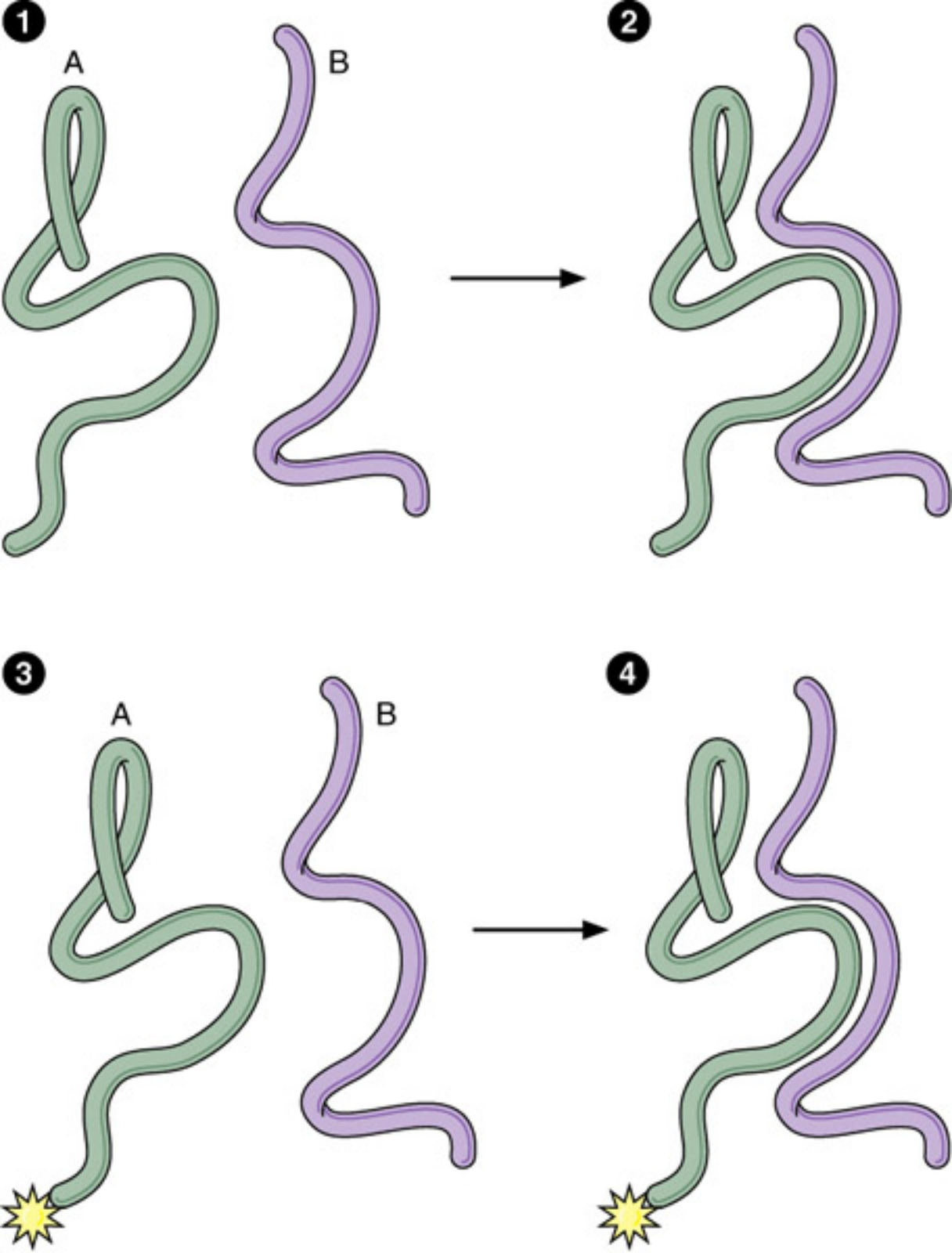
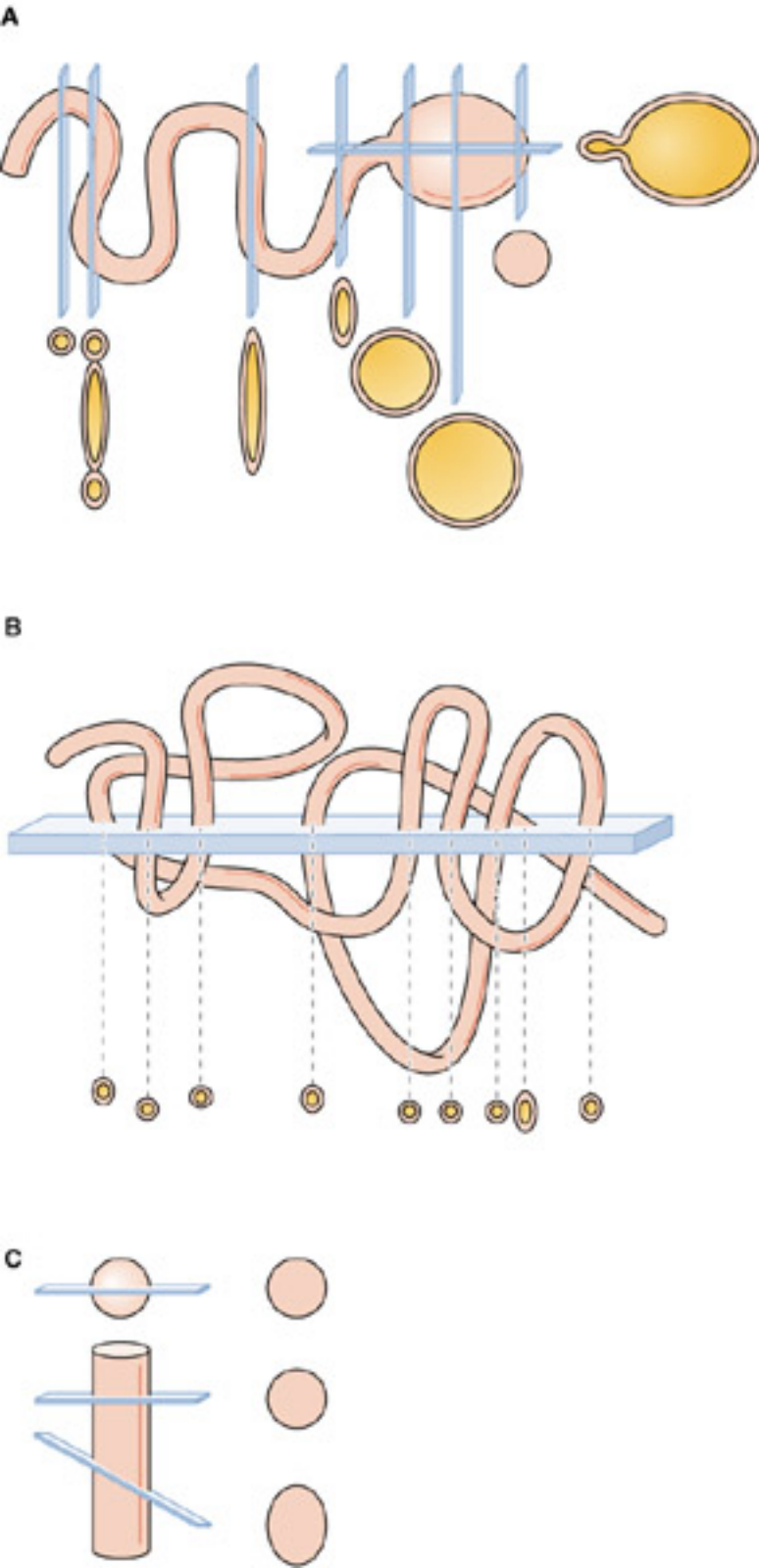
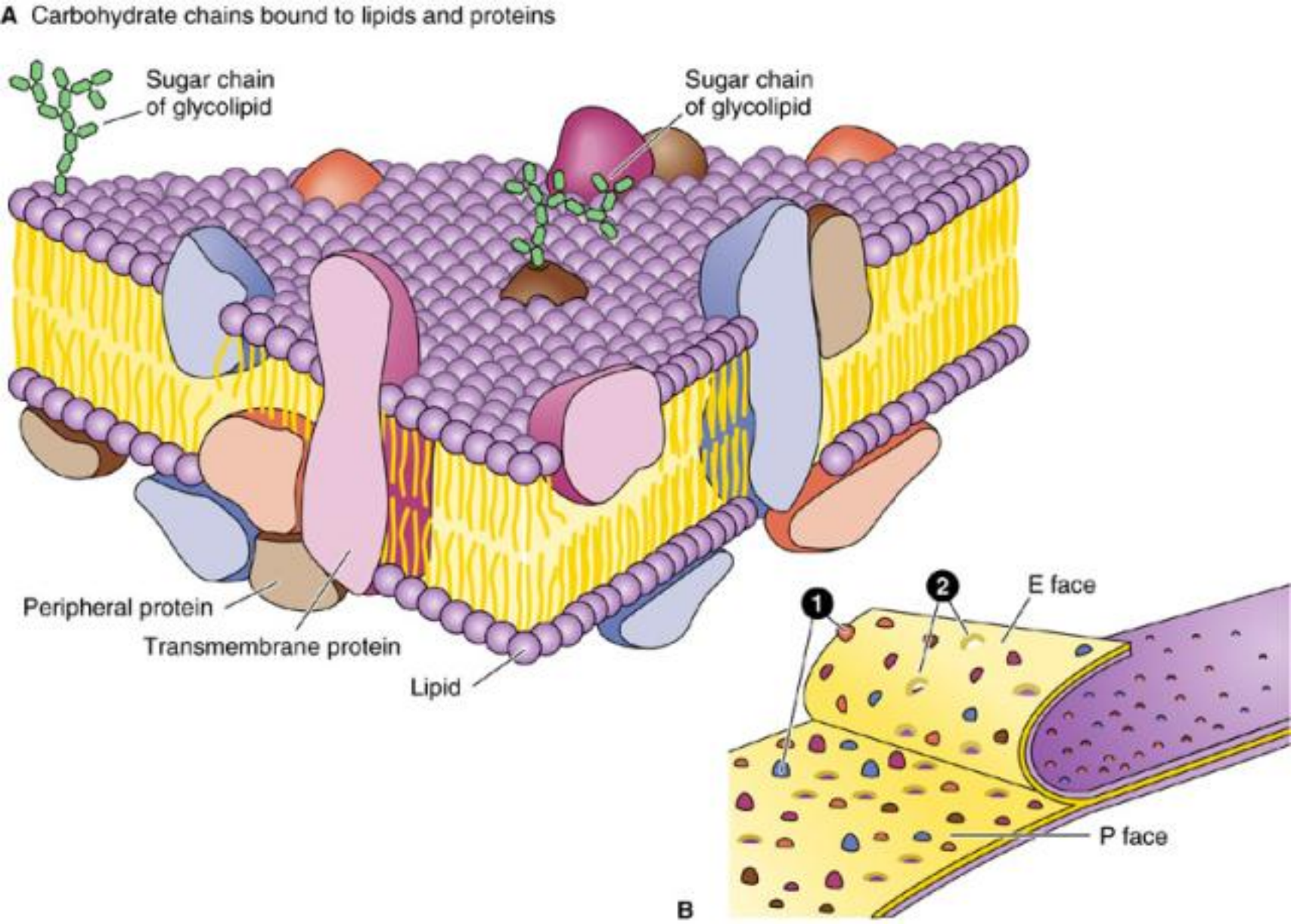
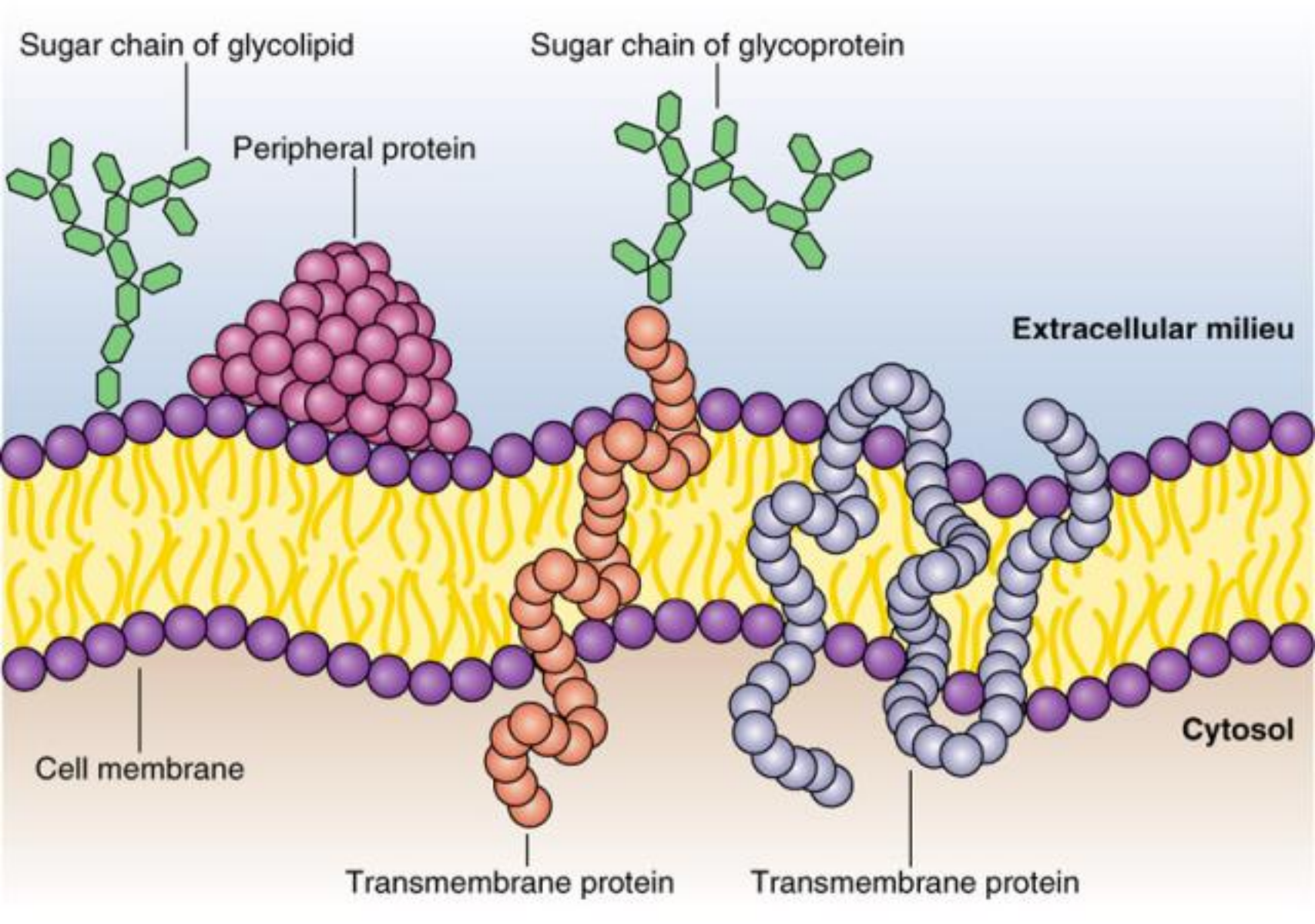
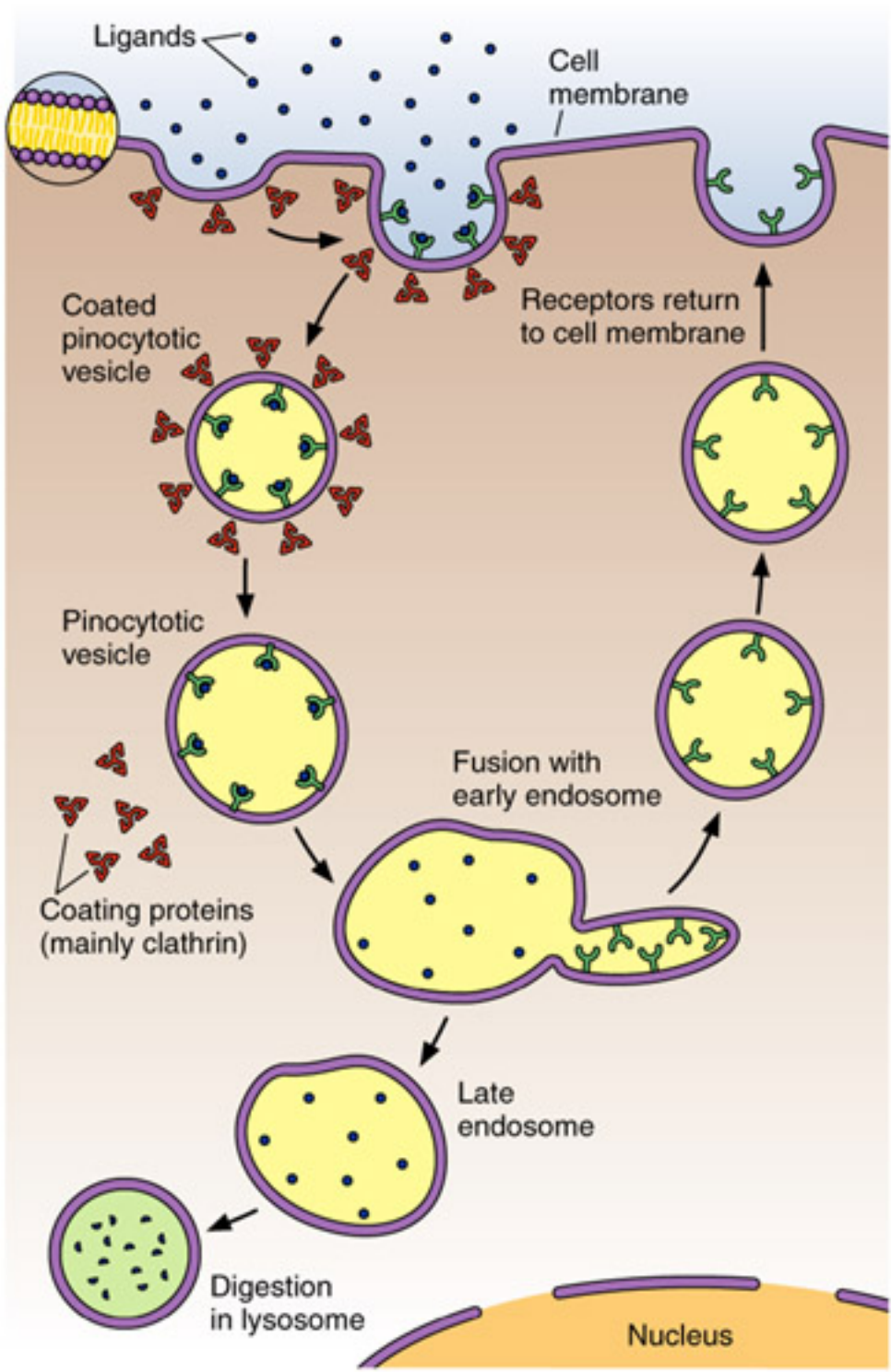
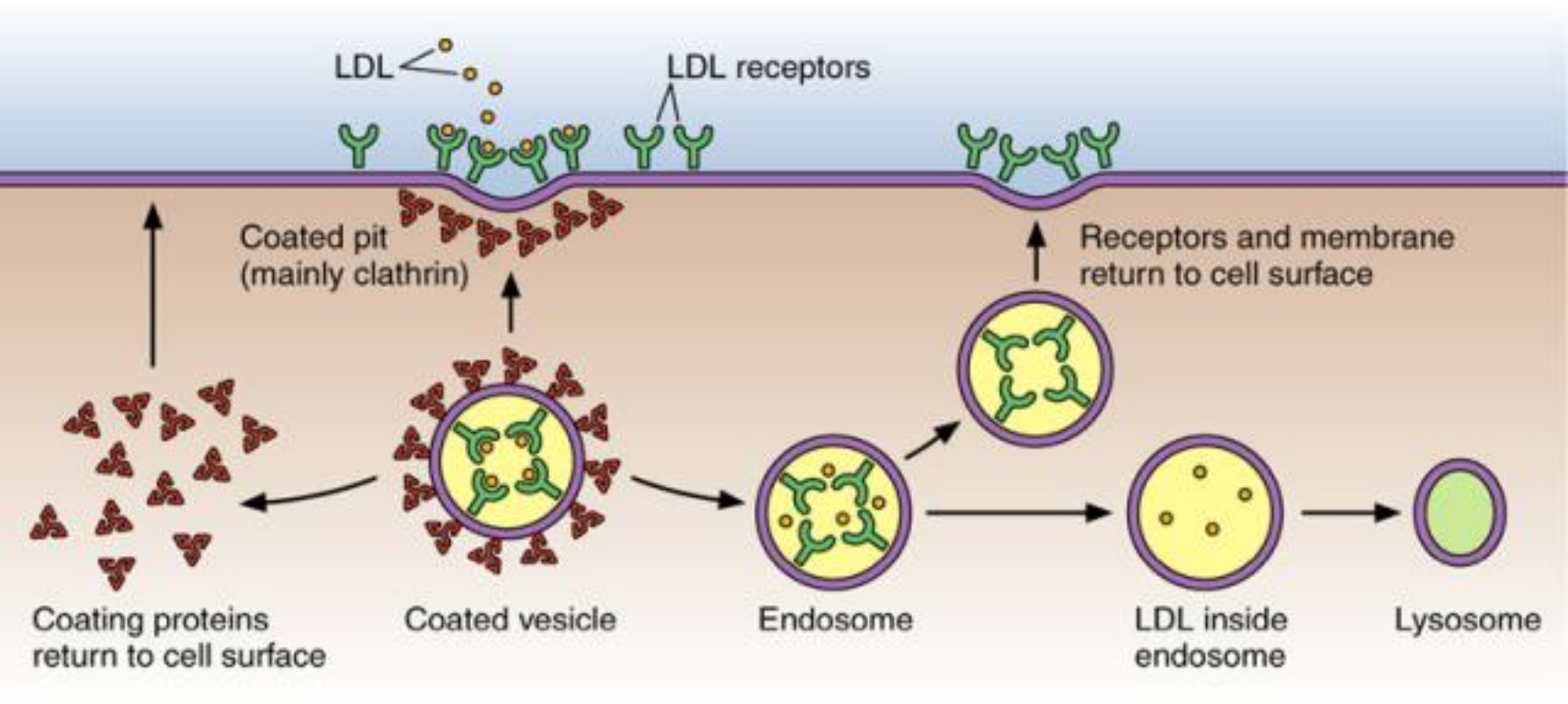

1
A
B
2
3
A
B
4

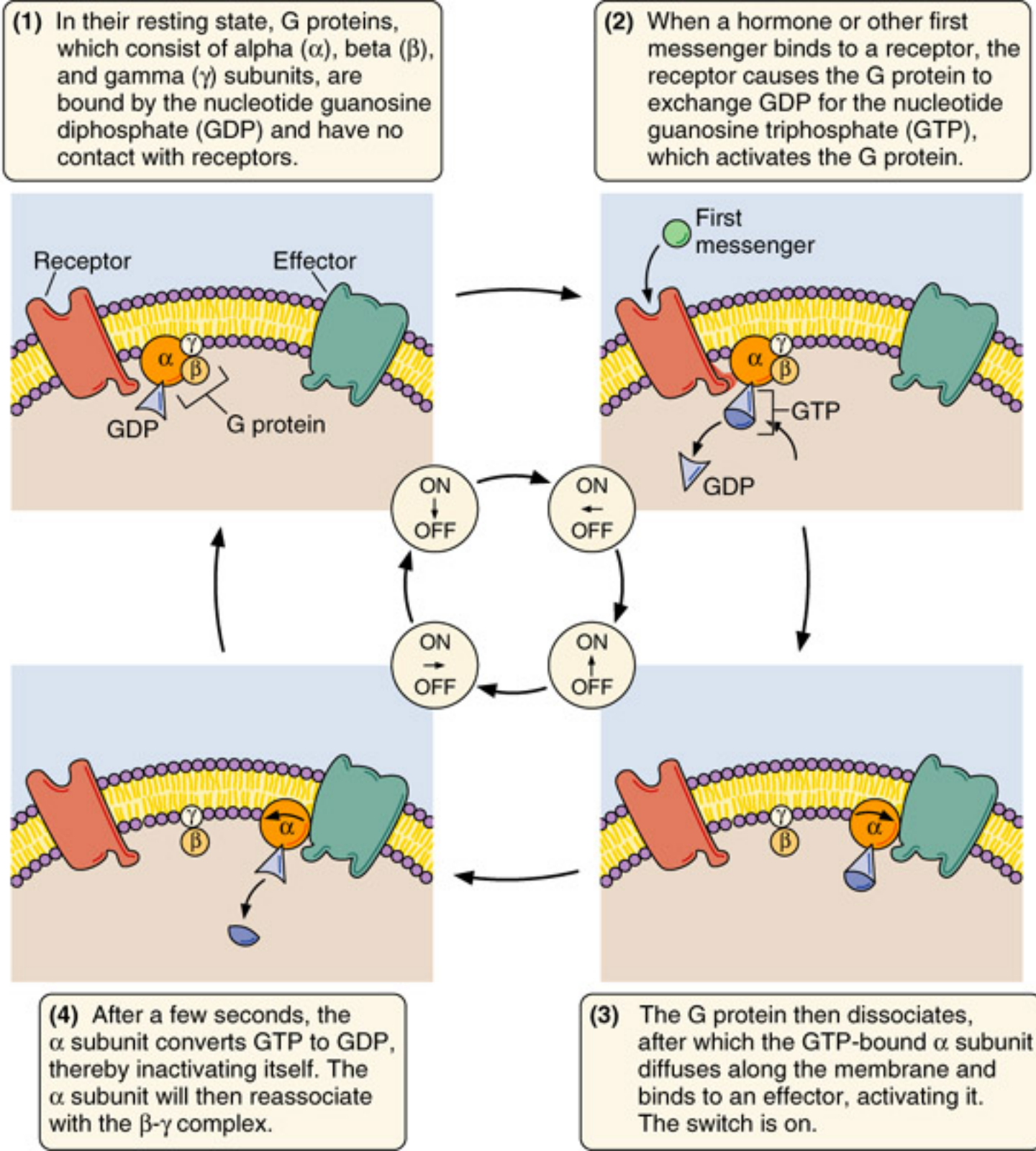

A
B
C

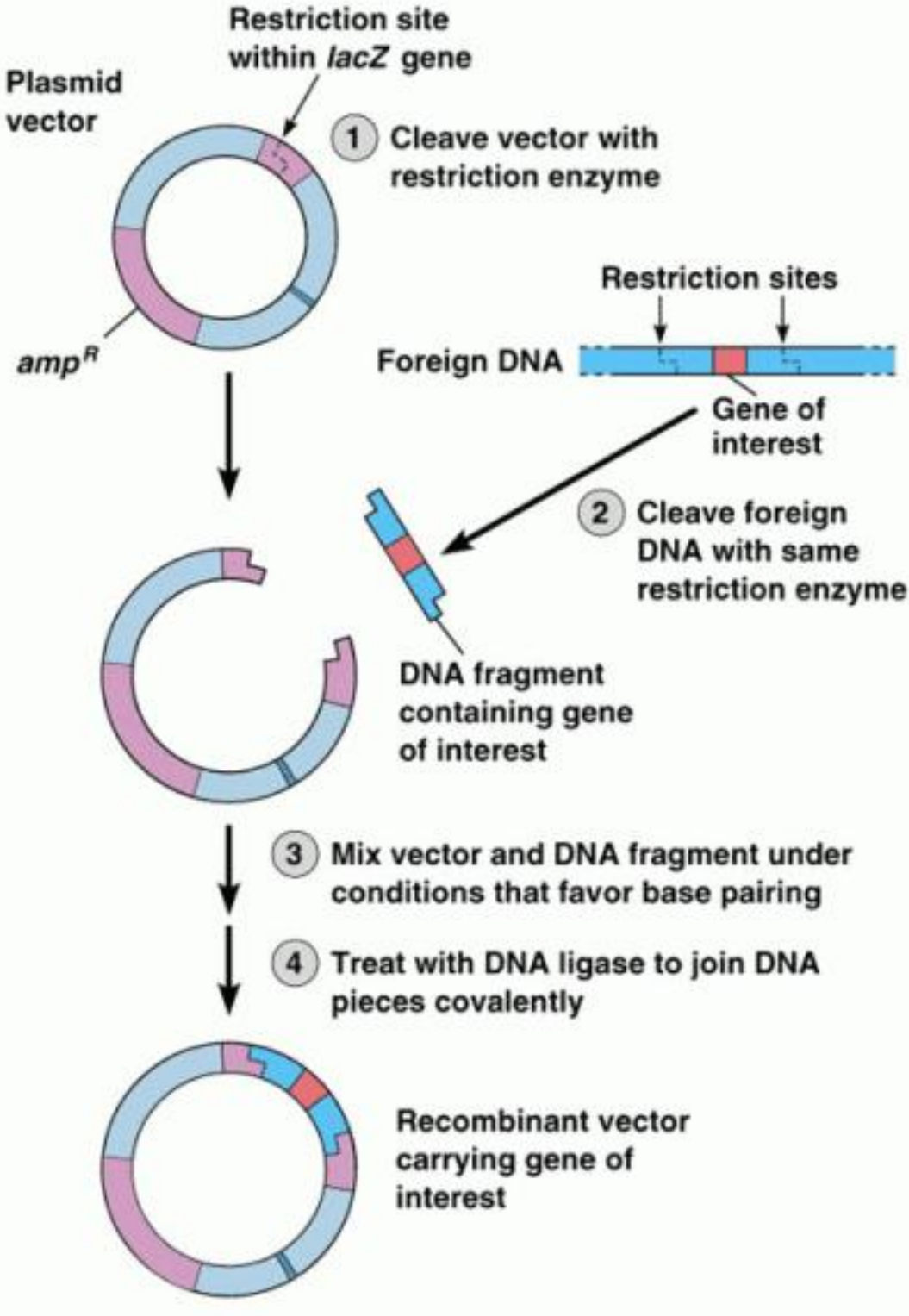

A Carbohydrate chains bound to lipids and proteins
Sugar chain of glycolipid
Sugar chain of glycolipid
Peripheral protein
Transmembrane protein
Lipid
1
2
E face
P face
B


Sugar chain of glycolipid
Sugar chain of glycoprotein
Peripheral protein
Extracellular milieu
Cytosol
Cell membrane
Transmembrane protein
Transmembrane protein


Ligands
Cell membrane
Coated pinocytotic vesicle
Receptors return to cell membrane
Pinocytotic vesicle
Fusion with early endosome
Coating proteins (mainly clathrin)
Late endosome
Digestion in lysosome
Nucleus

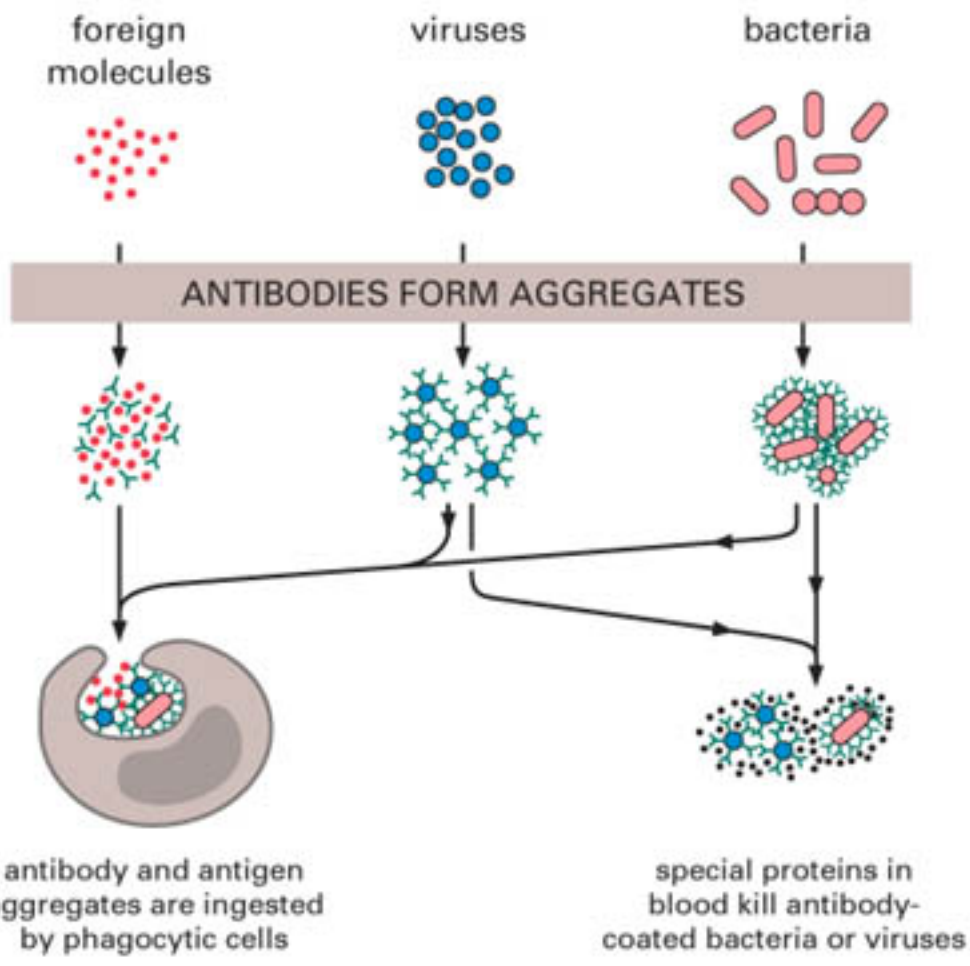

LDL
LDL receptors
Coated pit
(mainly clathrin)
Receptors and membrane
return to cell surface
Coating proteins
return to cell surface
Coated vesicle
Endosome
LDL inside
endosome
Lysosome


(1) In their resting state, G proteins, which consist of alpha (α), beta (β), and gamma (γ) subunits, are bound by the nucleotide guanosine diphosphate (GDP) and have no contact with receptors.
(2) When a hormone or other first messenger binds to a receptor, the receptor causes the G protein to exchange GDP for the nucleotide guanosine triphosphate (GTP), which activates the G protein.
Receptor
Effector
GDP
G protein
First messenger
GTP
GDP
ON → OFF
ON ← OFF
ON → OFF
ON ↑ OFF
(4) After a few seconds, the α subunit converts GTP to GDP, thereby inactivating itself. The α subunit will then reassociate with the β-γ complex.
(3) The G protein then dissociates, after which the GTP-bound α subunit diffuses along the membrane and binds to an effector, activating it. The switch is on.



(b) Preparation of recombinant plasmid vector

ANTIBODIES DEFEND US AGAINST INFECTION

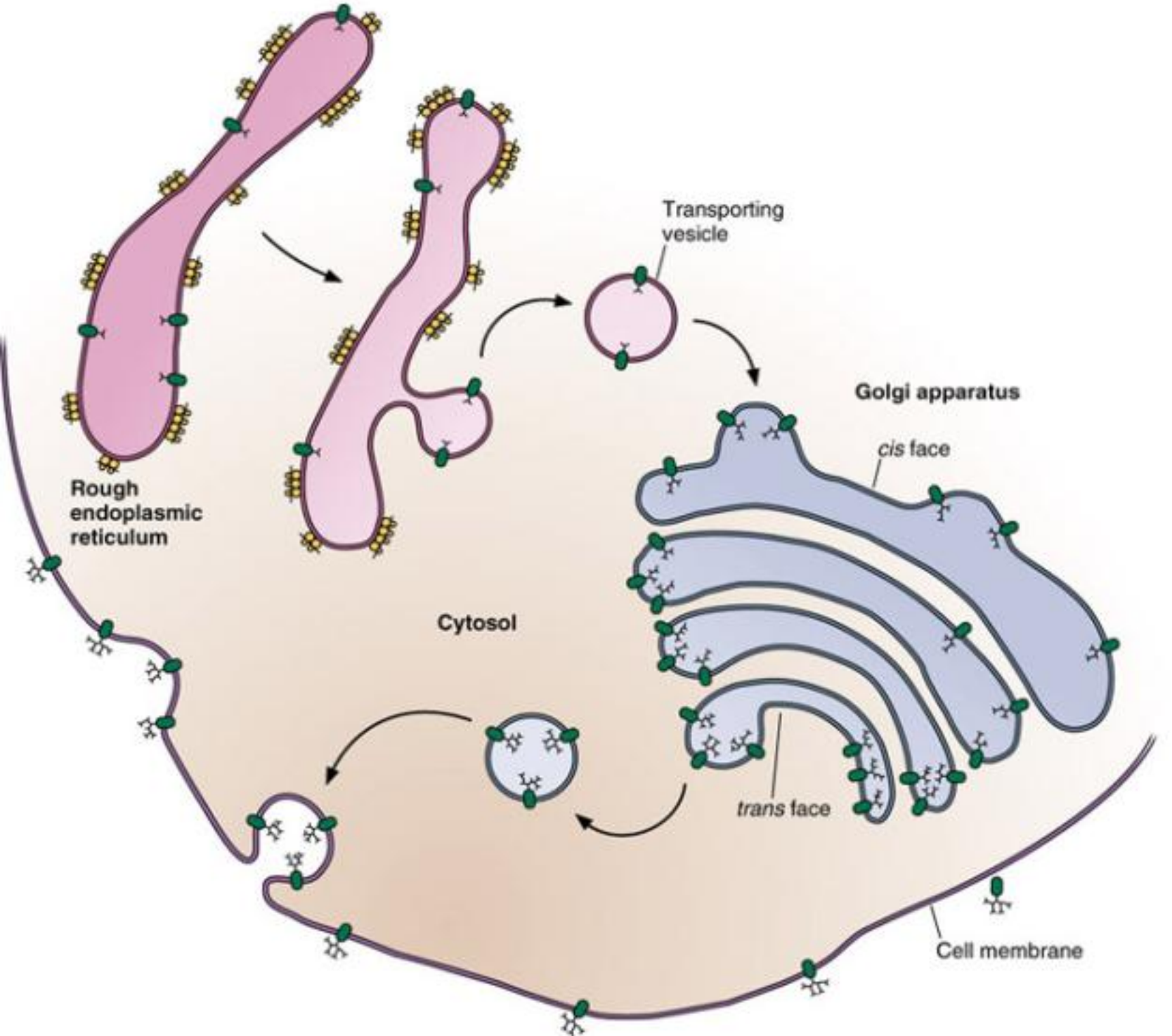


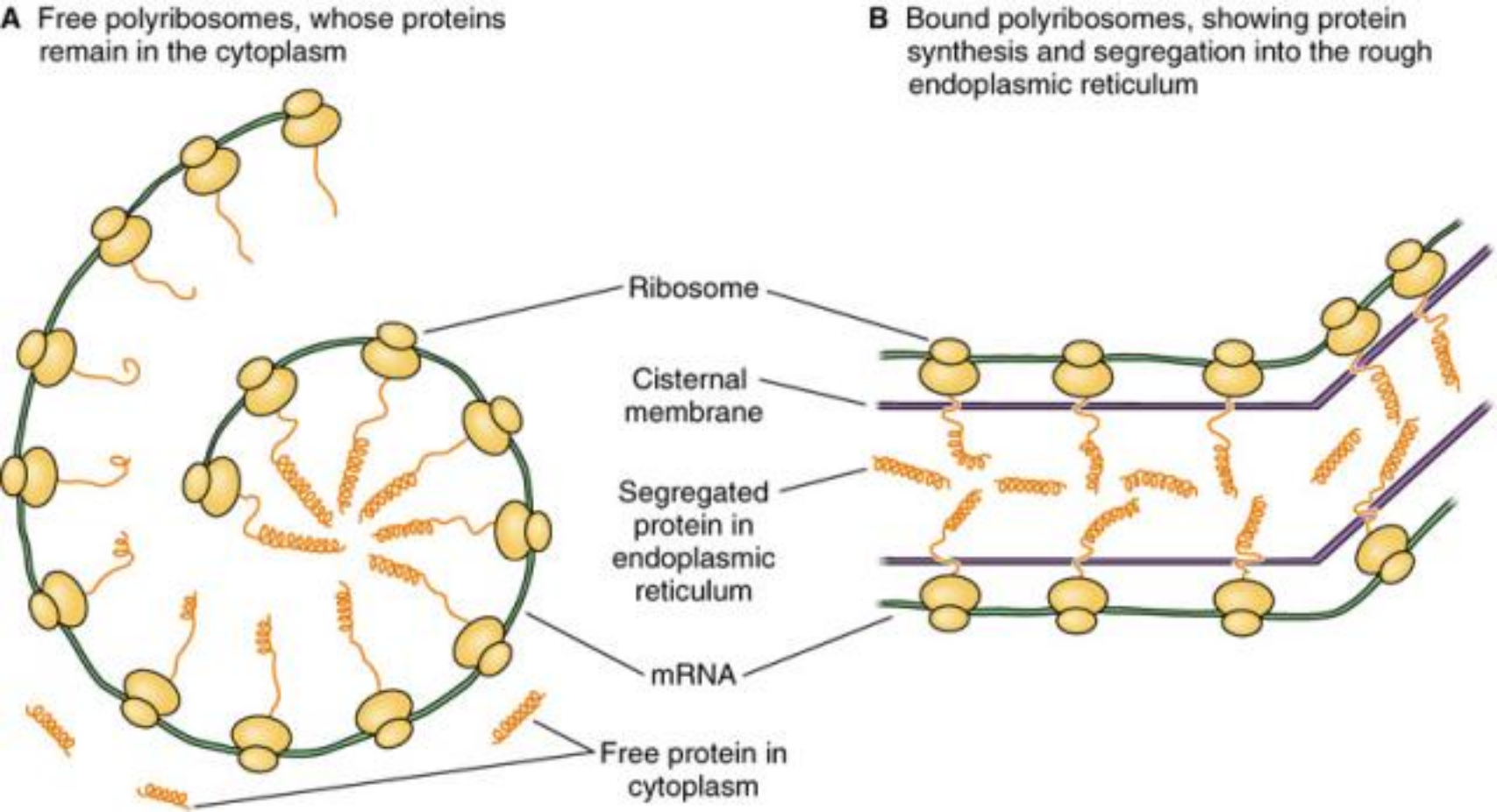
The Ape Man
Pithecanthropus erectus

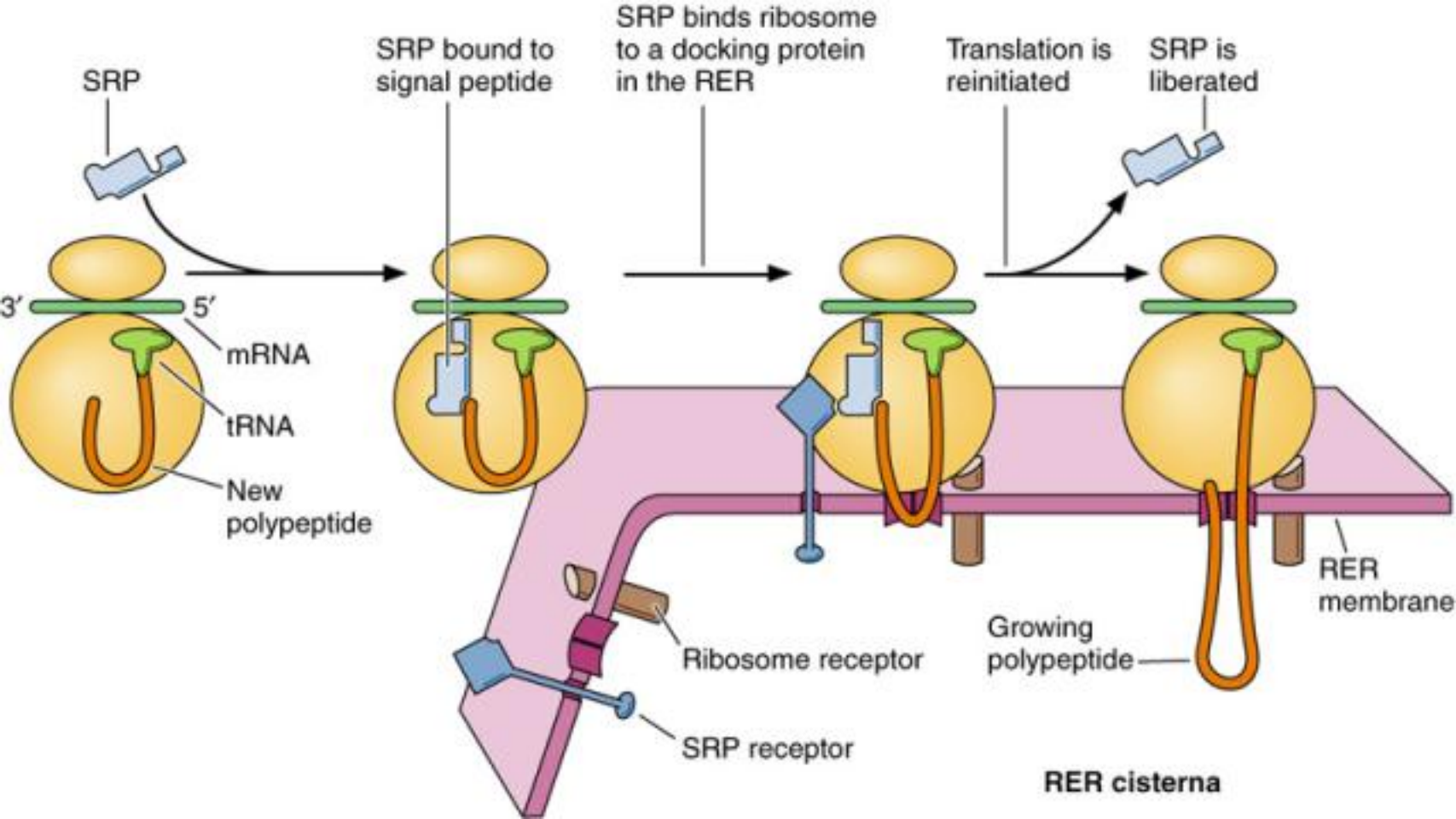
The Dawn Man
Eoanthropus dawsoni

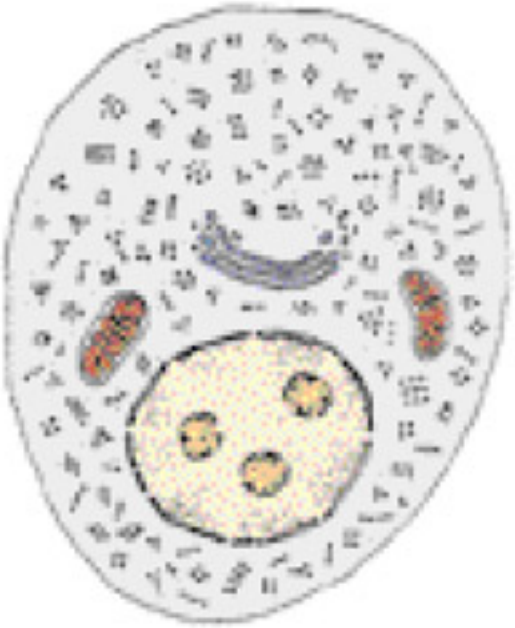
The Neanderthal Man
Homo neanderthalensis

The Cromagnon Man
Homo sapiens

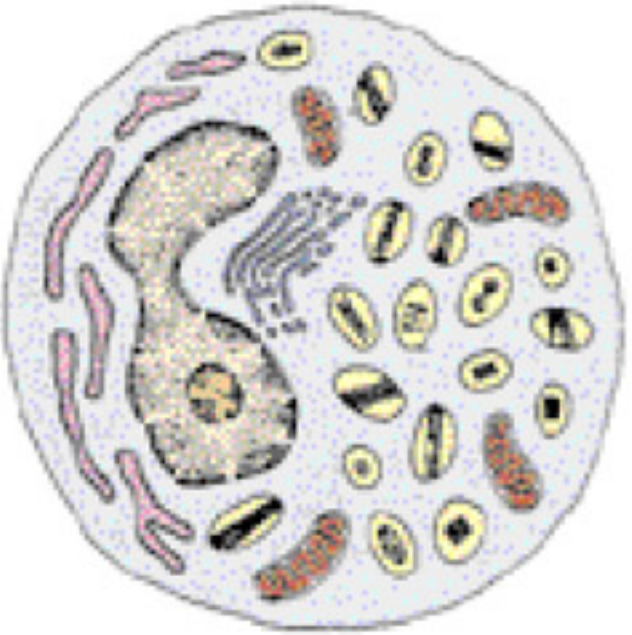

Transporting vesicle
Golgi apparatus
cis face
Rough endoplasmic reticulum
Cytosol
trans face
Cell membrane


A Free polyribosomes, whose proteins remain in the cytoplasm
B Bound polyribosomes, showing protein synthesis and segregation into the rough endoplasmic reticulum
Ribosome
Cisternal membrane
Segregated protein in endoplasmic reticulum
mRNA
Free protein in cytoplasm

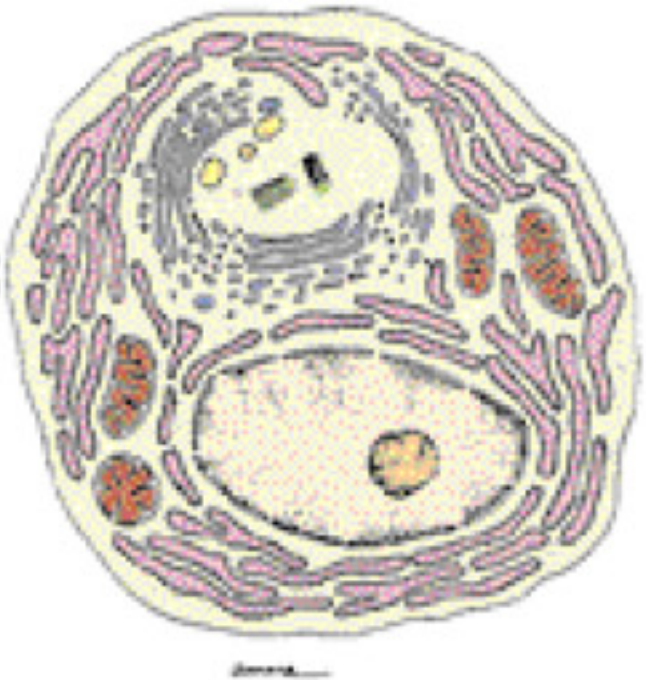

SRP
SRP bound to signal peptide
SRP binds ribosome to a docking protein in the RER
Translation is reinitiated
SRP is liberated
3′
5′
mRNA
tRNA
New polypeptide
Ribosome receptor
SRP receptor
Growing polypeptide
RER membrane
RER cisterna



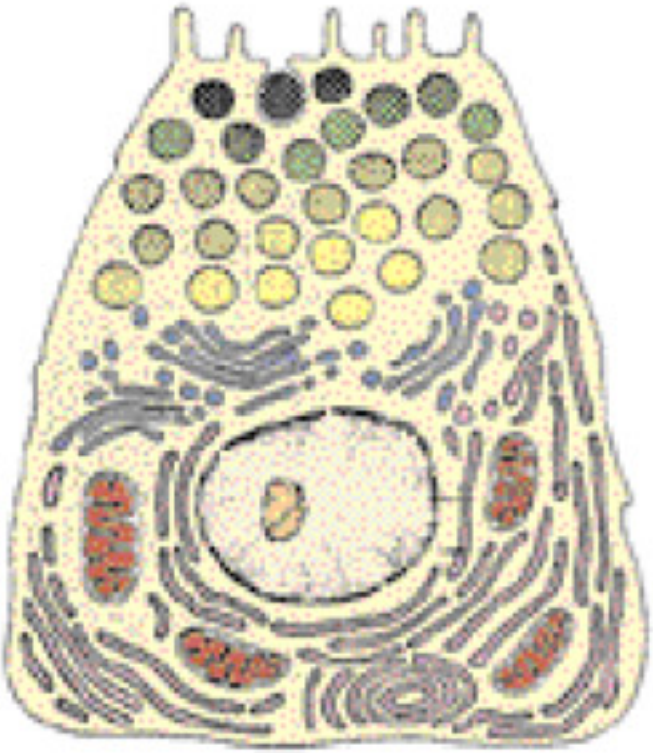
A Erythroblast



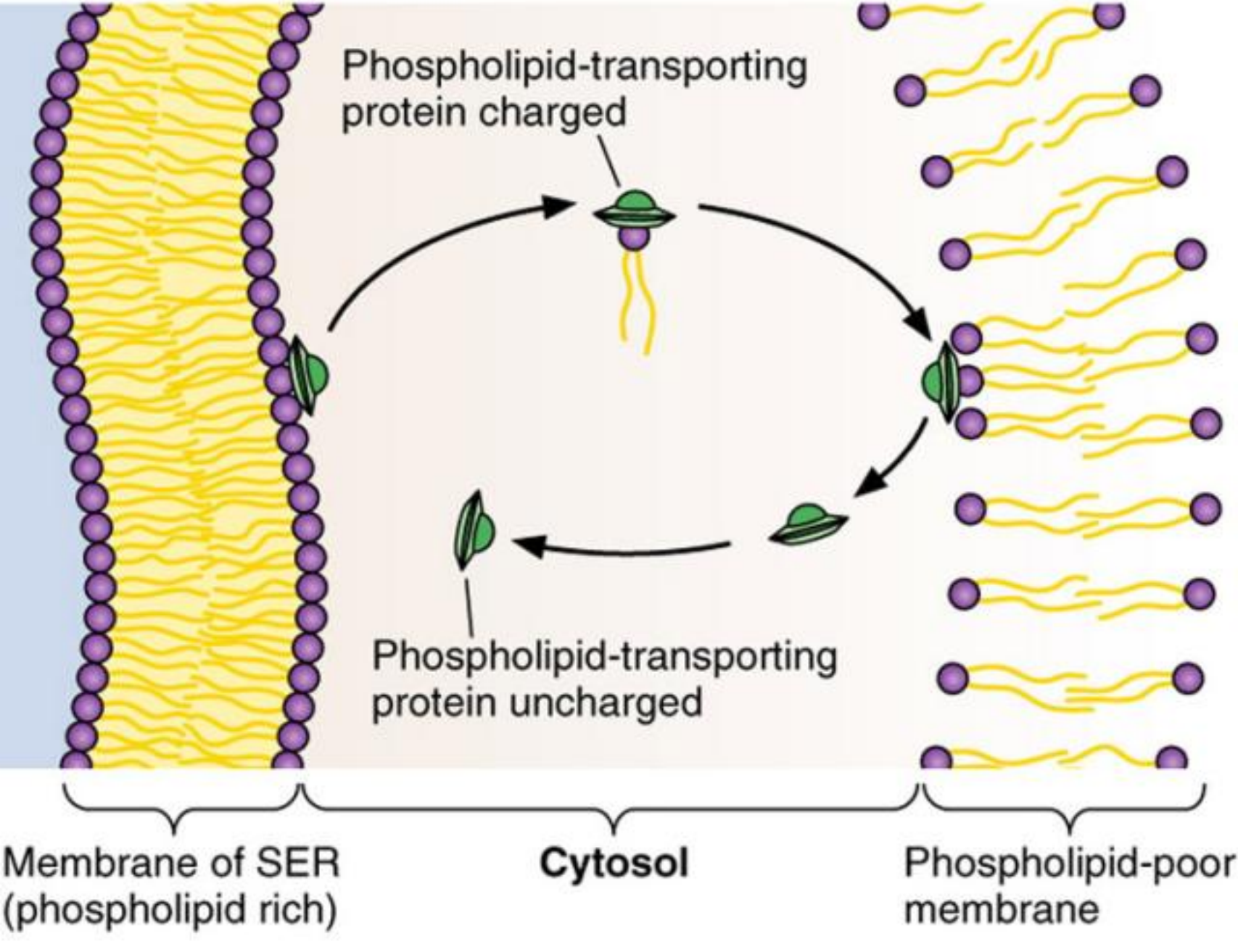
B Eosinophilic leukocyte

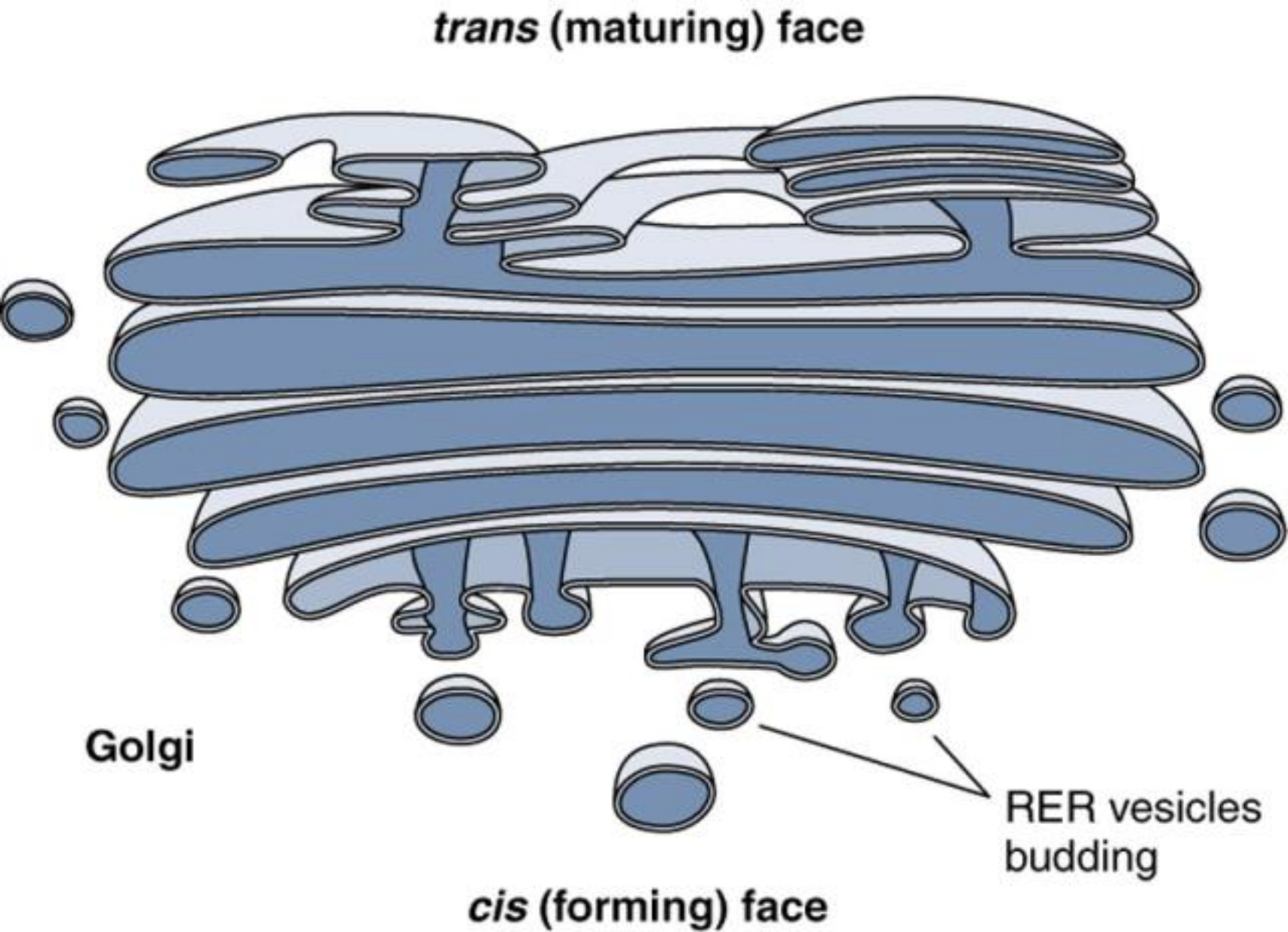


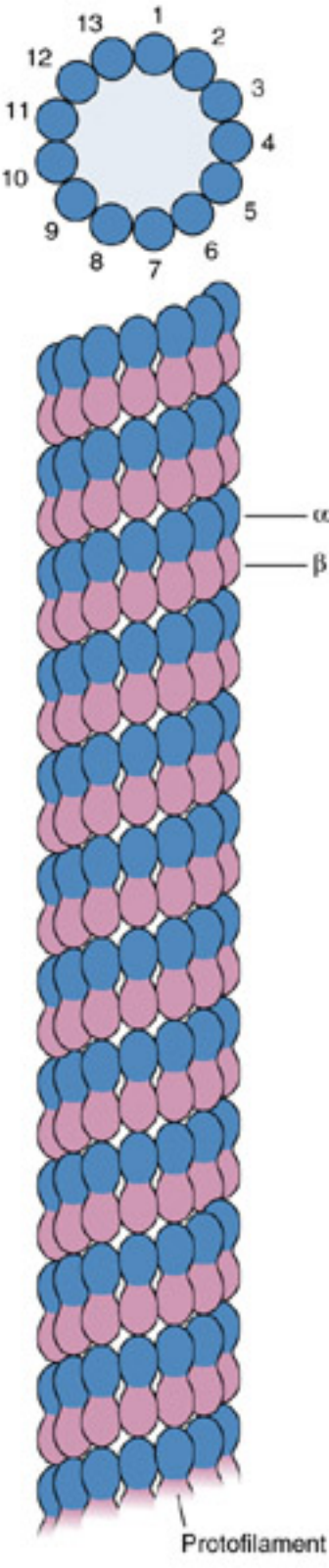
C Plasma cell

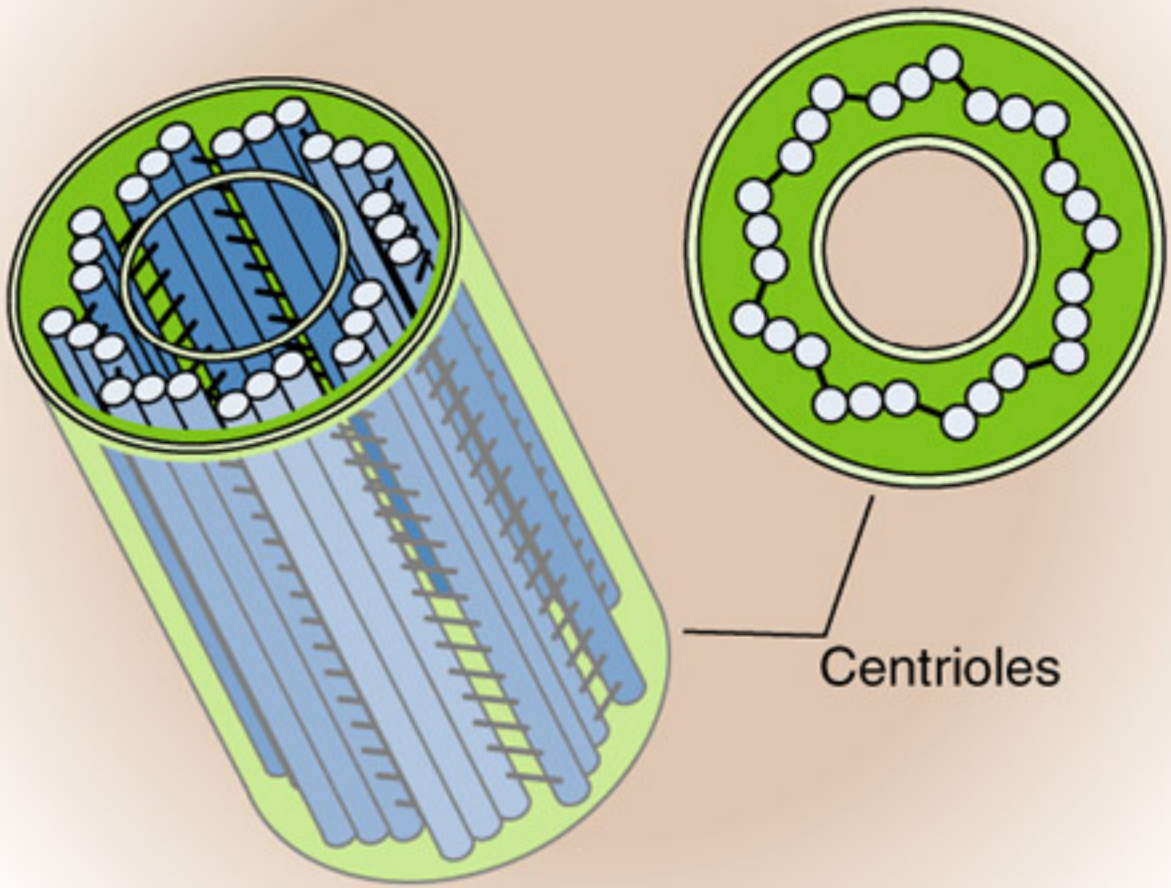


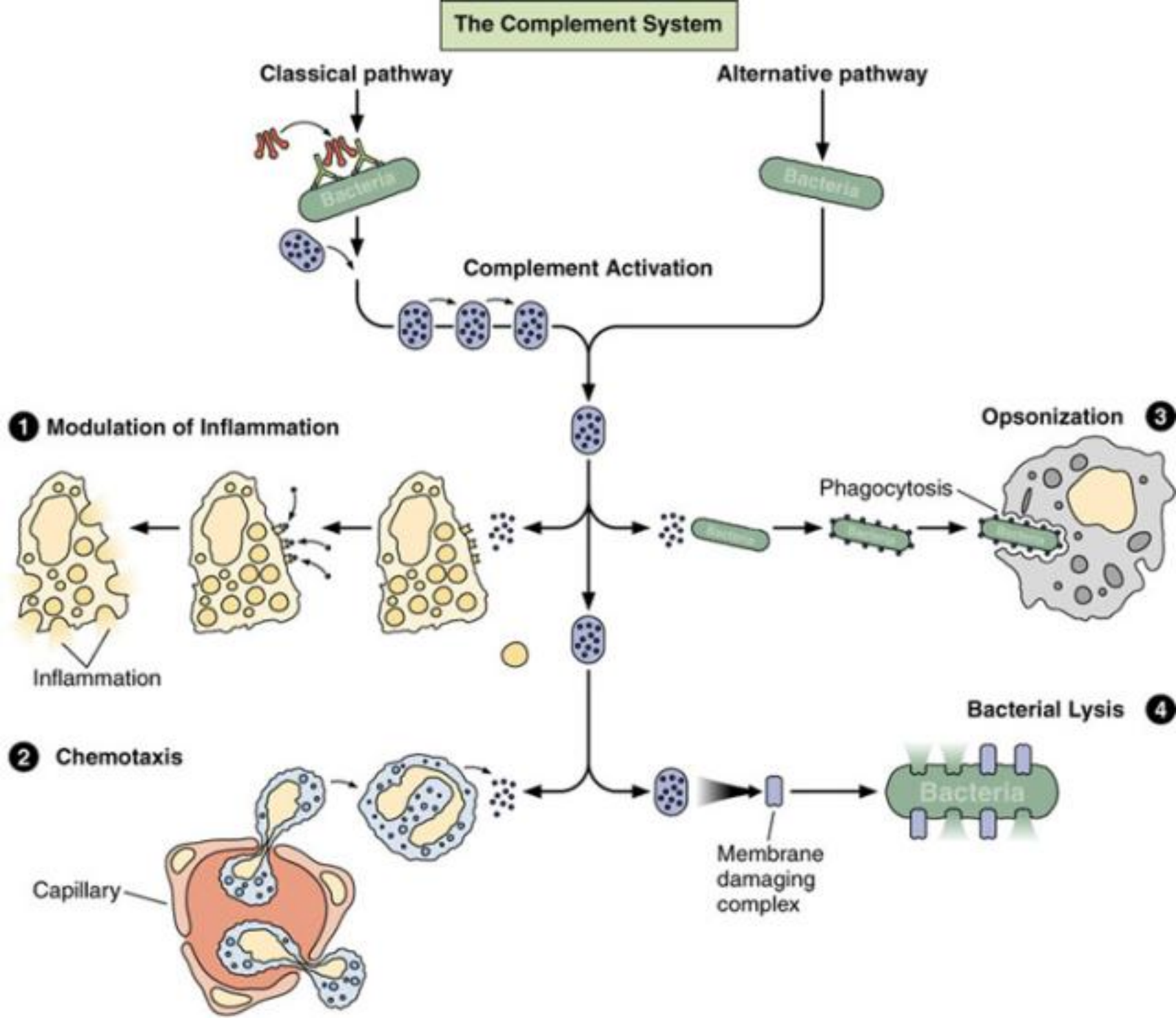
D Pancreatic acinar cell

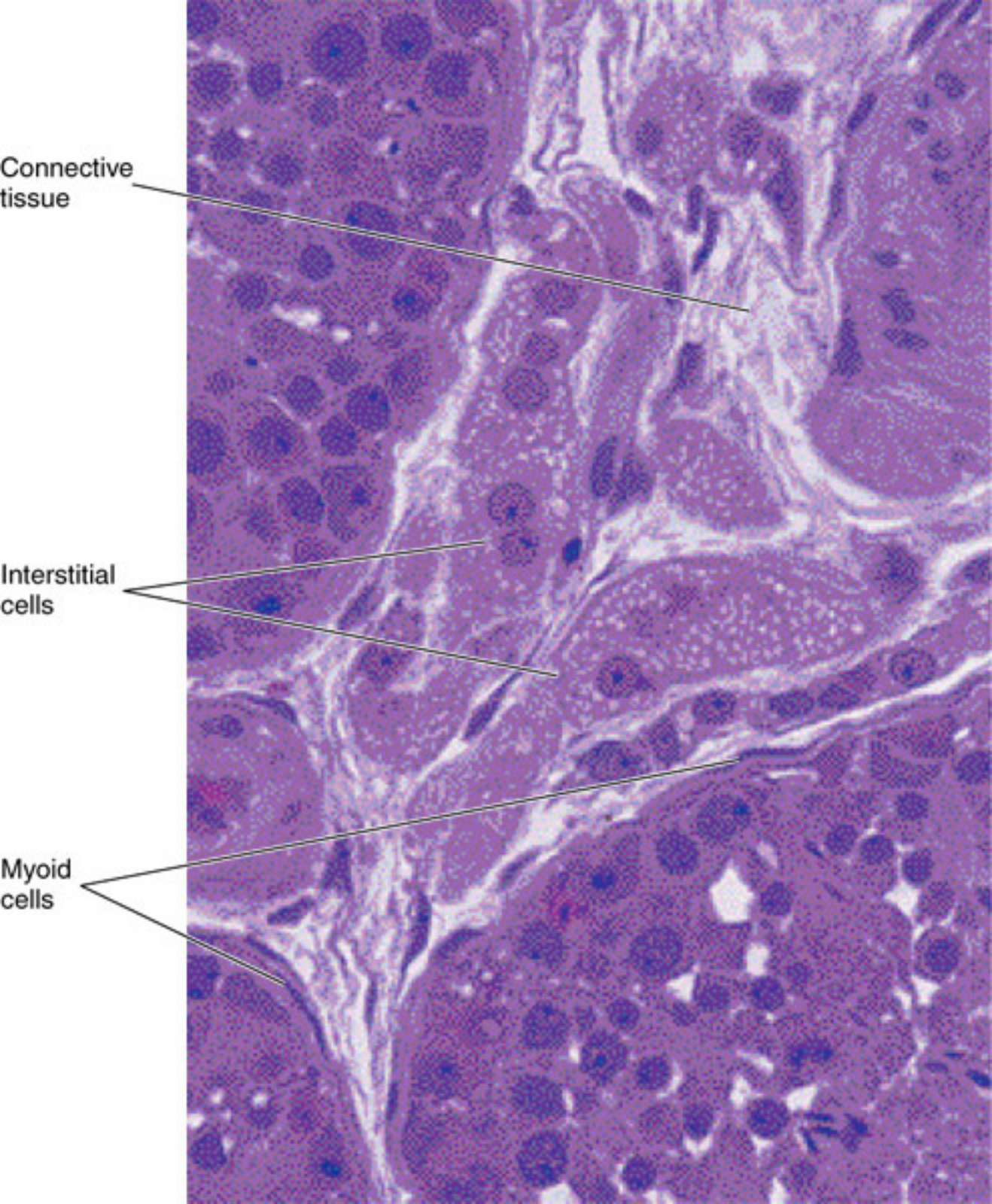

Phospholipid-transporting protein charged
Phospholipid-transporting protein uncharged
Membrane of SER (phospholipid rich)
Cytosol
Phospholipid-poor membrane

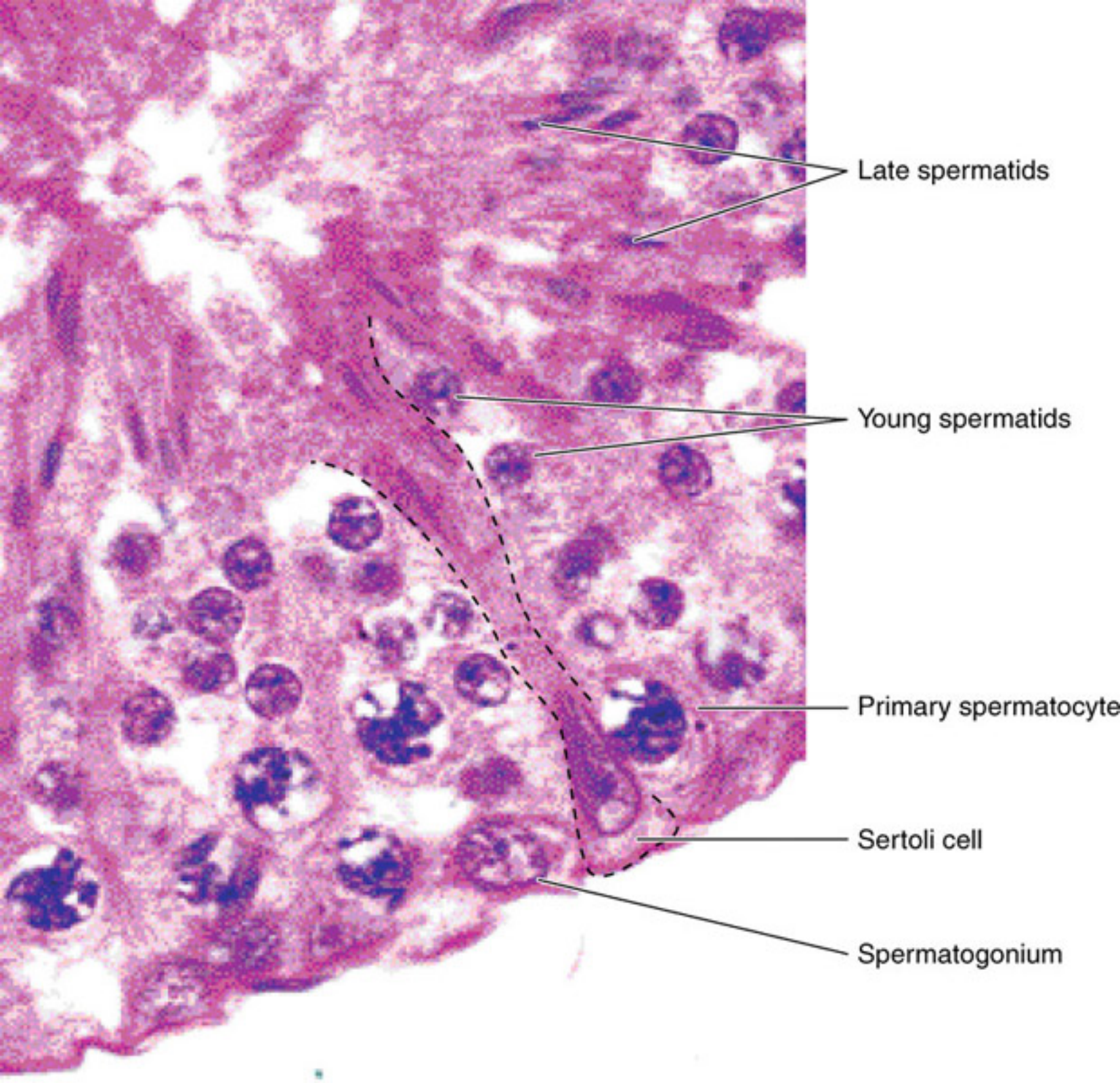

trans (maturing) face
Golgi
RER vesicles budding
cis (forming) face

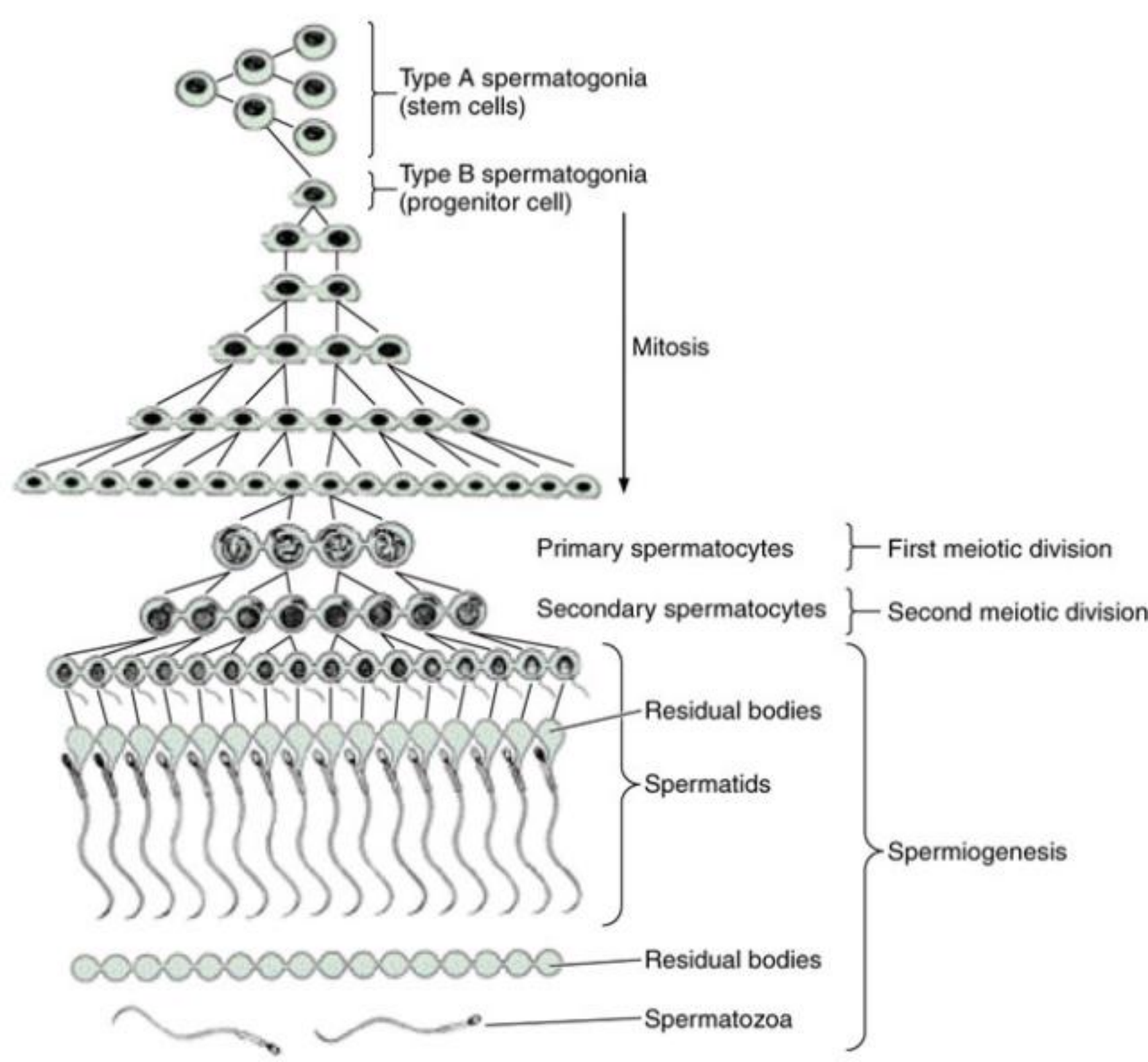

13
1
12
2
11
3
10
4
9
5
8
7
6
α
β
Protofilament

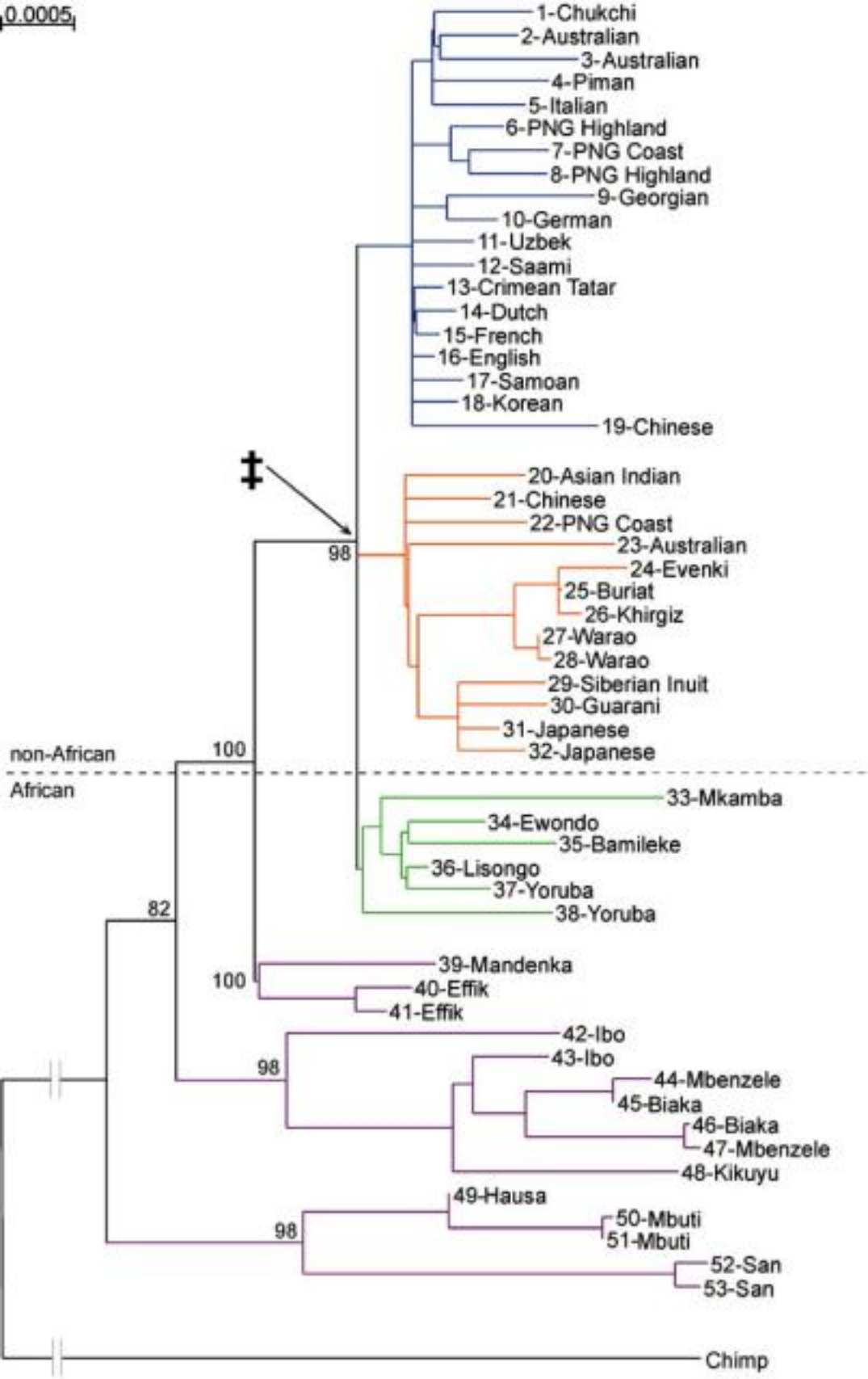

Centrioles

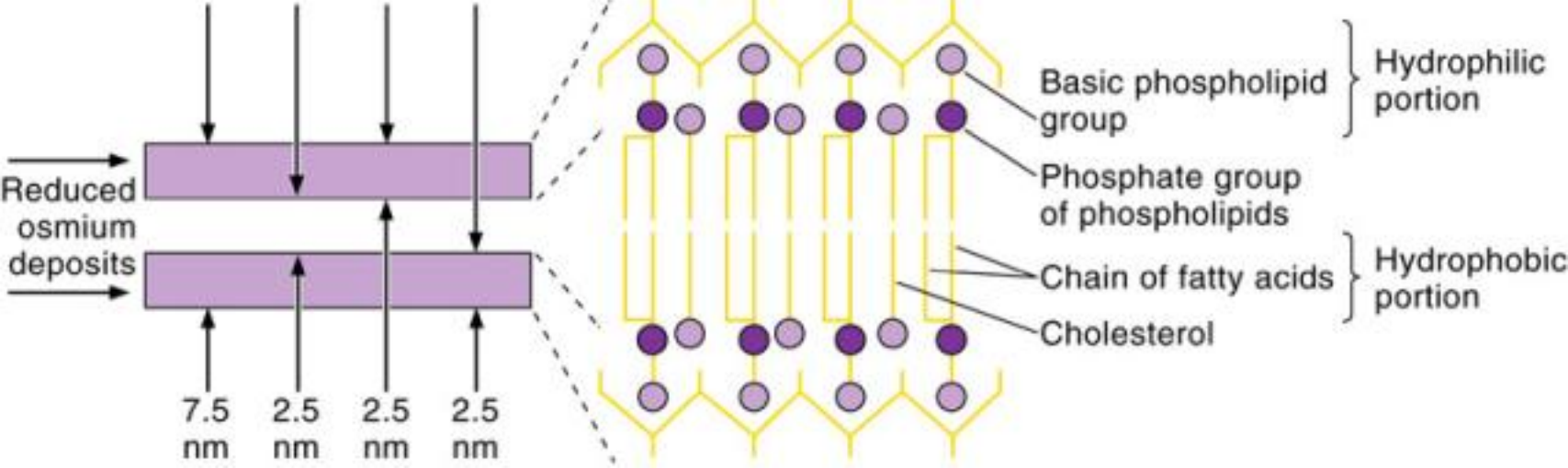

The Complement System
Classical pathway
Alternative pathway
Bacteria
Bacteria
Complement Activation
1 Modulation of Inflammation
Opsonization 3
Phagocytosis
Inflammation
Bacterial Lysis 4
2 Chemotaxis
Bacteria
Capillary
Membrane damaging complex

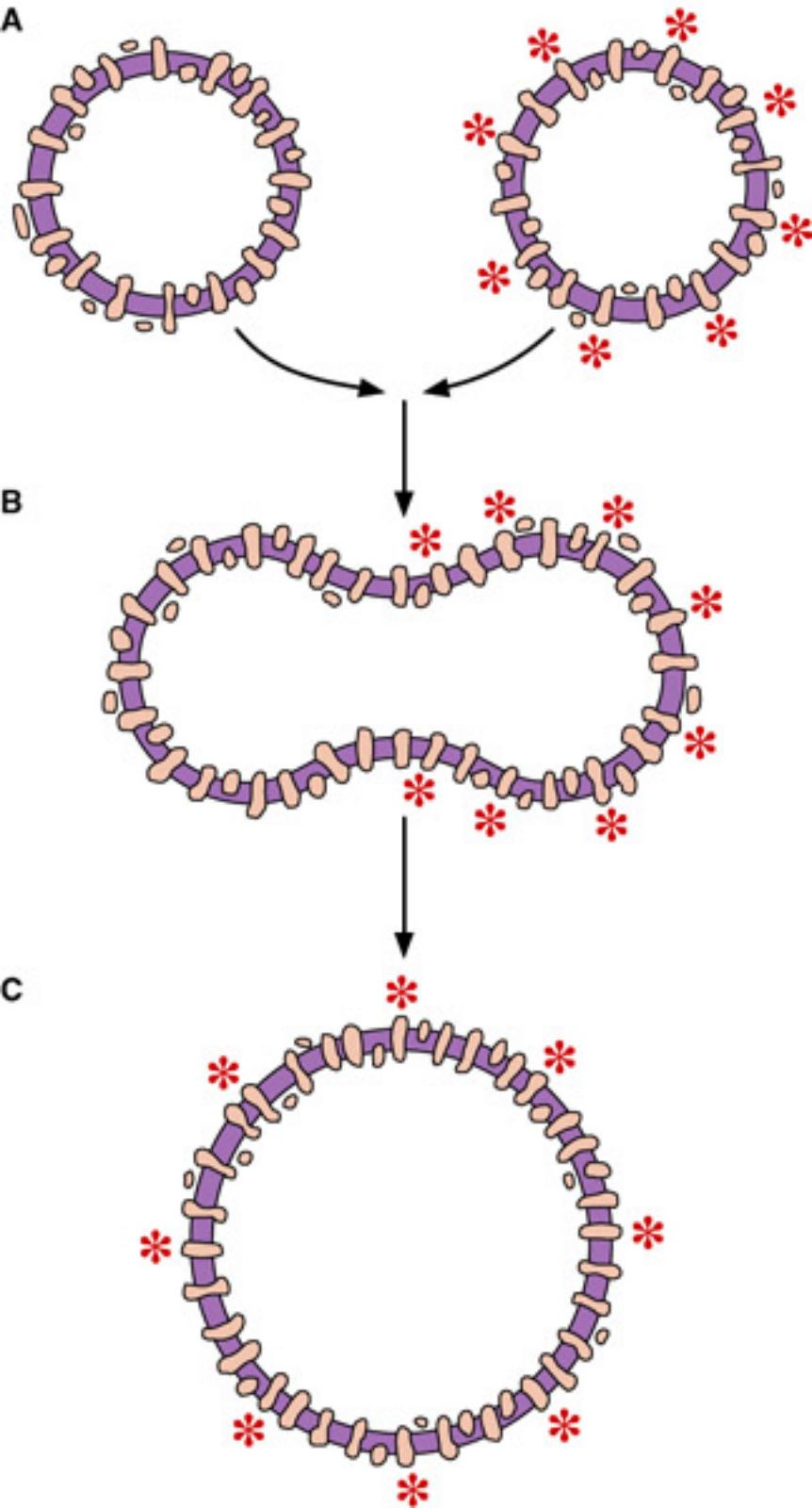

Connective tissue
Interstitial cells
Myoid cells

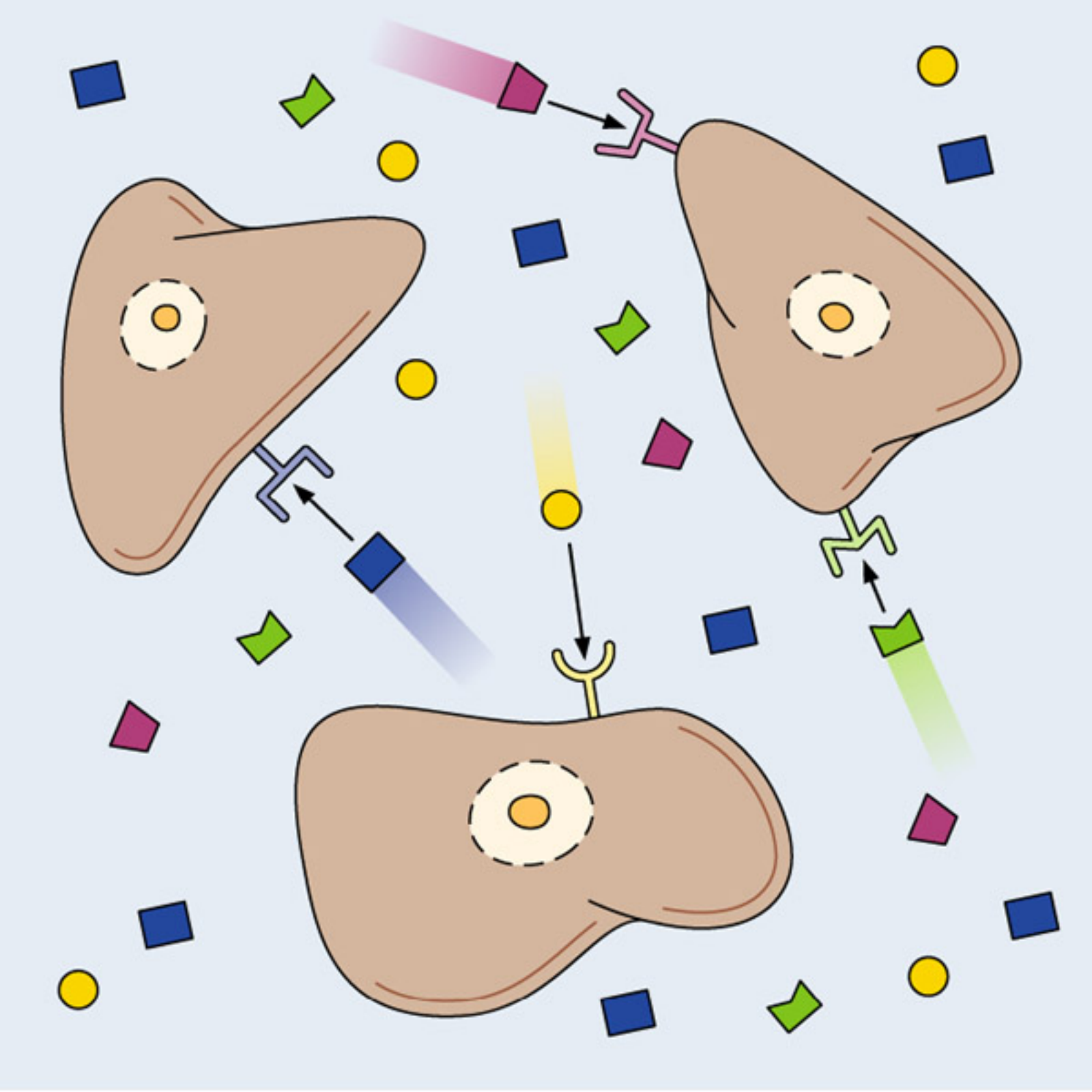

Late spermatids
Young spermatids
Primary spermatocyte
Sertoli cell
Spermatogonium

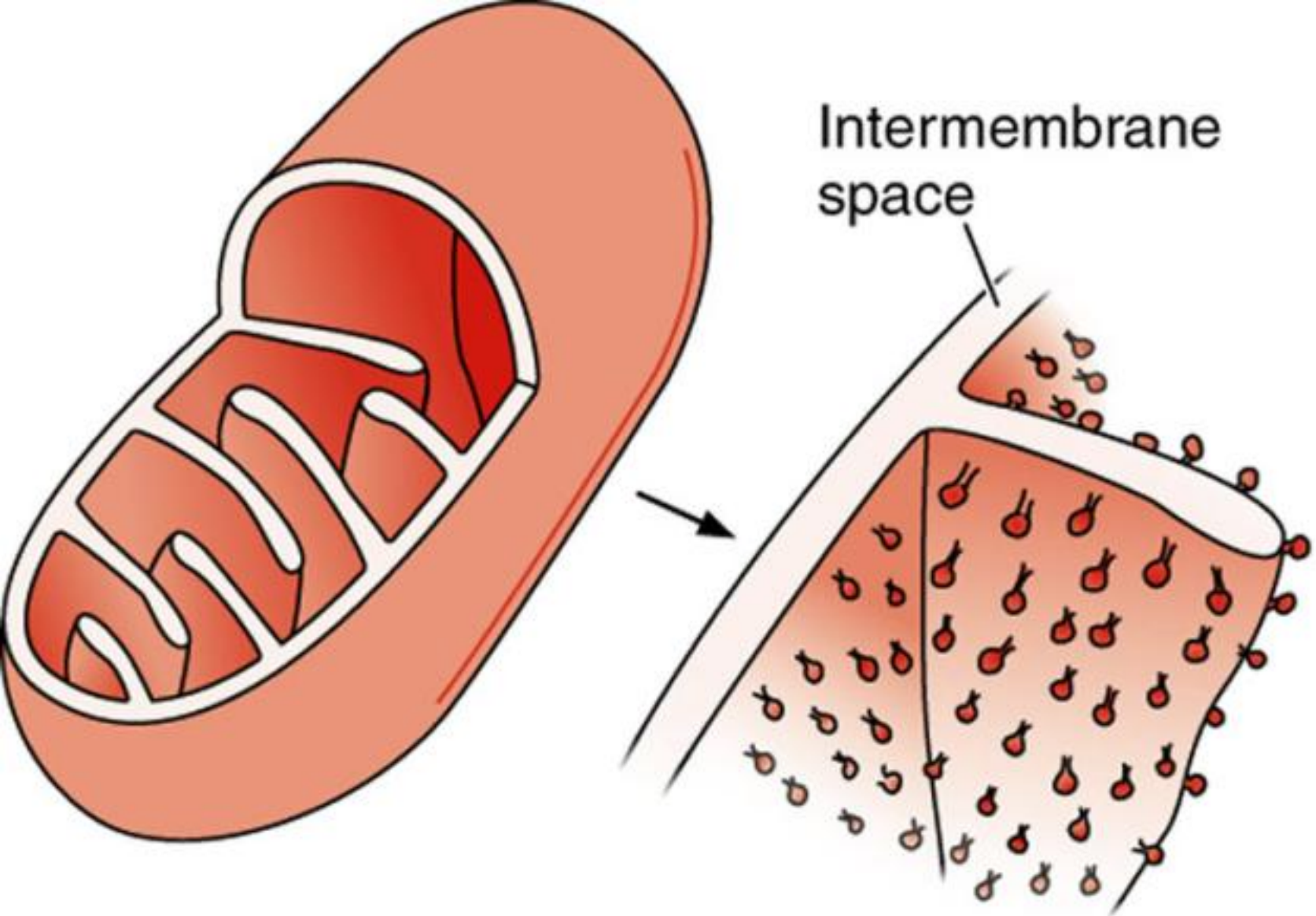

Type A spermatogonia
(stem cells)
Type B spermatogonia
(progenitor cell)
Mitosis
Primary spermatocytes
First meiotic division
Secondary spermatocytes
Second meiotic division
Residual bodies
Spermatids
Spermiogenesis
Residual bodies
Spermatozoa


0.0005
1-Chukchi
2-Australian
3-Australian
4-Piman
5-Italian
6-PNG Highland
7-PNG Coast
8-PNG Highland
9-Georgian
10-German
11-Uzbek
12-Saami
13-Crimean Tatar
14-Dutch
15-French
16-English
17-Samoan
18-Korean
19-Chinese
‡
20-Asian Indian
21-Chinese
22-PNG Coast
23-Australian
24-Evenki
25-Buriat
26-Khirgiz
27-Warao
28-Warao
29-Siberian Inuit
30-Guarani
31-Japanese
32-Japanese
98
non-African
100
African
33-Mkamba
34-Ewondo
35-Bamileke
36-Lisongo
37-Yoruba
38-Yoruba
82
39-Mandenka
100
40-Effik
41-Effik
42-Ibo
43-Ibo
98
44-Mbenzele
45-Biaka
46-Biaka
47-Mbenzele
48-Kikuyu
49-Hausa
50-Mbuti
98
51-Mbuti
52-San
53-San
Chimp


Reduced
osmium
deposits
7.5
nm
2.5
nm
2.5
nm
2.5
nm
Basic phospholipid
group
Phosphate group
of phospholipids
Chain of fatty acids
Cholesterol
Hydrophilic
portion
Hydrophobic
portion

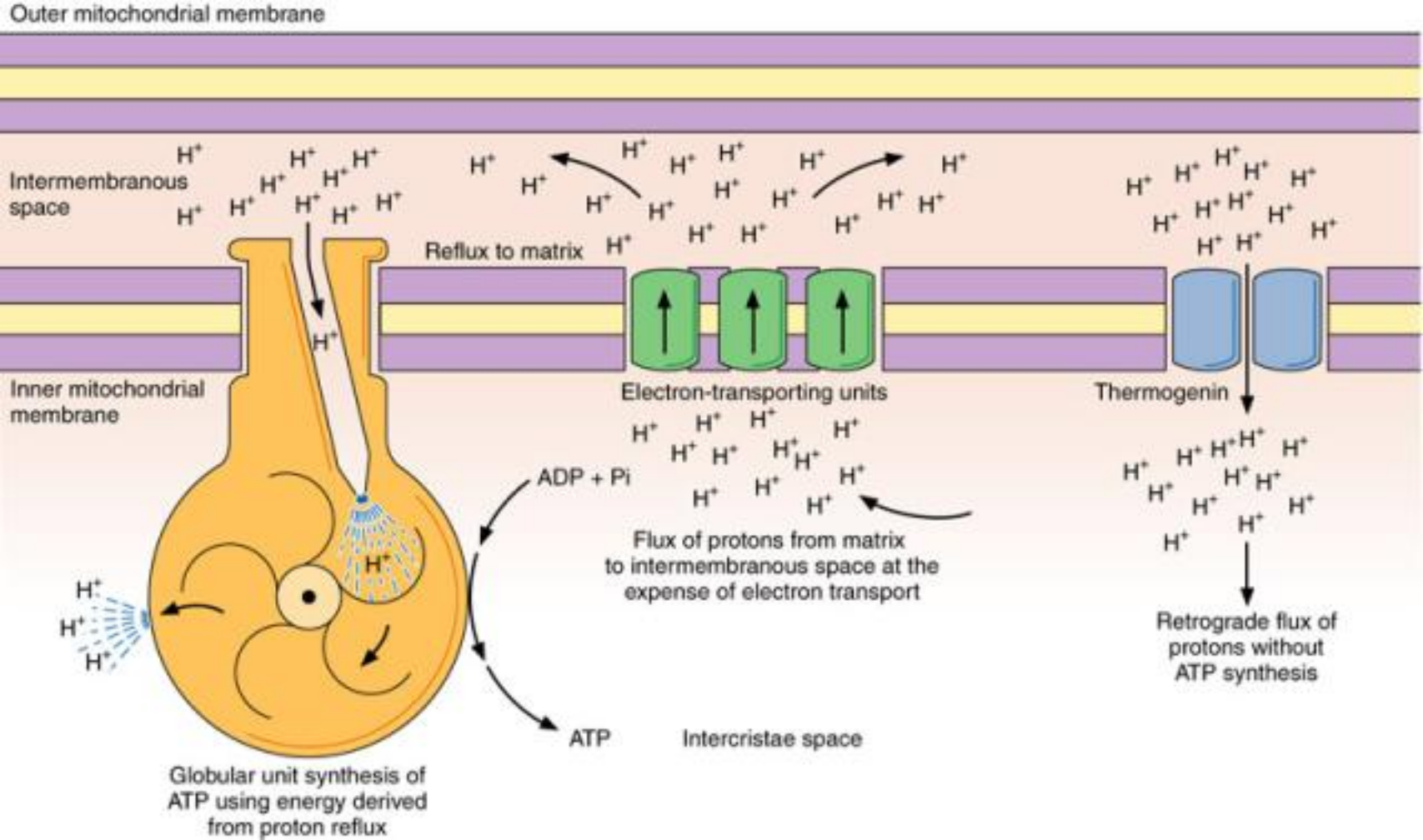

A
B
C

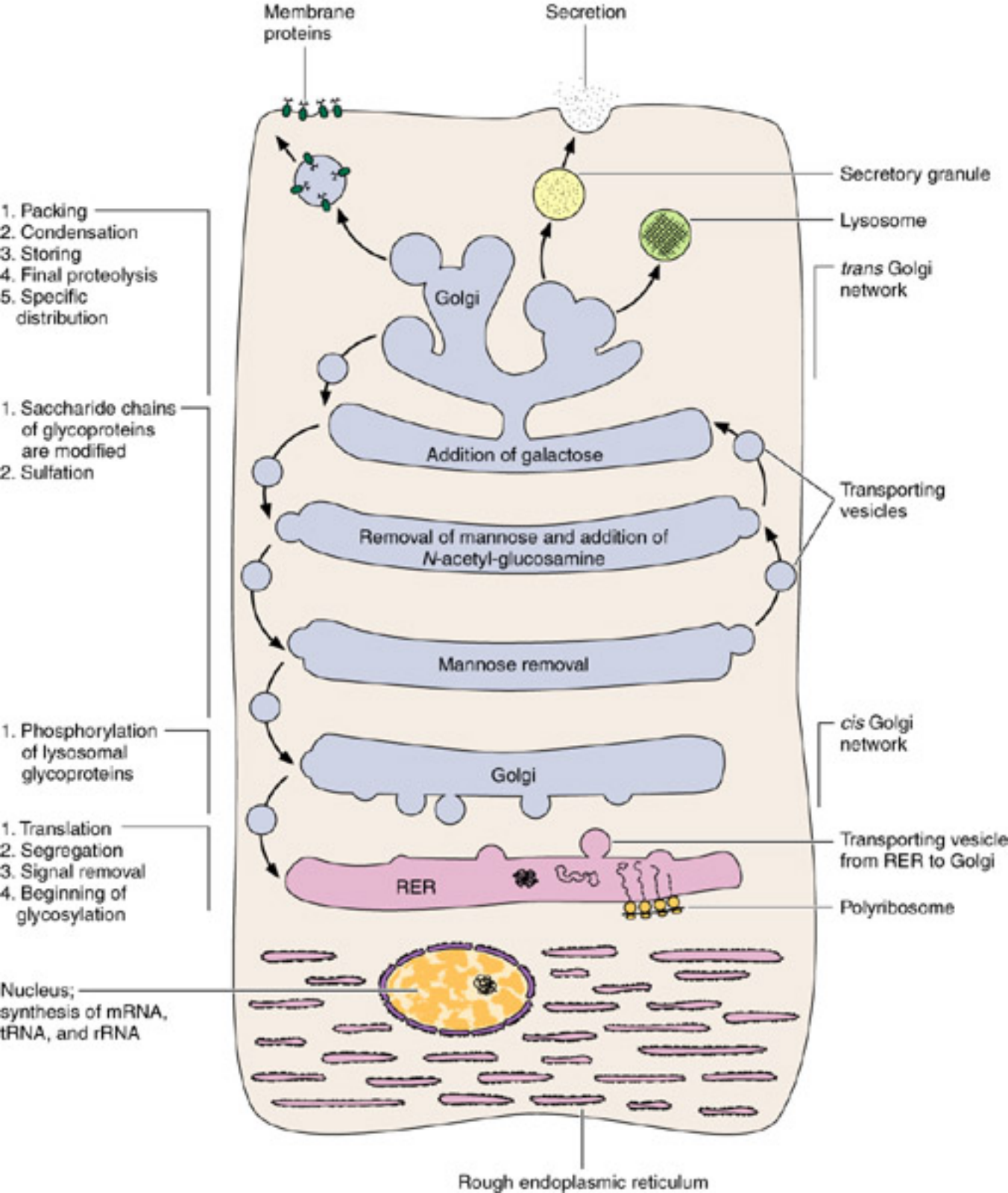


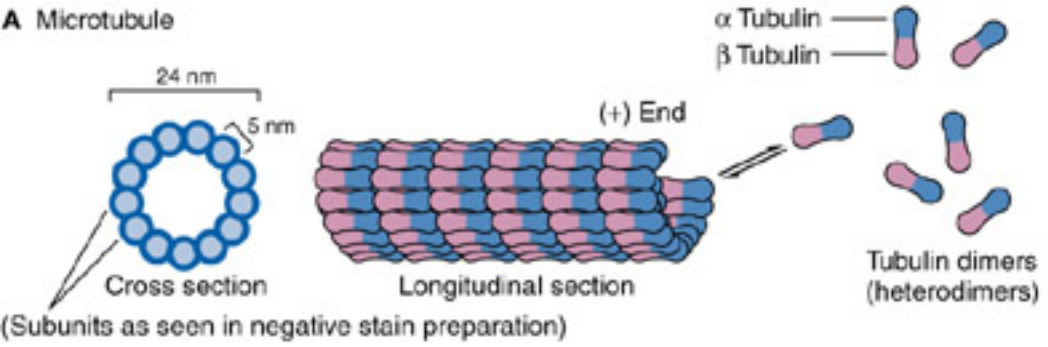


Mitochondrion
(ATP synthesis)

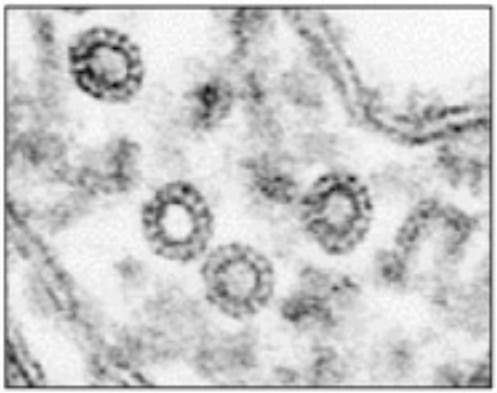
Globular units
(energy transformation)

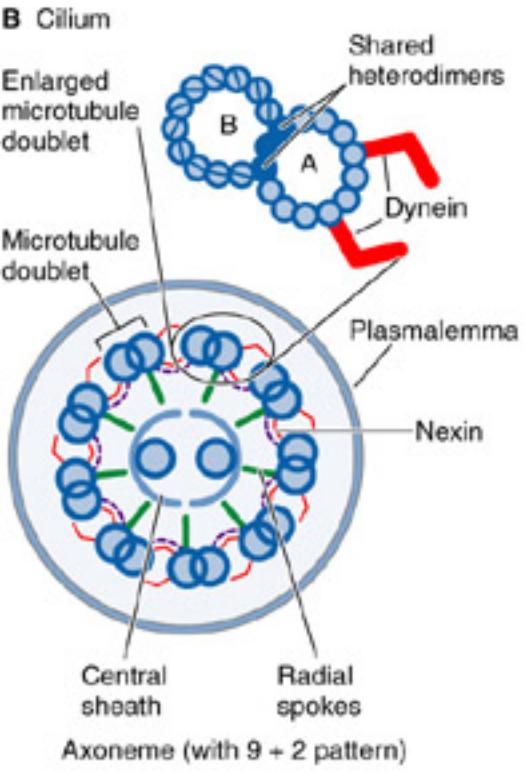

Outer mitochondrial membrane
Intermembranous space
Reflux to matrix
Inner mitochondrial membrane
Electron-transporting units
Thermogenin
ADP + Pi
Flux of protons from matrix to intermembranous space at the expense of electron transport
Retrograde flux of protons without ATP synthesis
ATP
Intercristae space
Globular unit synthesis of ATP using energy derived from proton reflux

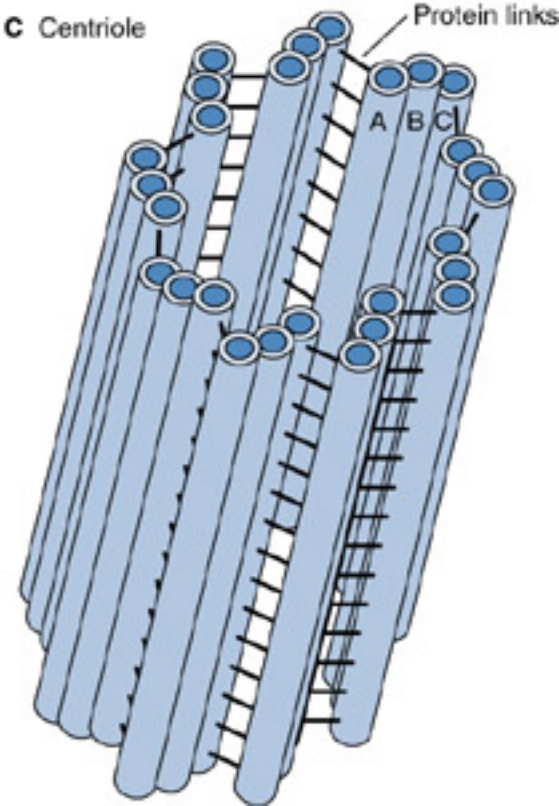

Membrane proteins
Secretion
Secretory granule
Lysosome
trans Golgi network
1. Packing
2. Condensation
3. Storing
4. Final proteolysis
5. Specific distribution
Golgi
1. Saccharide chains of glycoproteins are modified
2. Sulfation
Addition of galactose
Transporting vesicles
Removal of mannose and addition of N-acetyl-glucosamine
Mannose removal
cis Golgi network
1. Phosphorylation of lysosomal glycoproteins
Golgi
1. Translation
2. Segregation
3. Signal removal
4. Beginning of glycosylation
Transporting vesicle from RER to Golgi
RER
Polyribosome
Nucleus; synthesis of mRNA, tRNA, and rRNA
Rough endoplasmic reticulum

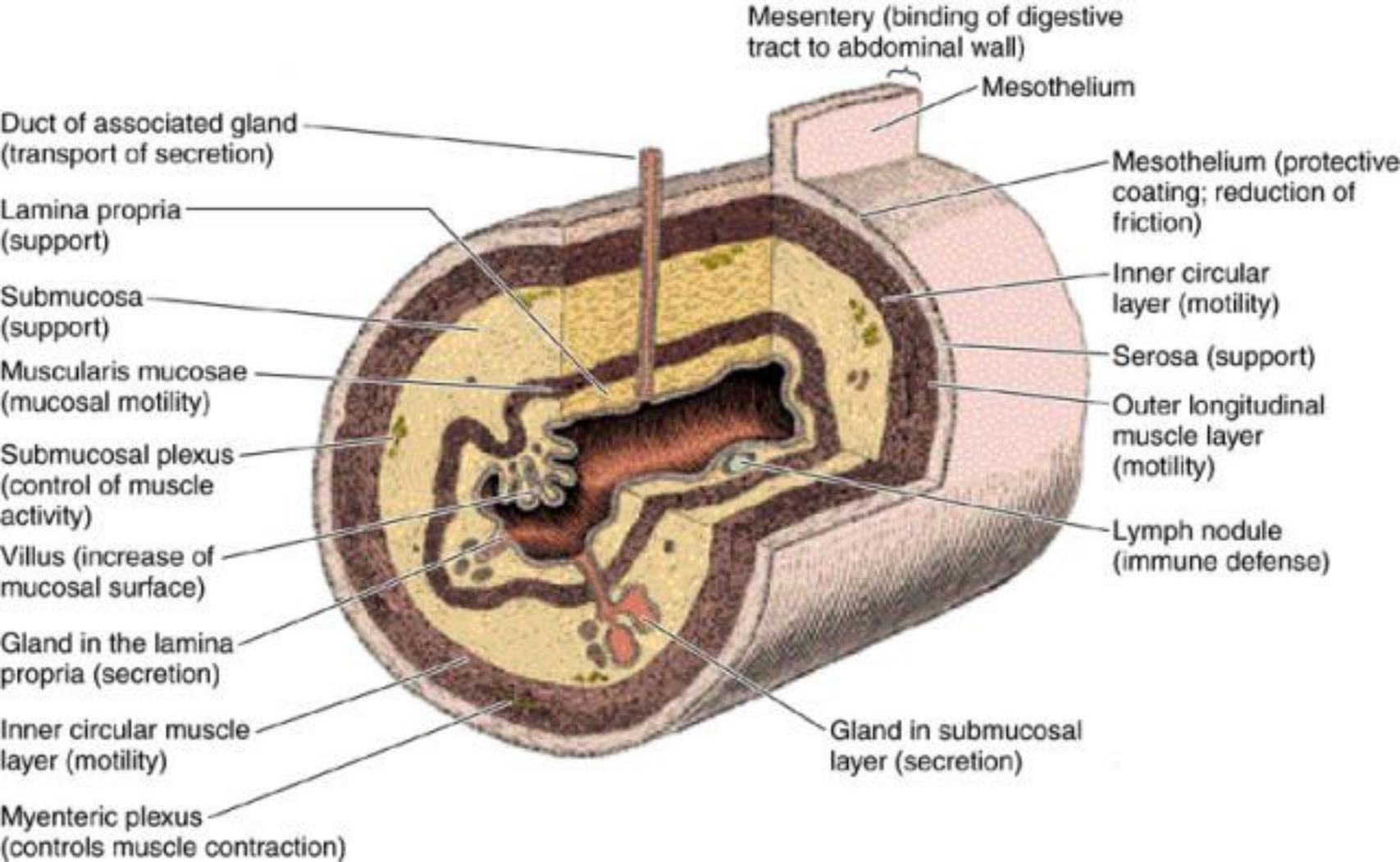


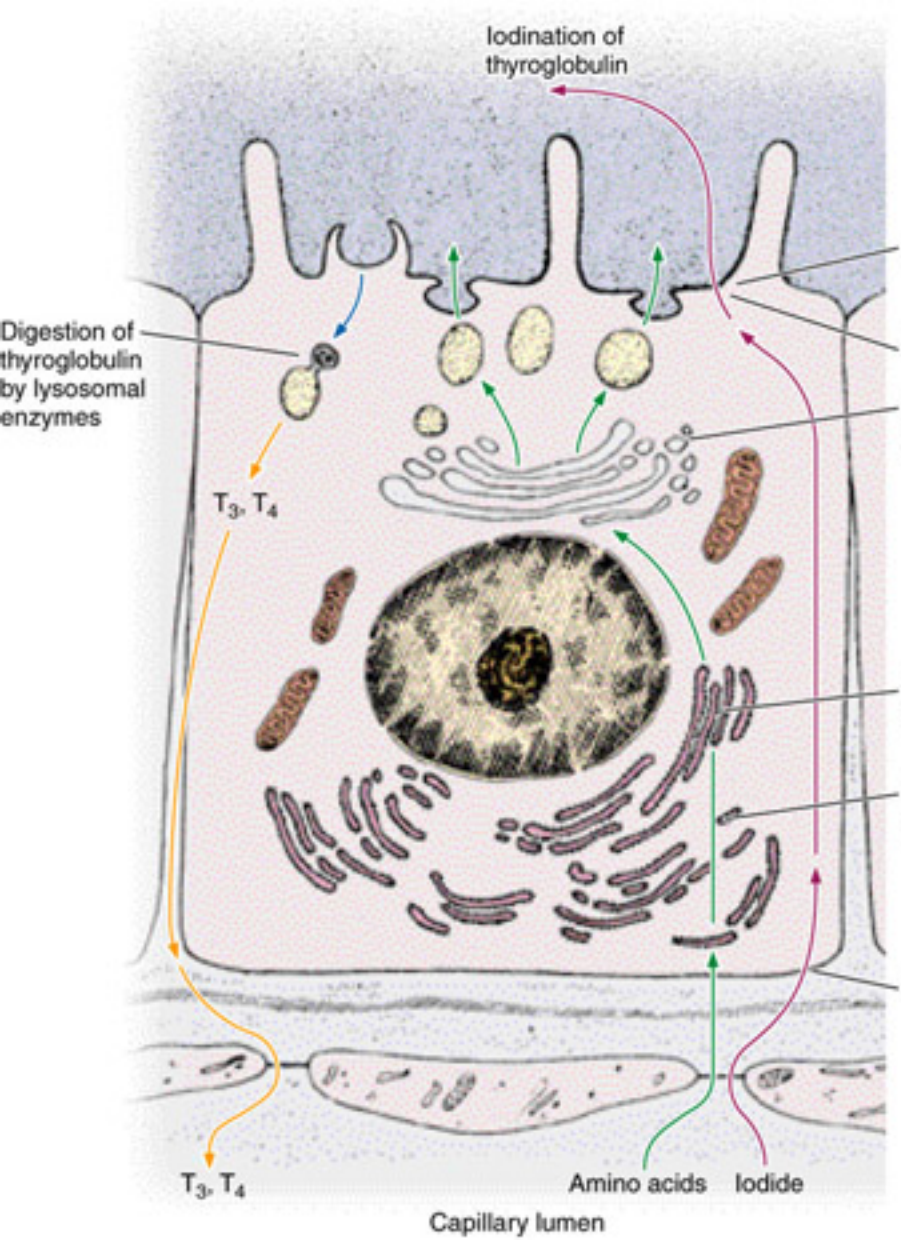
Electron micrograph of microtubules showing above structural features

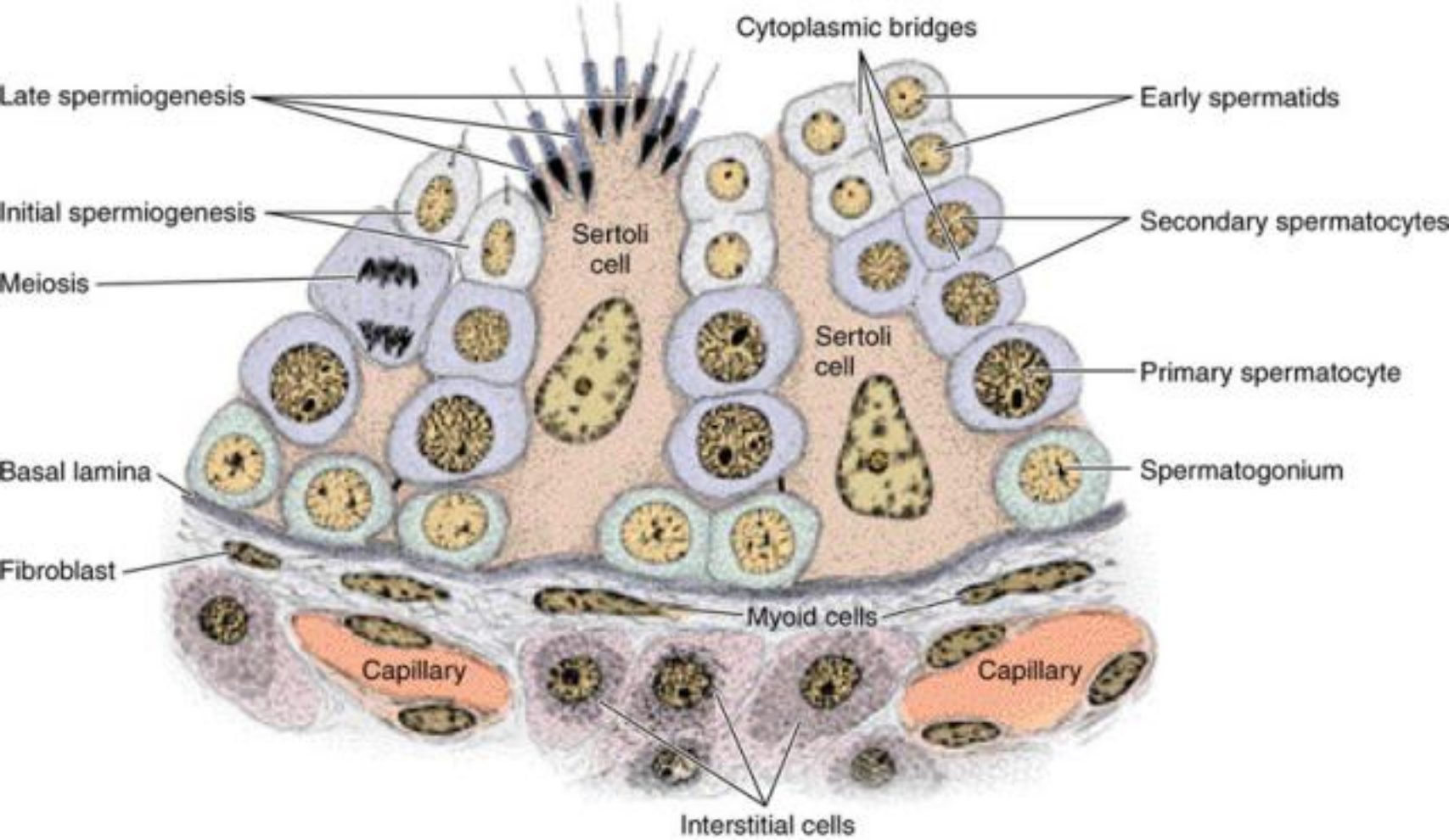


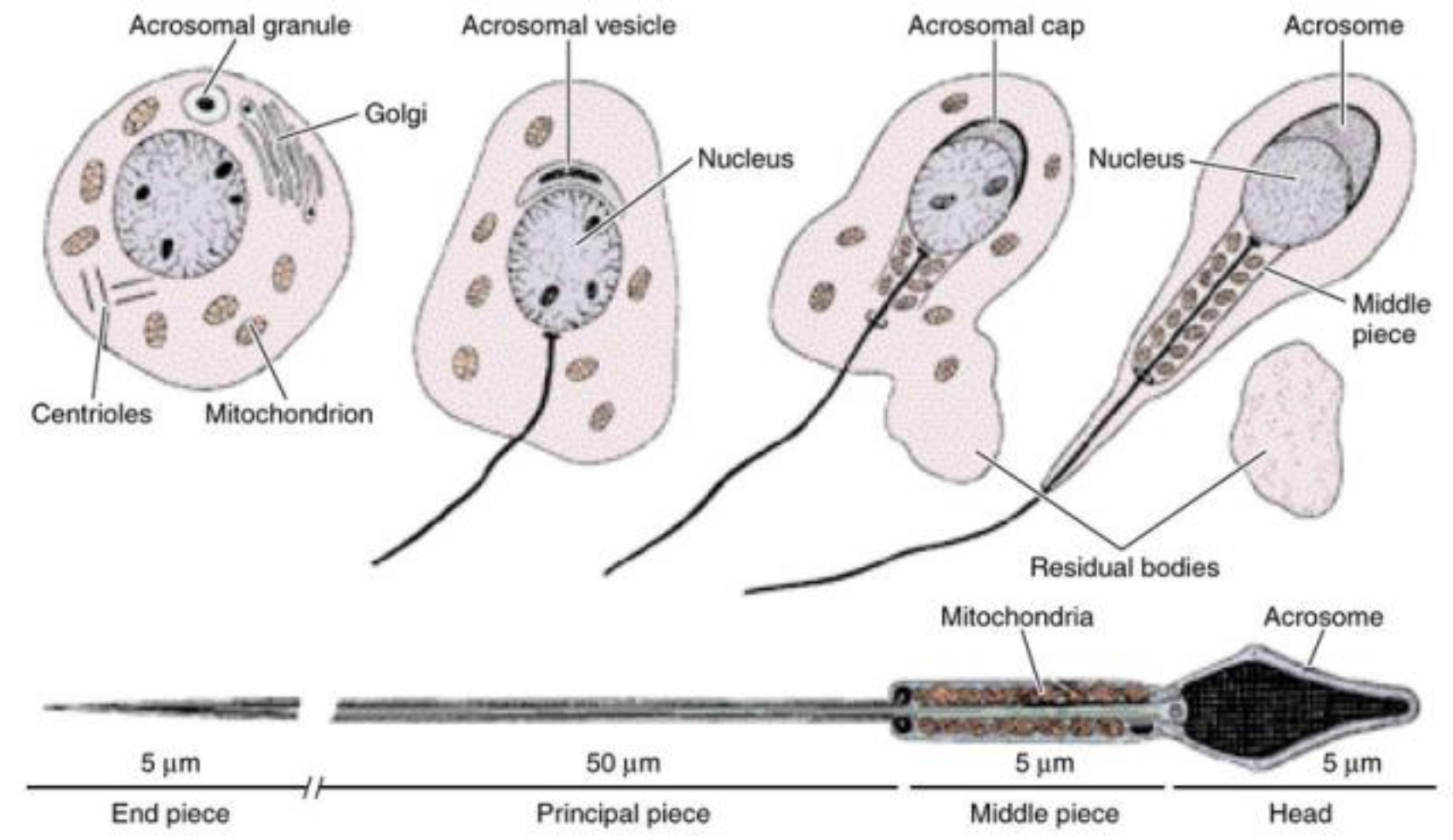


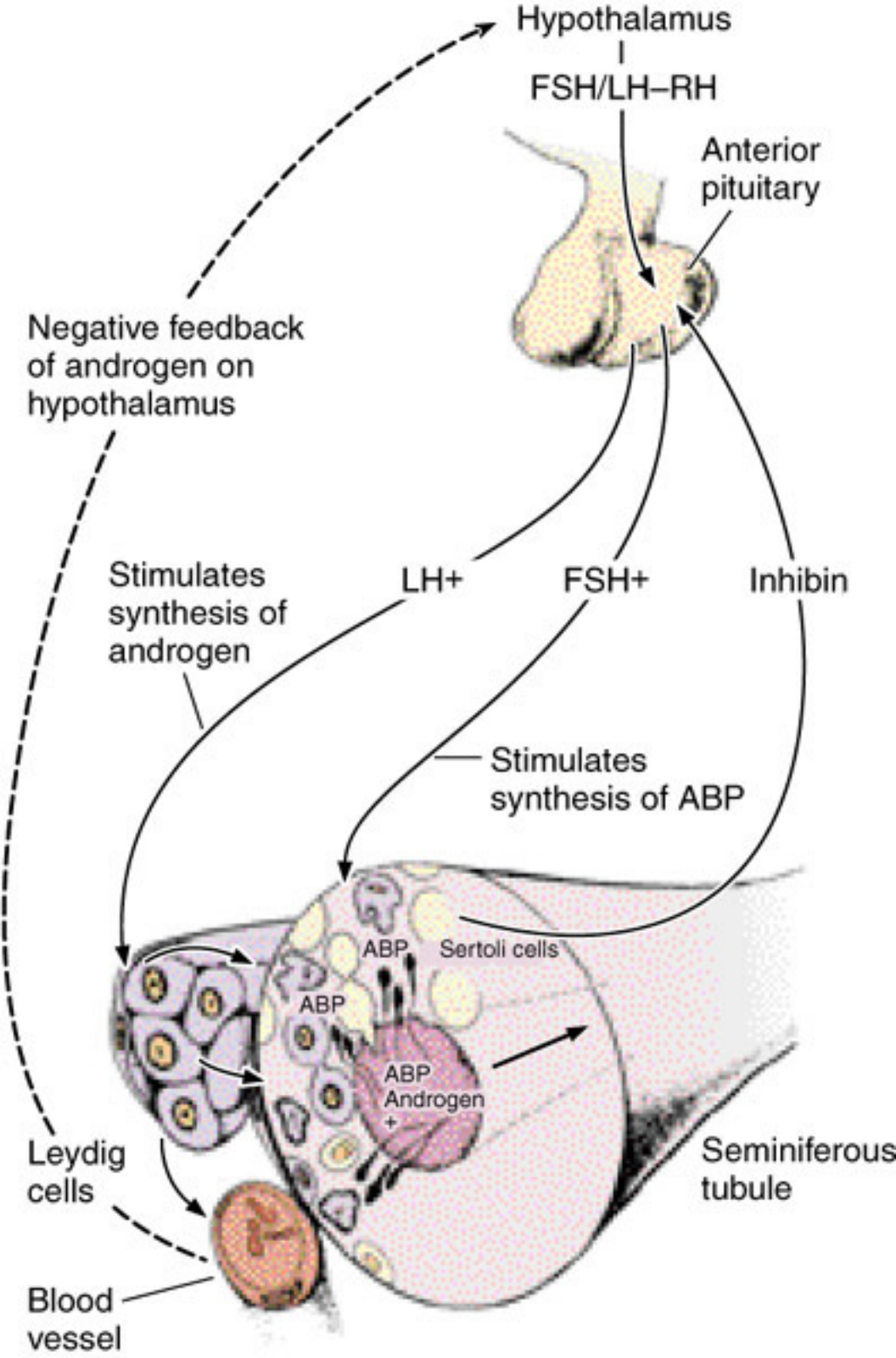


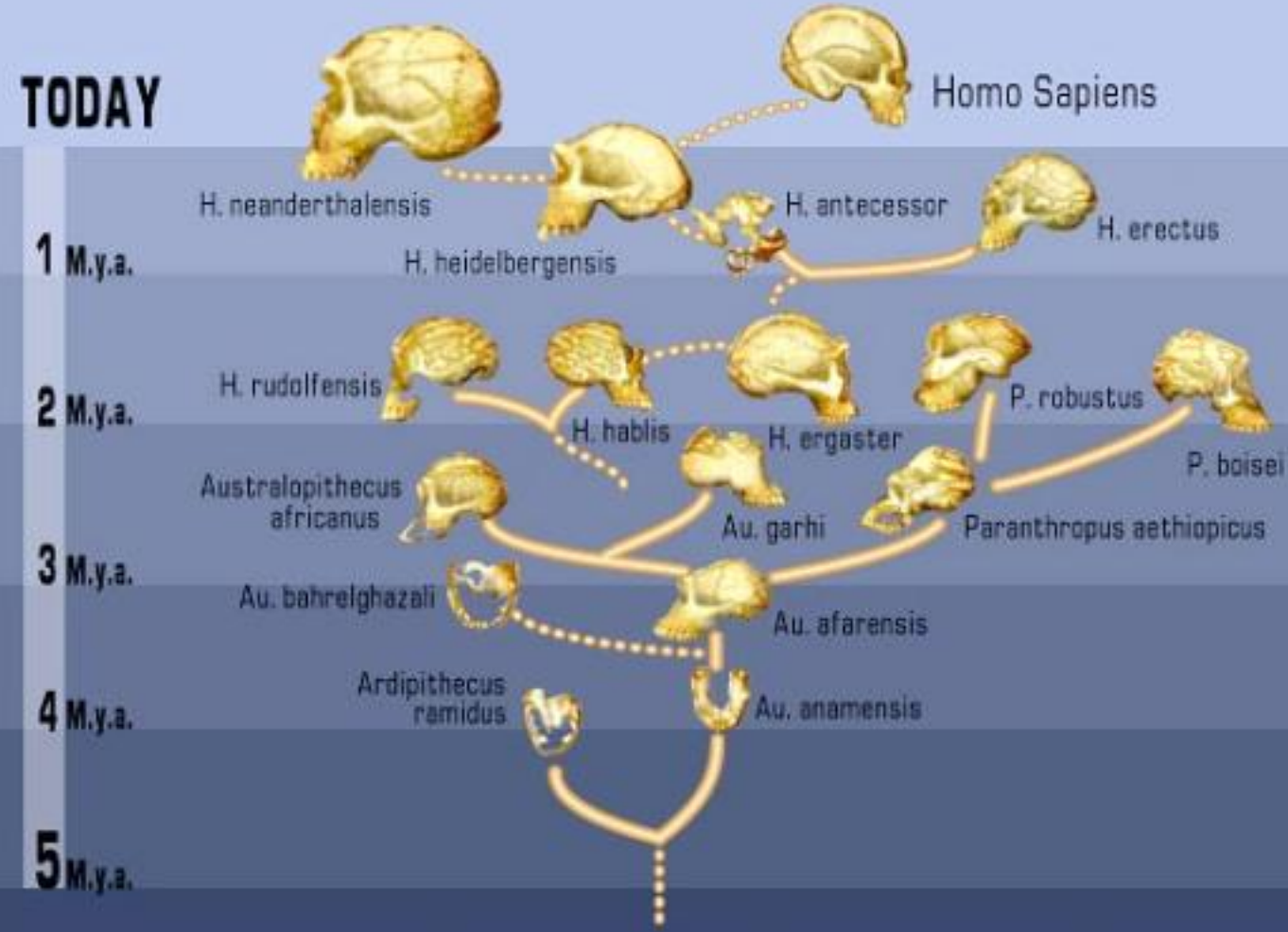

Mesentery (binding of digestive tract to abdominal wall)
Mesothelium
Duct of associated gland (transport of secretion)
Mesothelium (protective coating; reduction of friction)
Lamina propria (support)
Inner circular layer (motility)
Submucosa (support)
Serosa (support)
Muscularis mucosae (mucosal motility)
Outer longitudinal muscle layer (motility)
Submucosal plexus (control of muscle activity)
Lymph nodule (immune defense)
Villus (increase of mucosal surface)
Gland in the lamina propria (secretion)
Inner circular muscle layer (motility)
Gland in submucosal layer (secretion)
Myenteric plexus (controls muscle contraction)

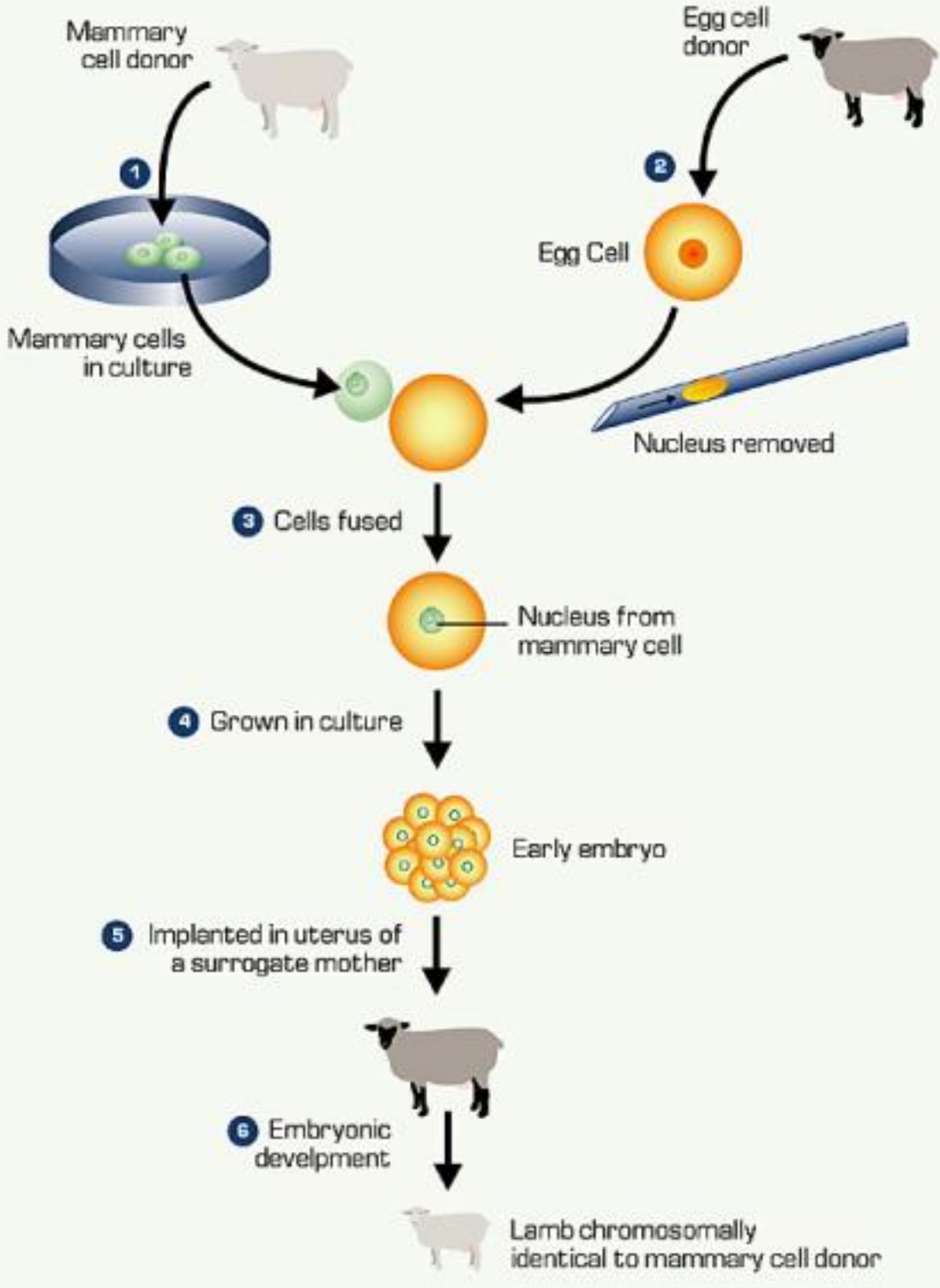

Iodination of thyroglobulin
Pendrin
Iodide oxidation
Digestion of thyroglobulin by lysosomal enzymes
Incorporation of galactose
T_3, T_4
Incorporation of mannose
Synthesis of thyroglobulin
Na/I symporter
T_3, T_4
Amino acids
Iodide
Capillary lumen


Cytoplasmic bridges
Late spermiogenesis
Early spermatids
Initial spermiogenesis
Secondary spermatocytes
Sertoli cell
Meiosis
Sertoli cell
Primary spermatocyte
Basal lamina
Spermatogonium
Fibroblast
Myoid cells
Capillary
Capillary
Interstitial cells


Acrosomal granule
Golgi
Centrioles
Mitochondrion
Acrosomal vesicle
Nucleus
Acrosomal cap
Acrosome
Nucleus
Middle piece
Residual bodies
Mitochondria
Acrosome
5 µm
50 µm
5 µm
5 µm
End piece
Principal piece
Middle piece
Head


Hypothalamus
FSH/LH–RH
Anterior pituitary
Negative feedback of androgen on hypothalamus
Stimulates synthesis of androgen
LH+
FSH+
Inhibin
Stimulates synthesis of ABP
ABP
Sertoli cells
ABP
ABP
Androgen
+
Leydig cells
Seminiferous tubule
Blood vessel


TODAY
Homo Sapiens
H. neanderthalensis
H. heidelbergensis
H. antecessor
H. erectus
1 M.y.a.
H. rudolfensis
H. habilis
H. ergaster
P. robustus
P. boisei
2 M.y.a.
Australopithecus africanus
Au. garhi
Paranthropus aethiopicus
3 M.y.a.
Au. bahrelghazali
Au. afarensis
Ardipithecus ramidus
Au. anamensis
4 M.y.a.
5 M.y.a.


Mammary cell donor
Egg cell donor
1
2
Egg Cell
Mammary cells in culture
Nucleus removed
3 Cells fused
Nucleus from mammary cell
4 Grown in culture
Early embryo
5 Implanted in uterus of a surrogate mother
6 Embryonic develpment
Lamb chromosomally identical to mammary cell donor