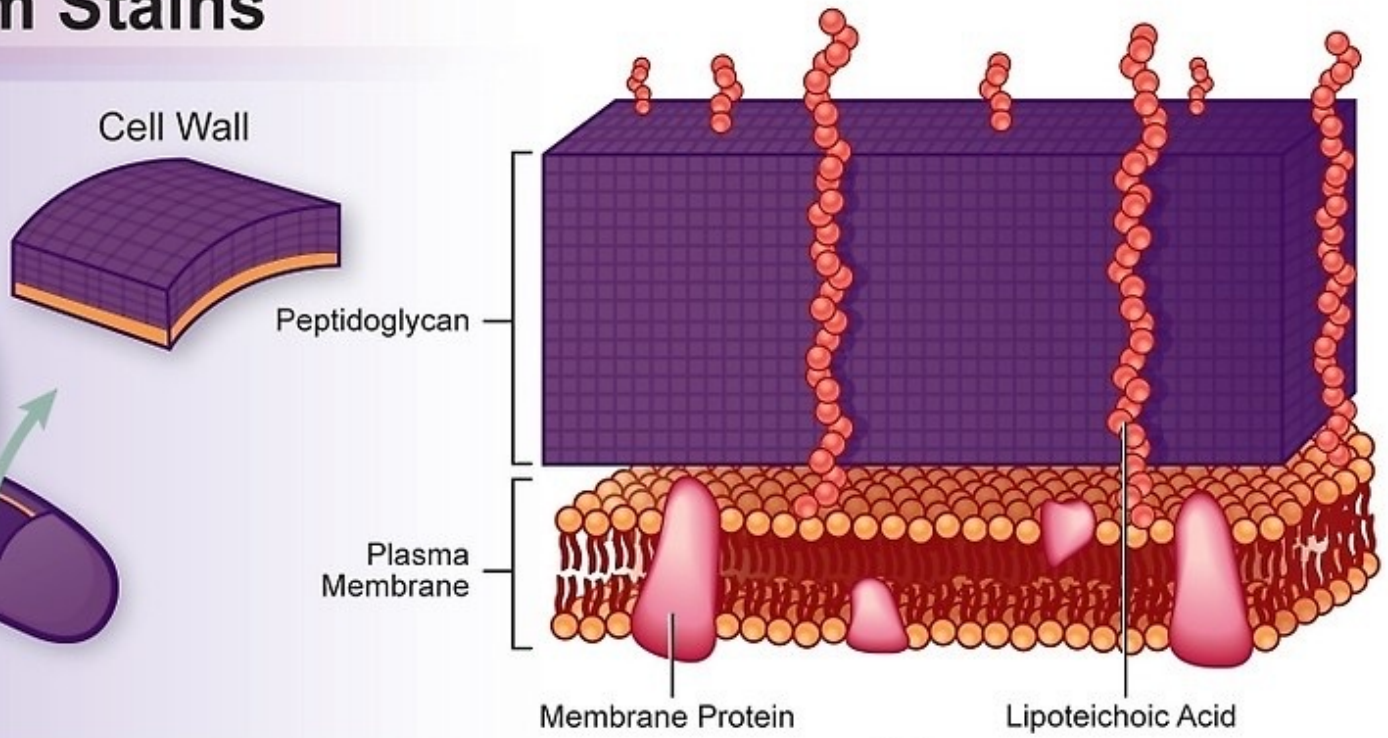
Involucro di un batterio Gram-negativo

Bacteria Gram Stains

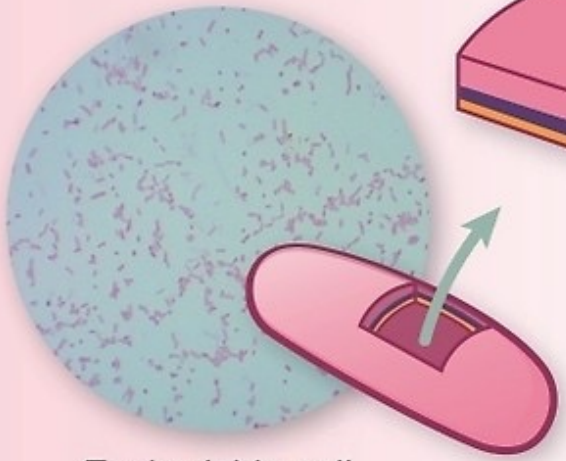
Gram Positive



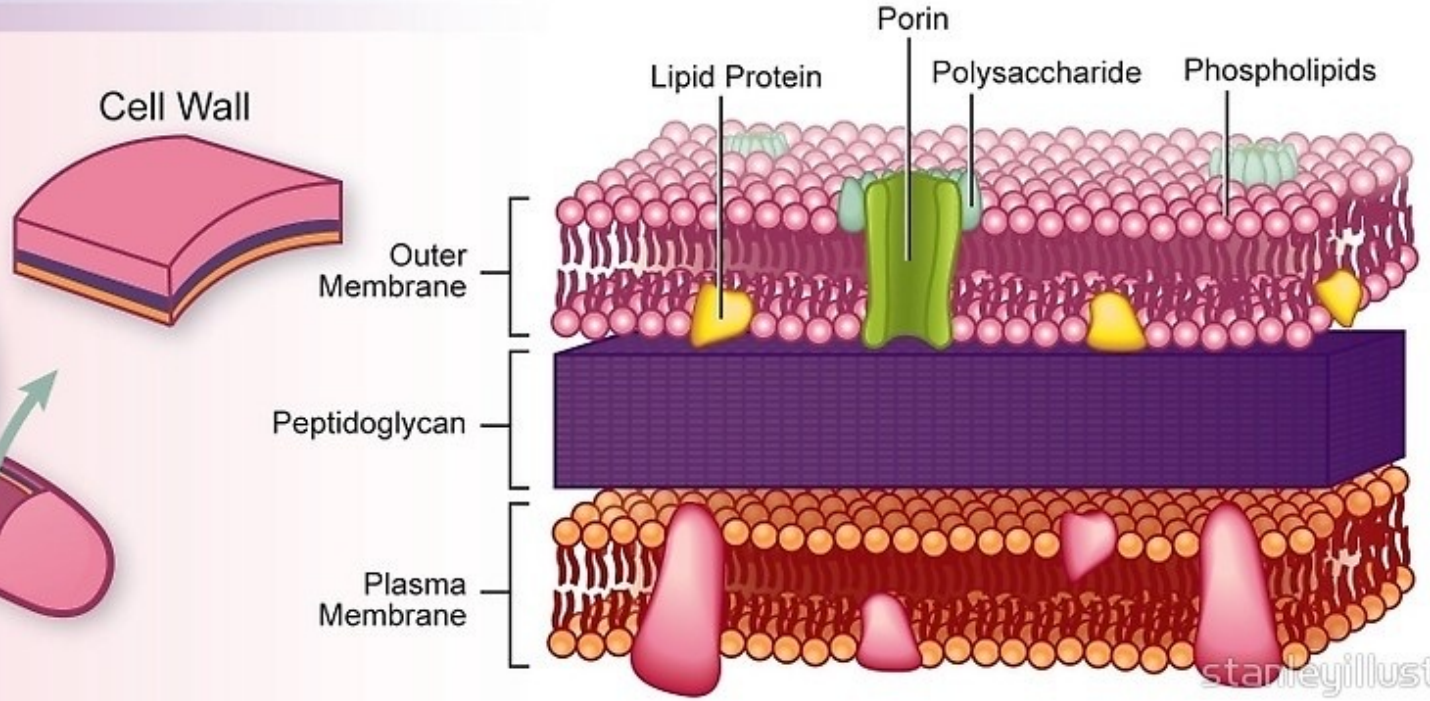
Micrococcus luteus

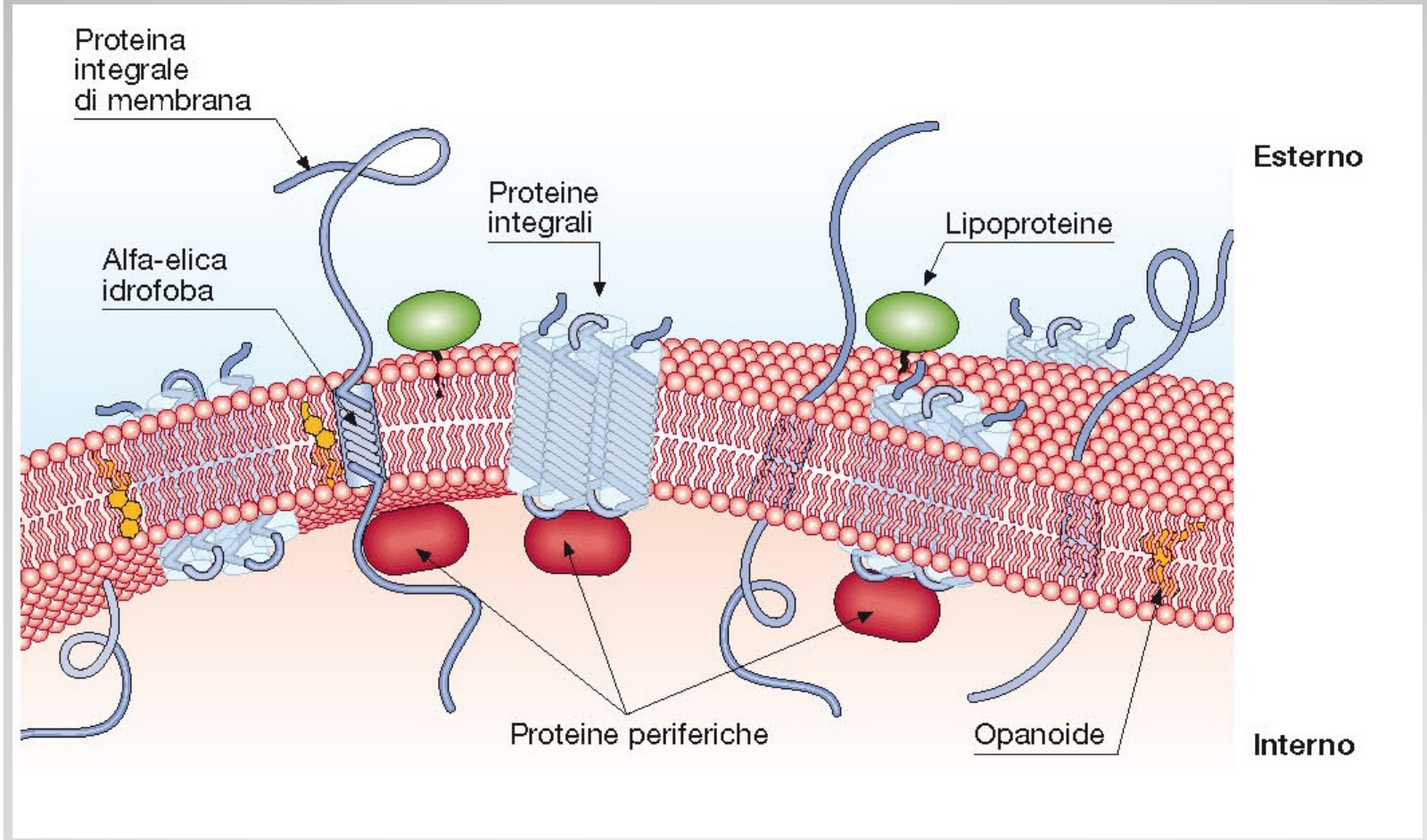


Gram Negative



Escherichia coli

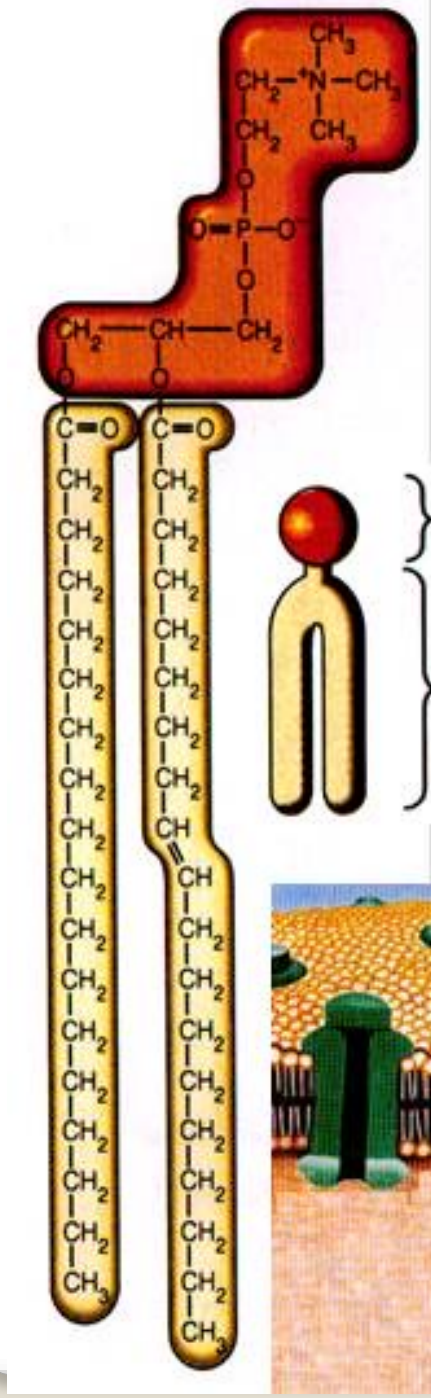




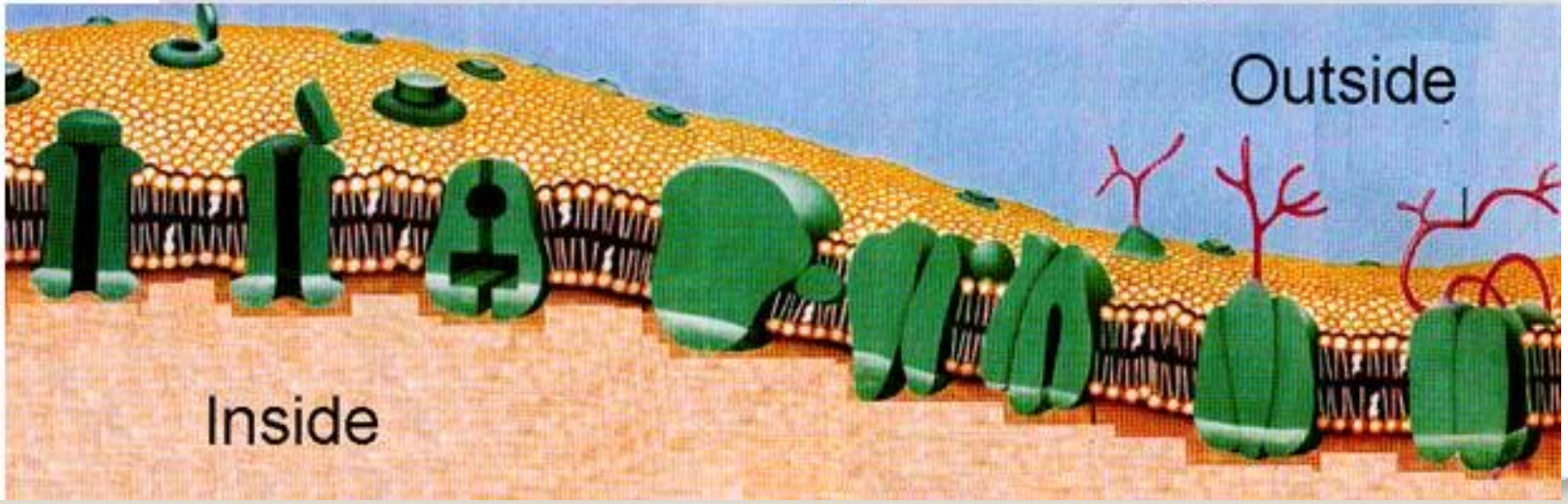
La composizione della membrana interna o cellulare

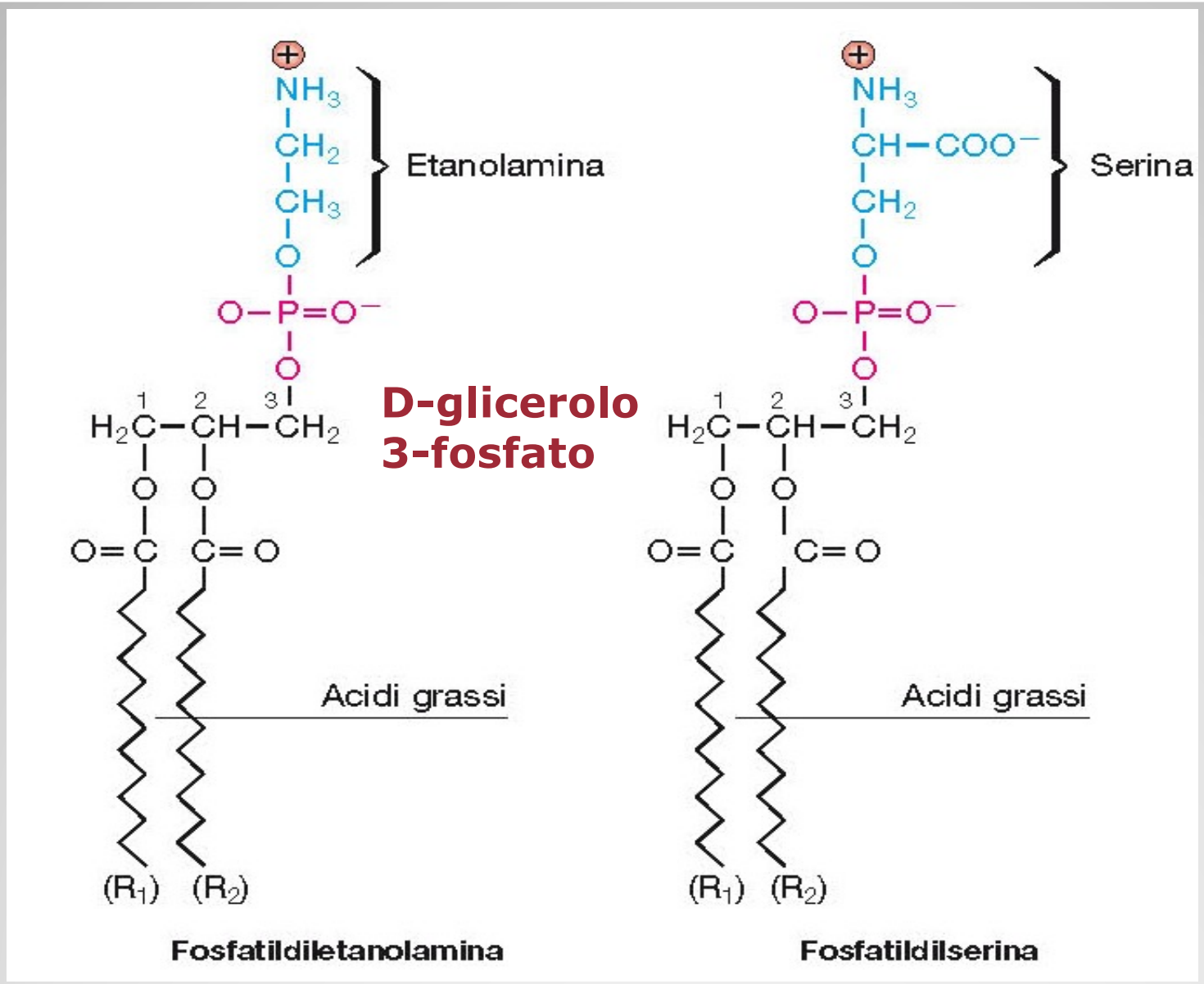
LIPIDI E MEMBRANE

La natura composta dei lipidi porta alla formazione di un doppio strato.



Le proteine nel doppio strato forniscono una permeabilità selettiva.




Etanolamina
Serina
D-glicerolo
3-fosfato
Acidi grassi
Acidi grassi
Fosfatildiletanolamina
Fosfatildilserina

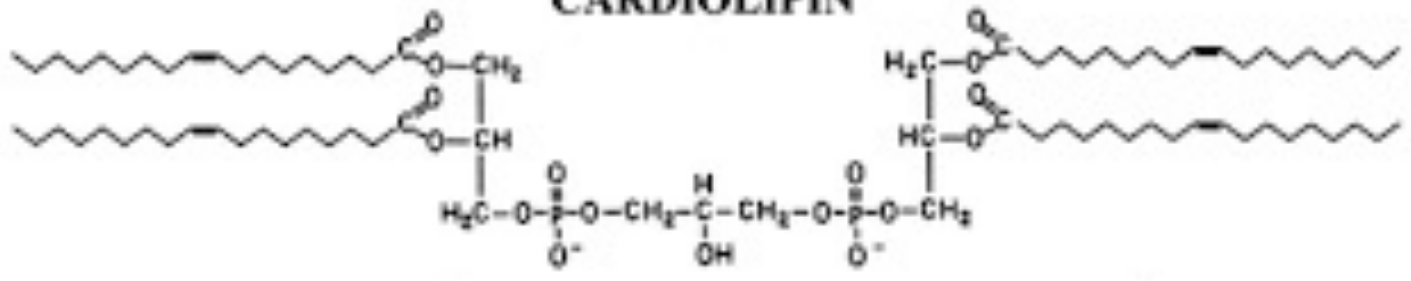
I principali fosfolipidi sono:

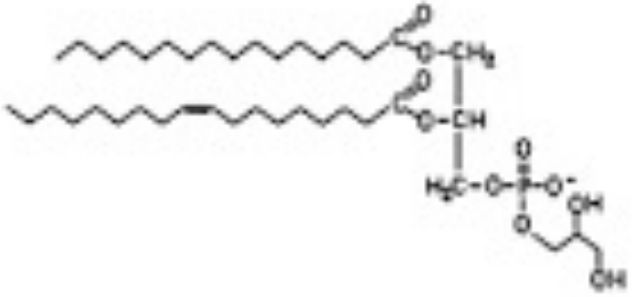
La cardiolipina
Il fosfolipidetanolamina

Meno frequentemente:

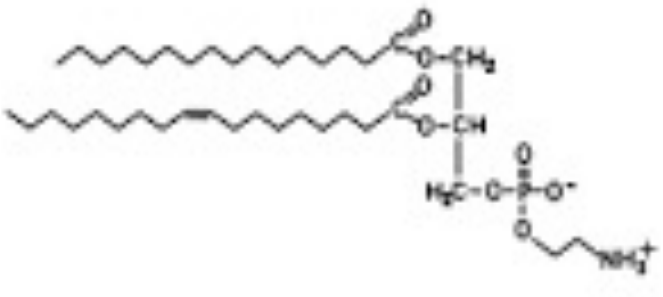
La fosfatidilcolina
Il fosfatidilinositolo

CARDIOLIPIN

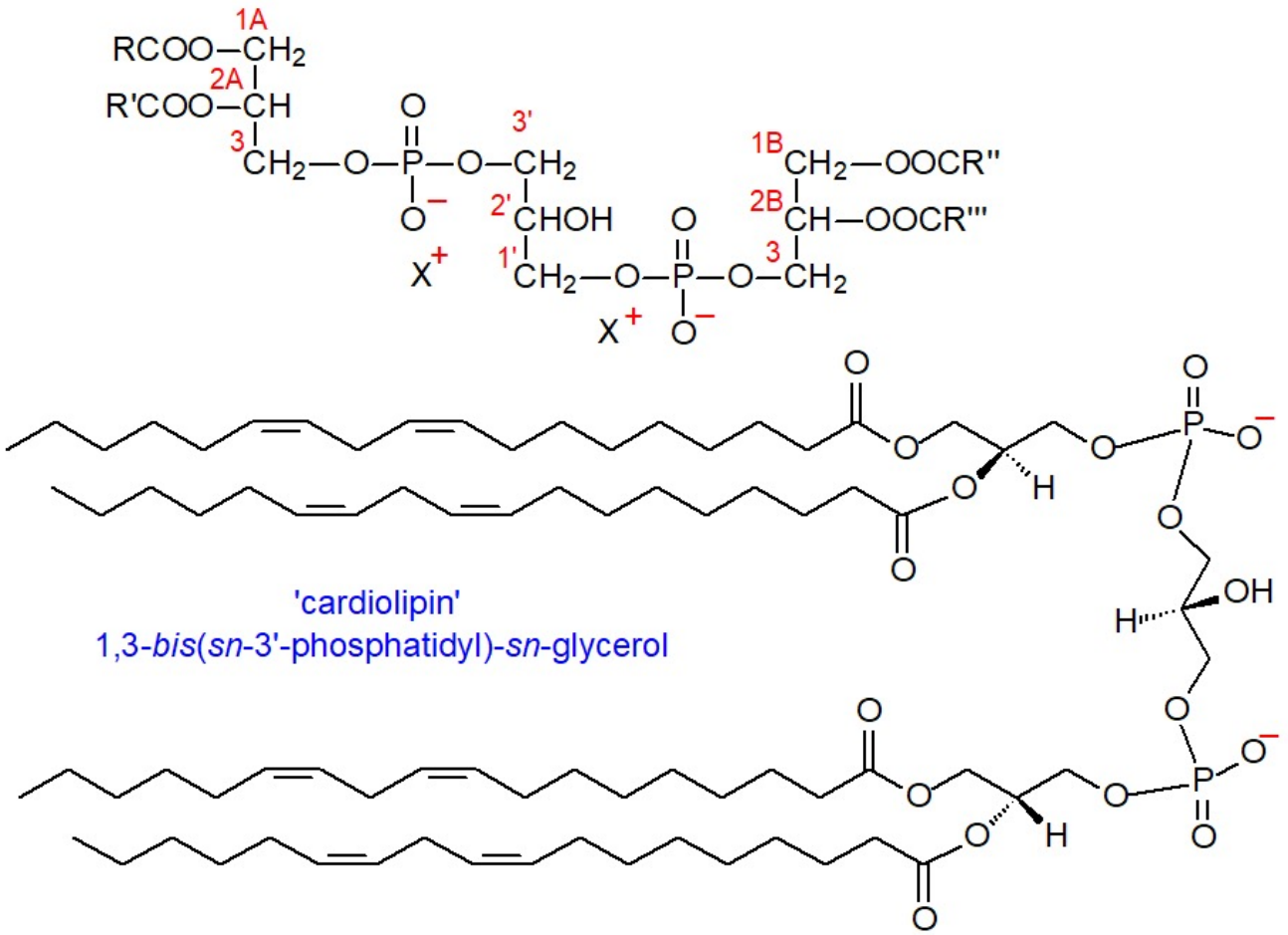


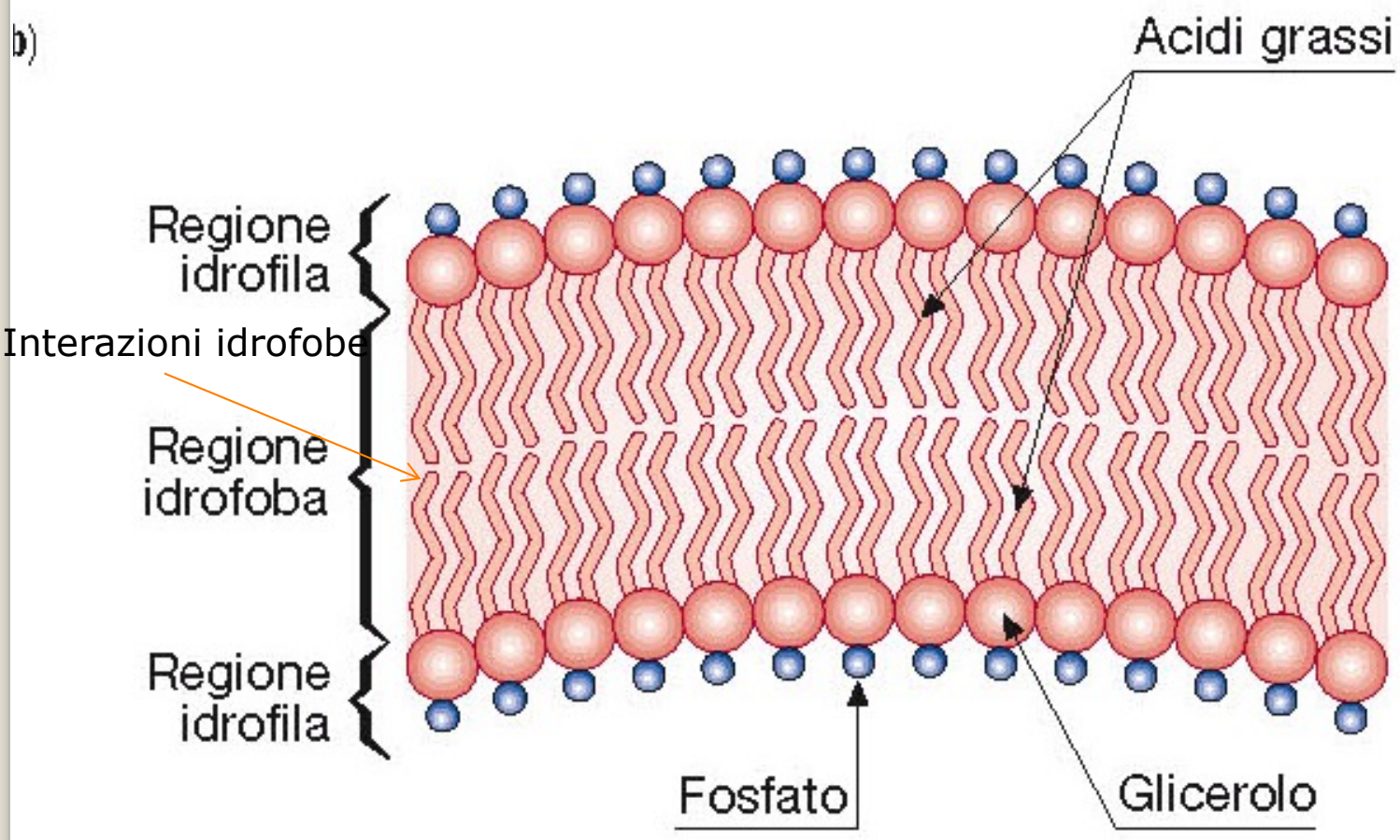


PHOSPHATIDYLGLYCEROL

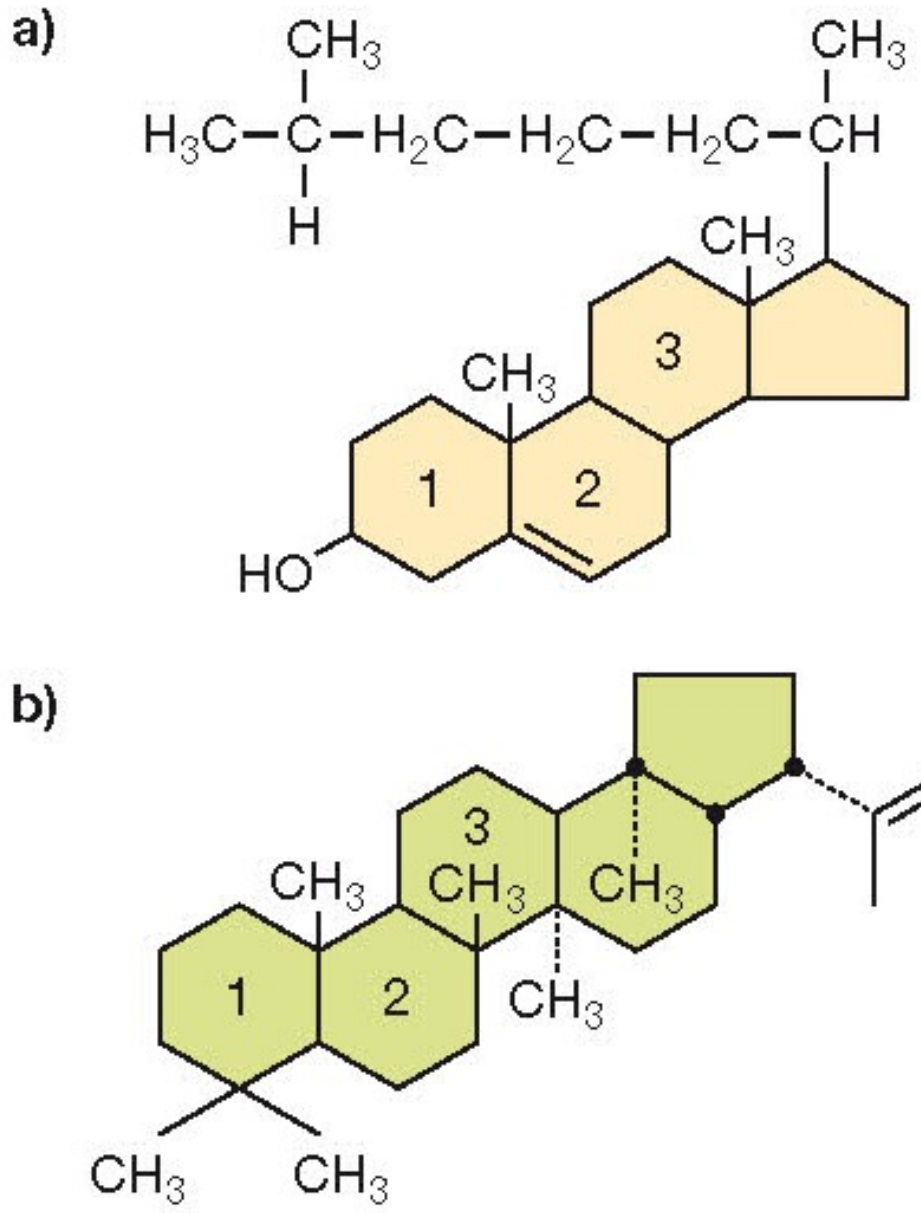


PHOSPHATIDYLETHANOLAMINE


'cardiolipin'
1,3-*bis*(*sn*-3'-phosphatidyl)-*sn*-glycerol



La struttura generale della MI viene stabilizzata da ioni Mg+2 e Ca+2 che stabiliscono interazioni ioniche con le cariche negative dei fosfolipidi

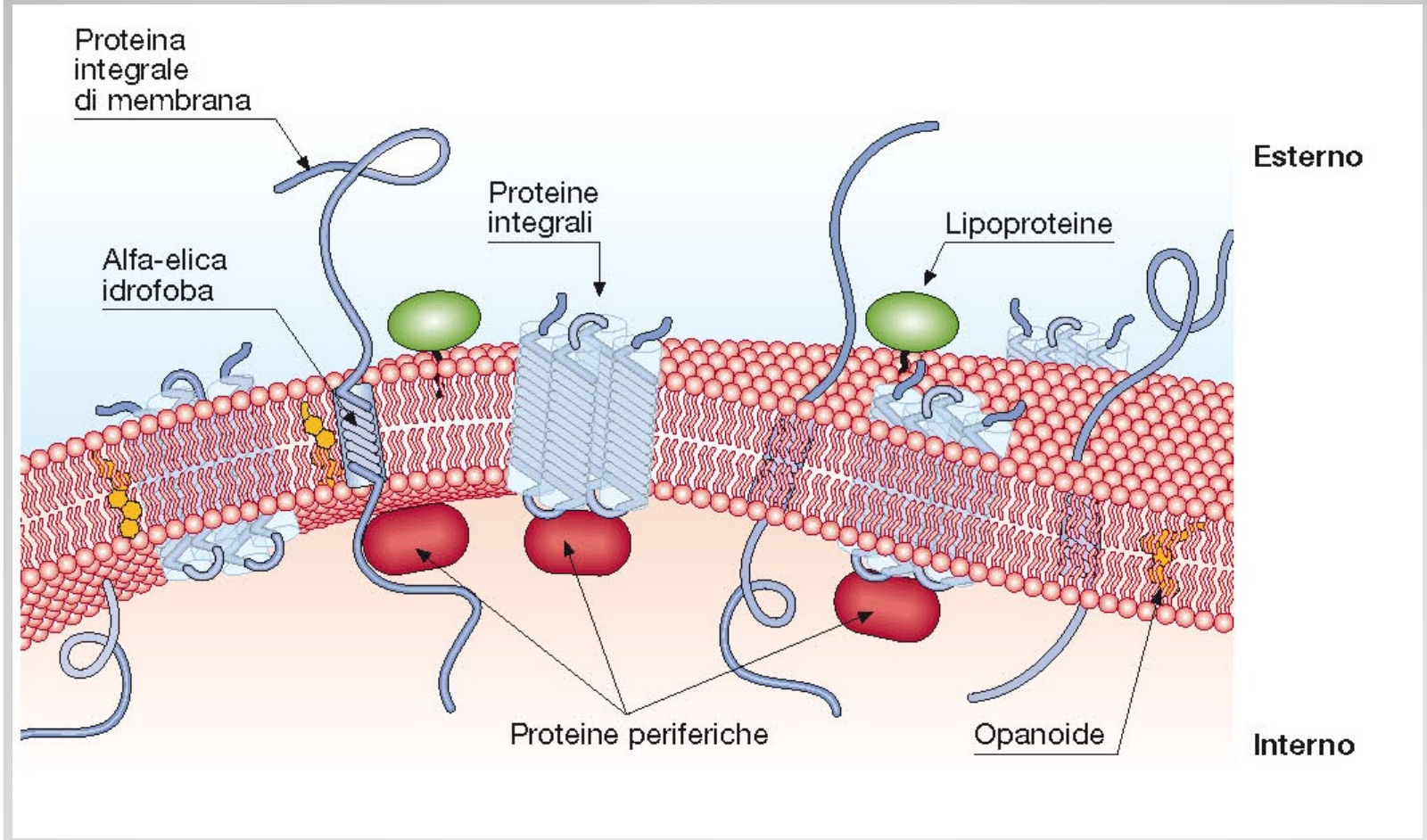


COLESTEROLO

Generalmente gli steroli sono assenti nei batteri, tranne che nei batteri metilotrofi che sintetizzano differenti tipi di steroli e li inseriscono nelle membrane. Anche i micoplasmi, batteri intracellulari obbligati,possono presentare steroli nella membrana, ma queste molecole derivano dall'ospite

OPANOIDE (Diploptene)

Gli opanoidi sono molecole simili agli steroli spesso presenti nelle membrane dei batteri ma non degli Archea



E proteine integrali di membrana, quelle periferiche e le lipoproteine