
Chapter 2 Cell

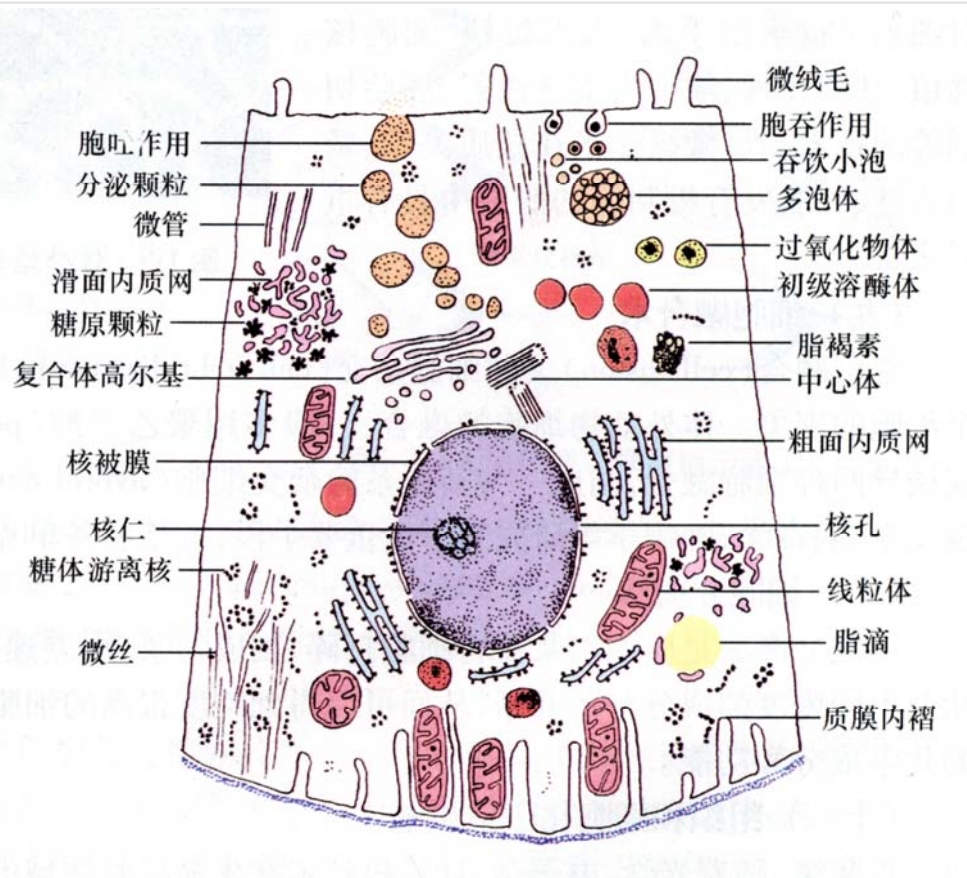
Liu Jiamei

CELL

□ Cell membrane

□ Cytoplasm

□ Nucleolus



I . Plasma membrane (Plasmalemma)

- Unit membrane: 3-layered structure
- Fluid mosaic model

phospholipid

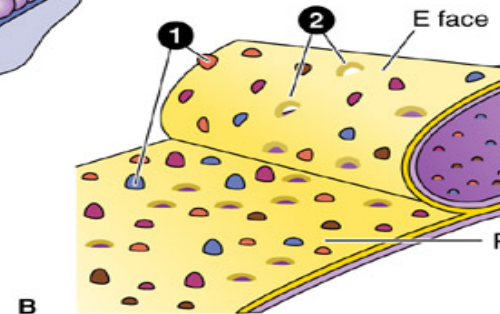
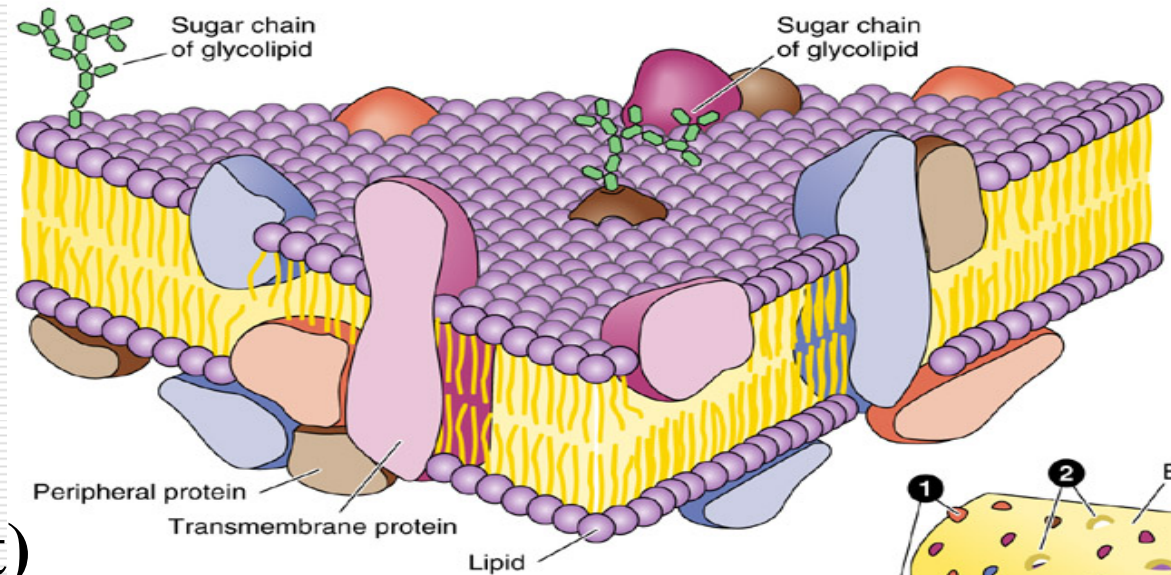
proteins

Integral proteins

Peripheral proteins

Glycocalyx (cell coat)

A Carbohydrate chains bound to lipids and proteins



The functions of cell membrane

1. Transmembrane transport

- Passive transport**
- Active transport**
- Transport of macromolecules and particles**

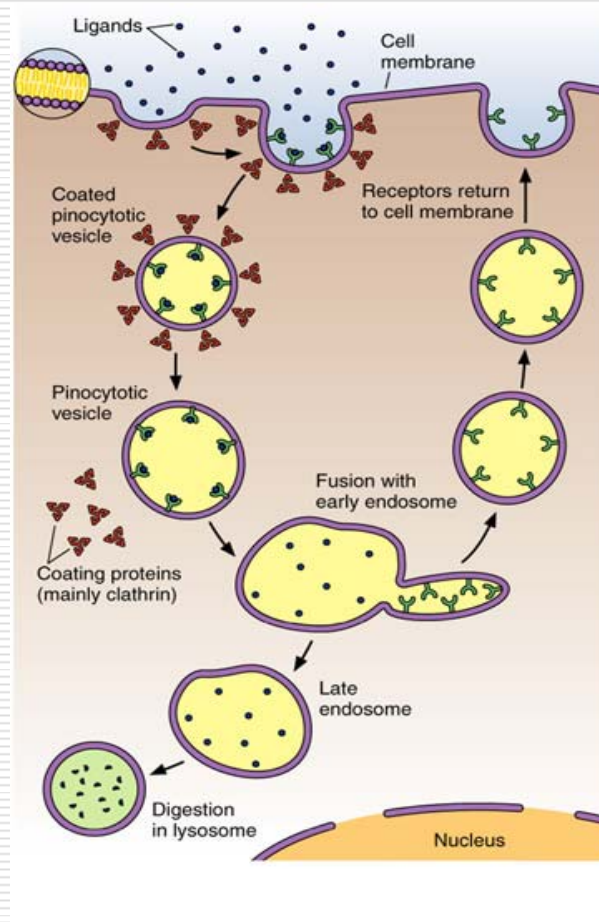
Endocytosis: Pinocytosis

Phagocytosis

Receptor mediated endocytosis

Exocytosis:

Endocytosis



II .Cytoplasm

1. Matrix (Cytosol)

(1) Components

(2) Functions

① Coordinates the intracellular movements of organelles

② Provides a framework for the organization of enzyme and substrates

2. Organelle

2.1 Ribosomes

(1) Structure

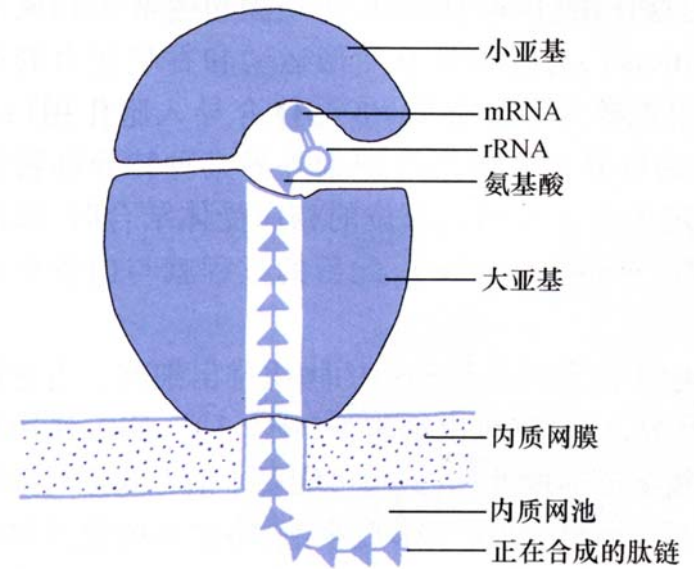
Small electron-dense particles

Free ribosome & attached ribosome

Polyribosome

(2) Function

Take part in protein synthesis

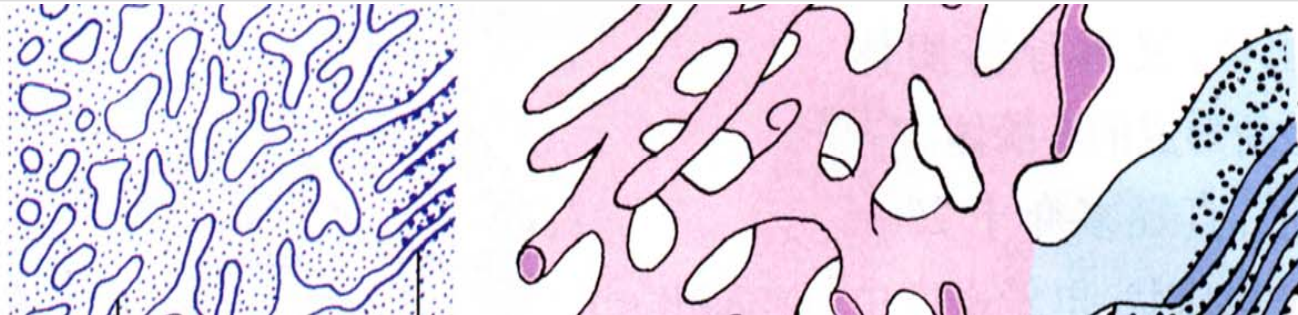


2.2 Endoplasmic Reticulum (ER)

Structure: Saclike and parallel stacks of flattened cisternae, Polyribosomes on the cytosolic surface

(1) Rough Endoplasmic Reticulum (**RER**)

Functions : Synthesis of Secretory proteins



(2) Smooth Endoplasmic Reticulum (SER)

Structure: smooth tubular or vesicle and lacks polyribosomes

Function:

- ① synthesis of steroid hormones**
 - ② neutralizing noxious substances**
 - ③ Synthesizes phospholipids**
 - ④ the contraction process in muscle cells**
-

2.3 Golgi Complex (Golgi Apparatus)

Structure: vesicles (Transport vesicles)
saccule, vacuoles (Condensing vacuoles)

Forming face , maturing face

Functions: initiates packing,
glycosylation and concentration of
secretory products (including secretory
granules and lysosome)

2.4 Lysosomes

Structure :Spherical, membrane-limited vesicles ,Containing hydrolytic enzymes

Primary lysosomes **multivesicular body**

Secondary lysosomes

Residual bodies (lipofuscin, or age pigment)

Functions

Digest intracellular material from its environment and turnover of cytoplasmic organelles

2.5 Peroxisomes or Microbodies

Structure:

**Spherical membrane-limited organelles,
Contain catalase**

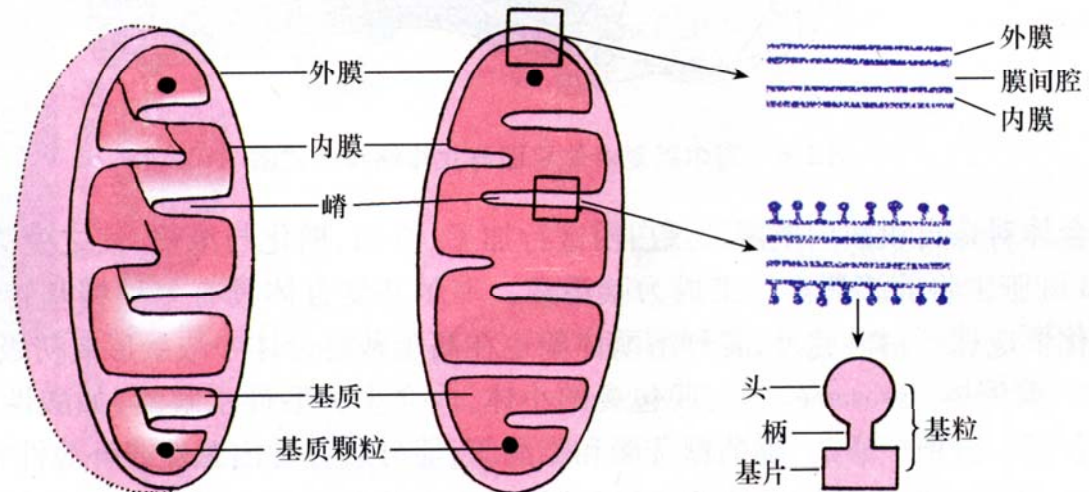
Functions

- ① Eliminate hydrogen peroxide**
 - ② Degrade toxic molecules in liver and kidney**
 - ③ Participate in lipid metabolism**
-

2.6 Mitochondria

Structure : Outer and Inner membrane, cristae, Intermembrane space, Intercristae space, Matrix elementary particle

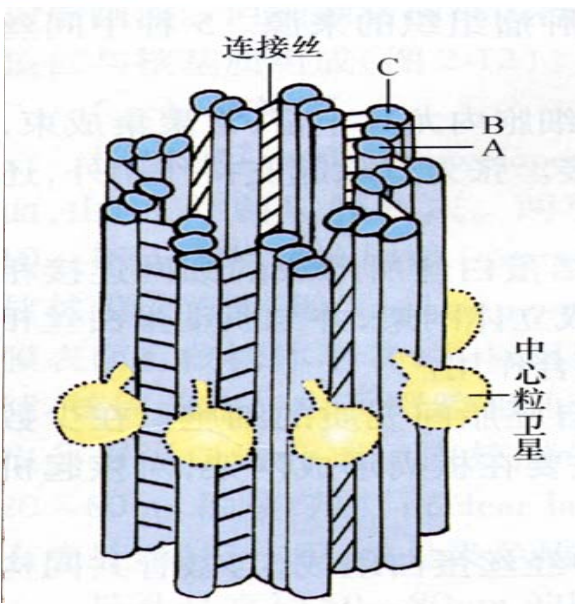
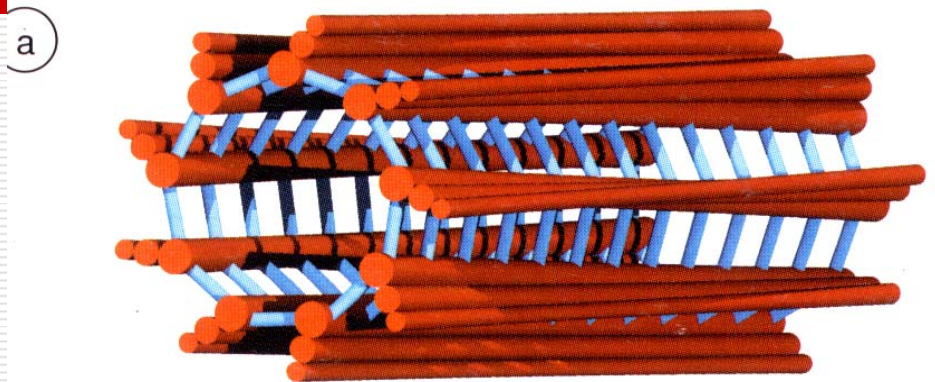
Function:



2.7 Centrosome

Structure:

Function:
Participate in the organization of the mitotic spindle.



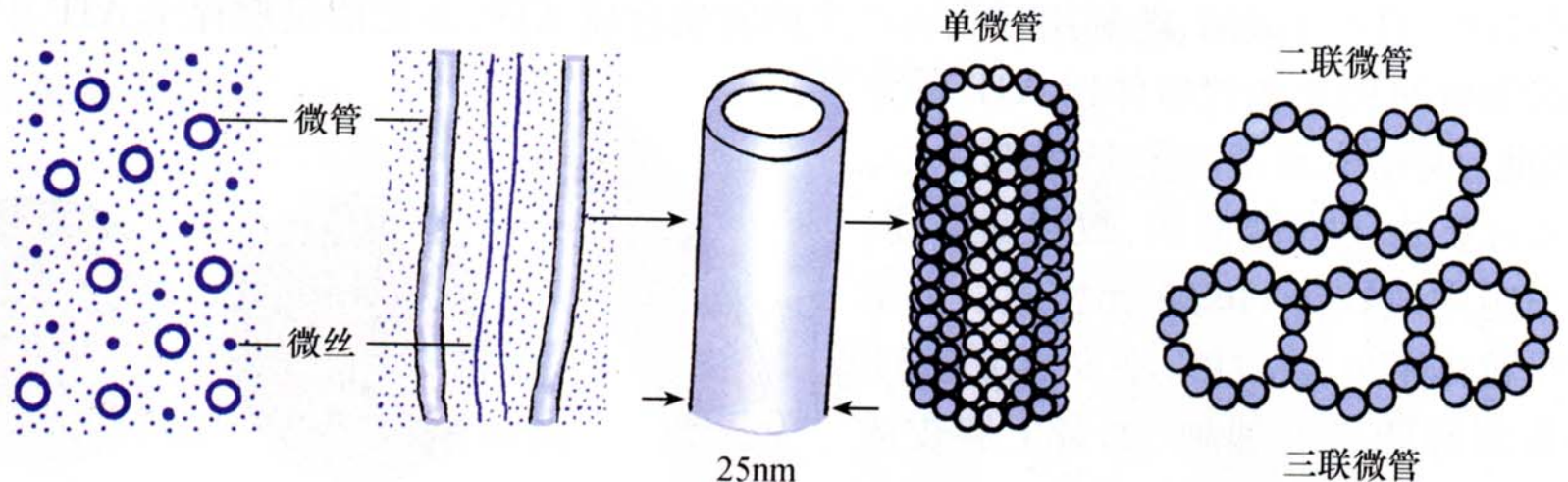
Cytoskeleton

- (1) microtubule**
 - (2) microfilament**
 - (3) intermediate filament**
-

Microtubules

(1) Structure

- α and β tubulin molecules.
- Microtubule-organizing centers (cilia, basal bodies, and centrosomes)



Microfilaments (Actin filaments)

Structure

- Thin filament (Actin filament, be composed of actin)**
- Thick filament (Myosin filament, be composed of myosin)**

Function

- Form a meshwork to maintain the shape of the cell**
-

Intermediate filaments

Classification:

Keratin filament (角蛋白丝)

Desmin filament (结蛋白丝)

Vimentin filament (波形蛋白丝)

Neurofilament (神经丝)

Neuroglial filament (神经胶质丝)

Inclusion

1. Glycogen granule
 2. Lipid droplet
 3. **Secretory granule or secretory vesicles**
 4. **Pigments (Lipofuscin)**
-

III. Cell Nucleus

1. Nuclear envelope

Outer nuclear membrane

Inner nuclear membrane

Perinuclear cisterna

Fibrous lamina

Nuclear pores

2. Chromatin

Components: DNA and Proteins

Classification

(1) **Heterochromatin**

LM: basophilic clumps

EM: coarse granules

(2) **Euchromatin**

LM: lightly stained basophilic areas

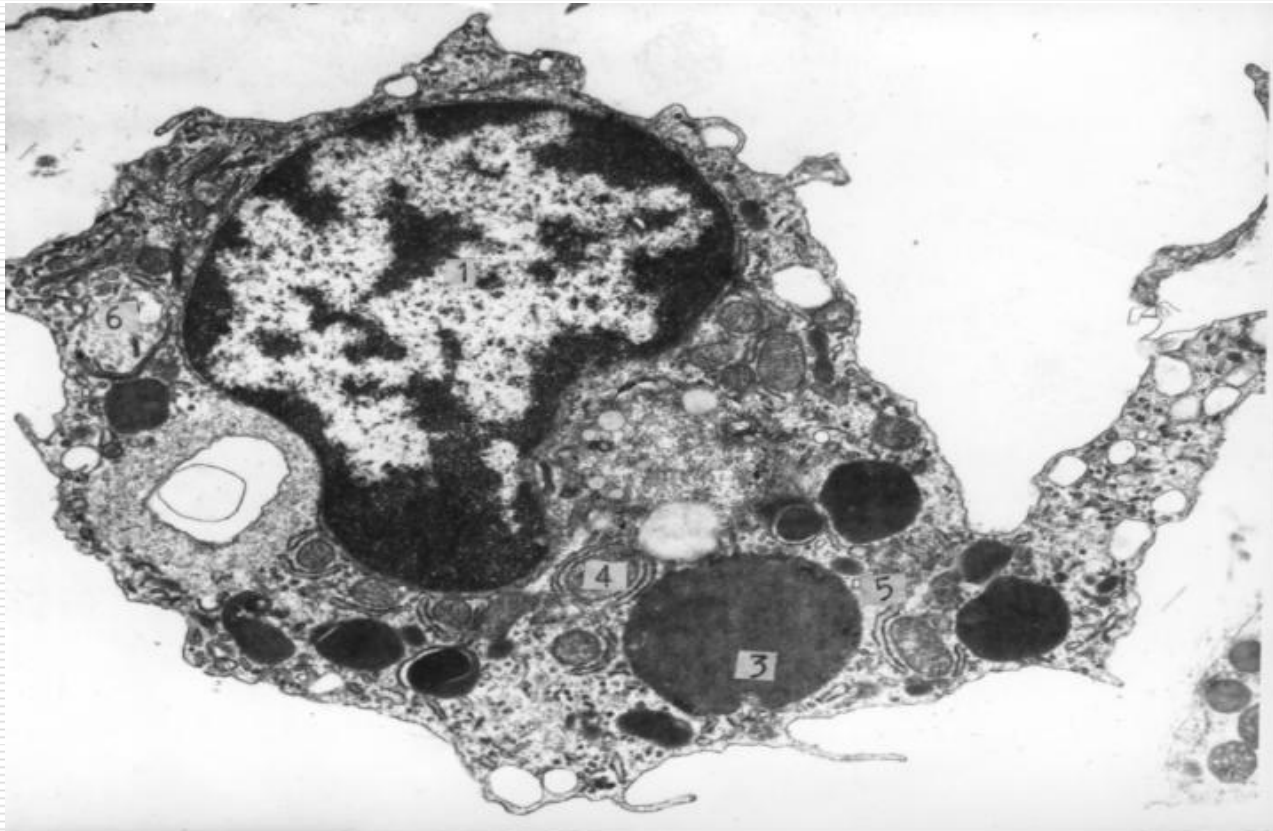
EM: finely dispersed granular material

3. Nucleolus

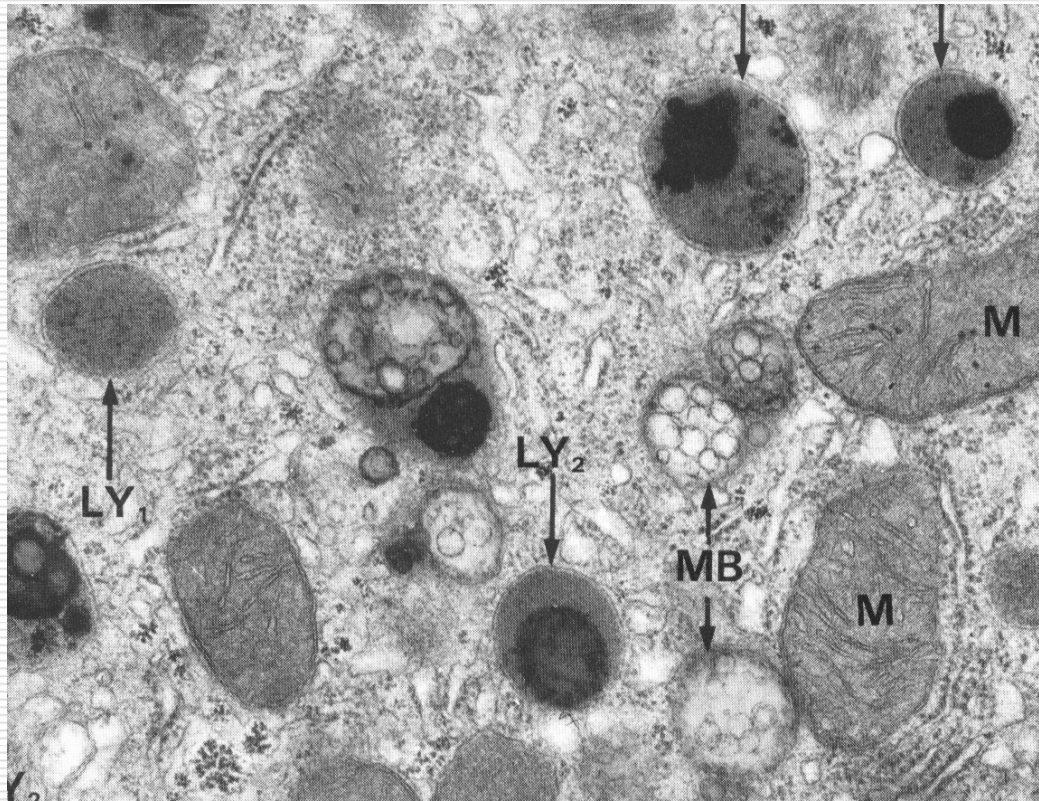
Components: rRNA and Proteins

4. Nuclear matrix

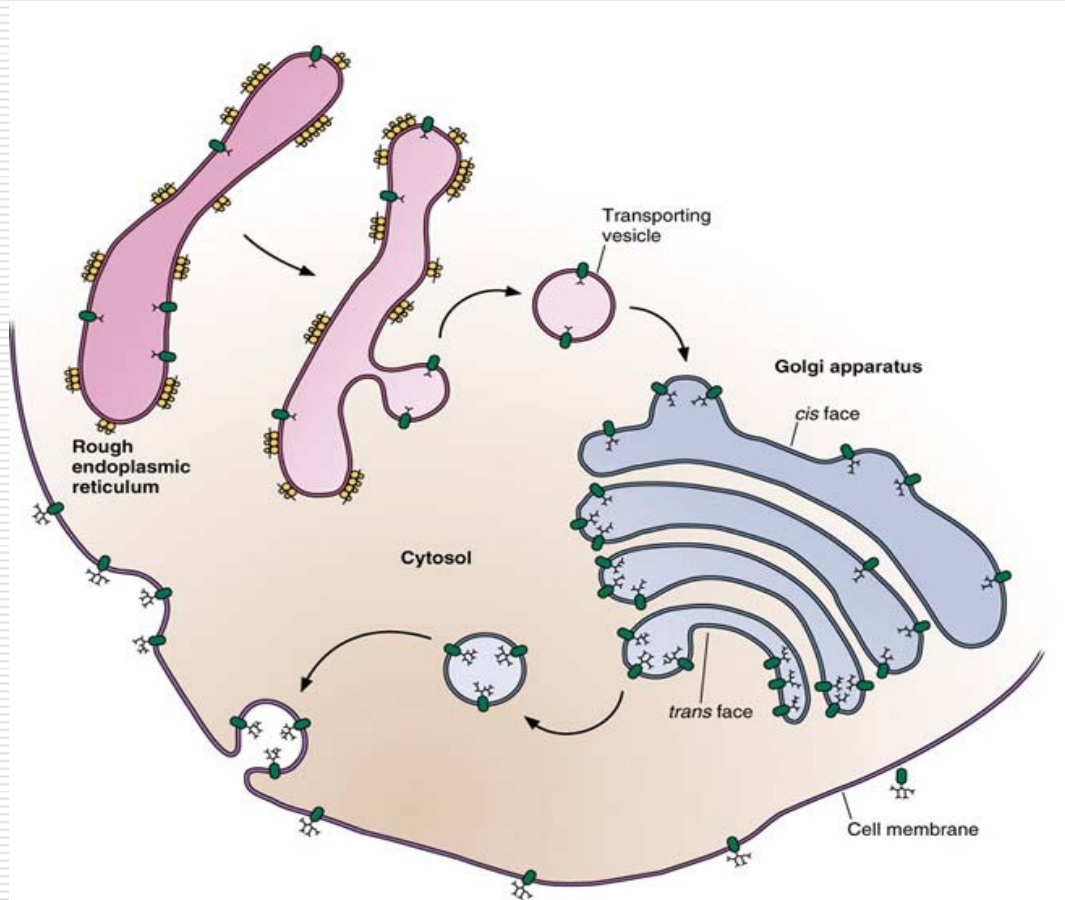
Lysosome



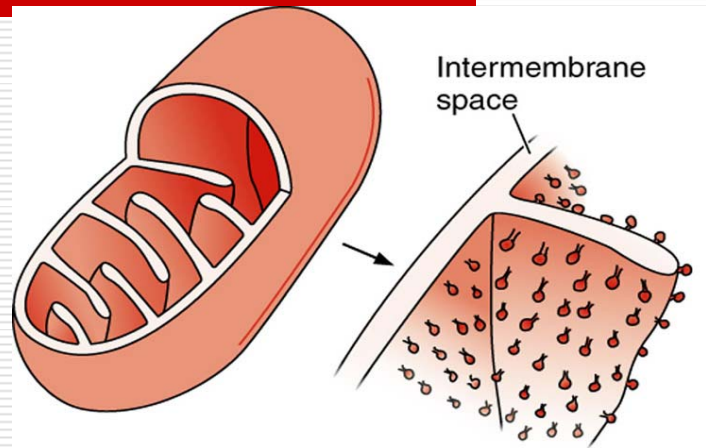
Multivesicular body



Process of sythesis and protein

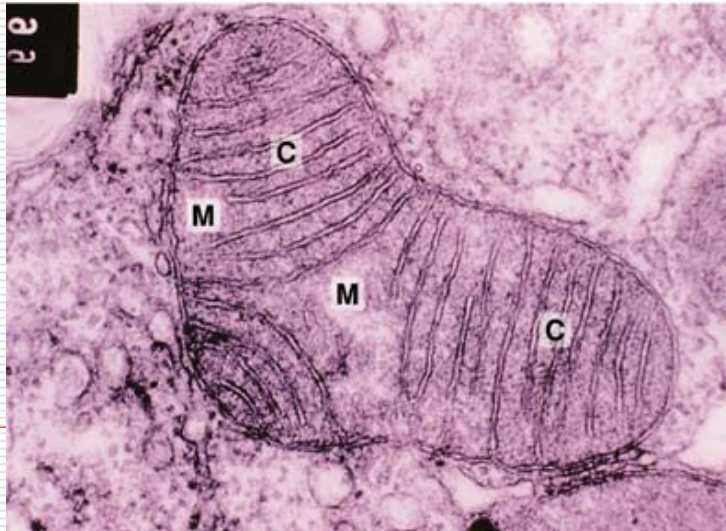


Structure modle of mitochondria



Mitochondrion
(ATP synthesis)

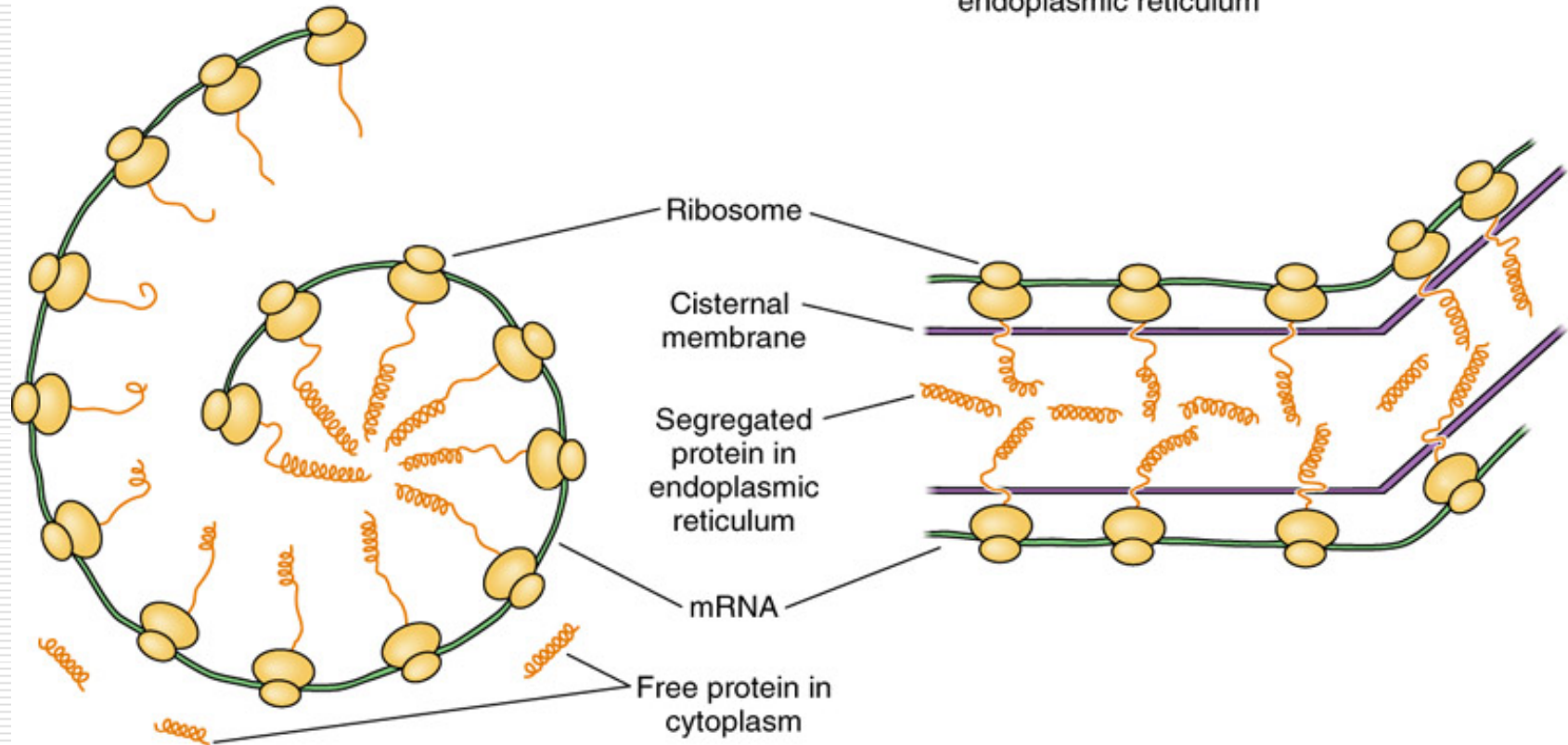
Globular units
(energy transformation)



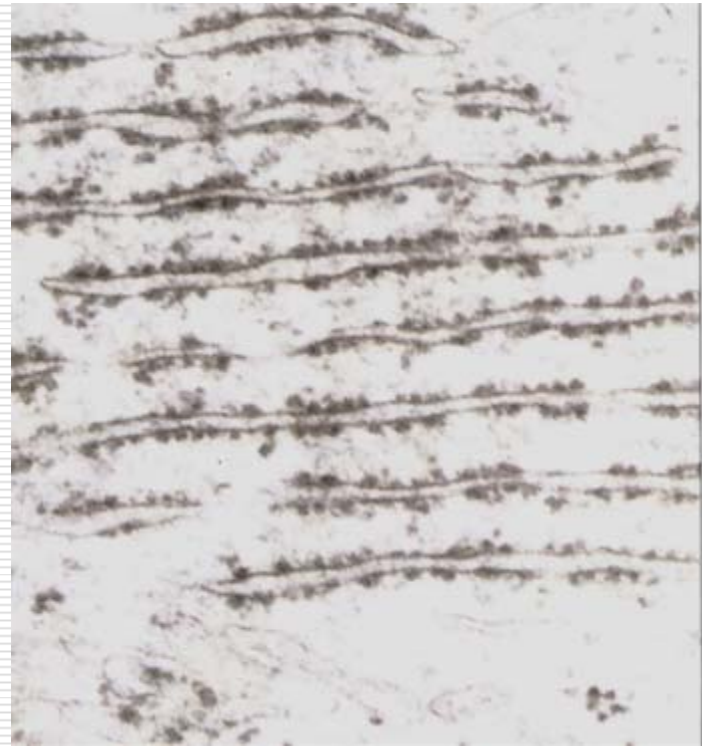
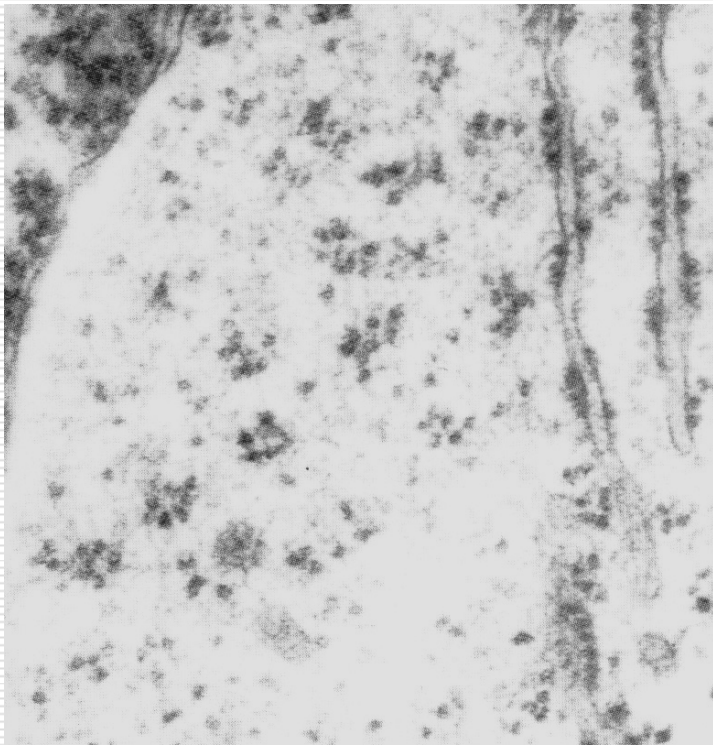
Polyribosomes

A Free polyribosomes, whose proteins remain in the cytoplasm

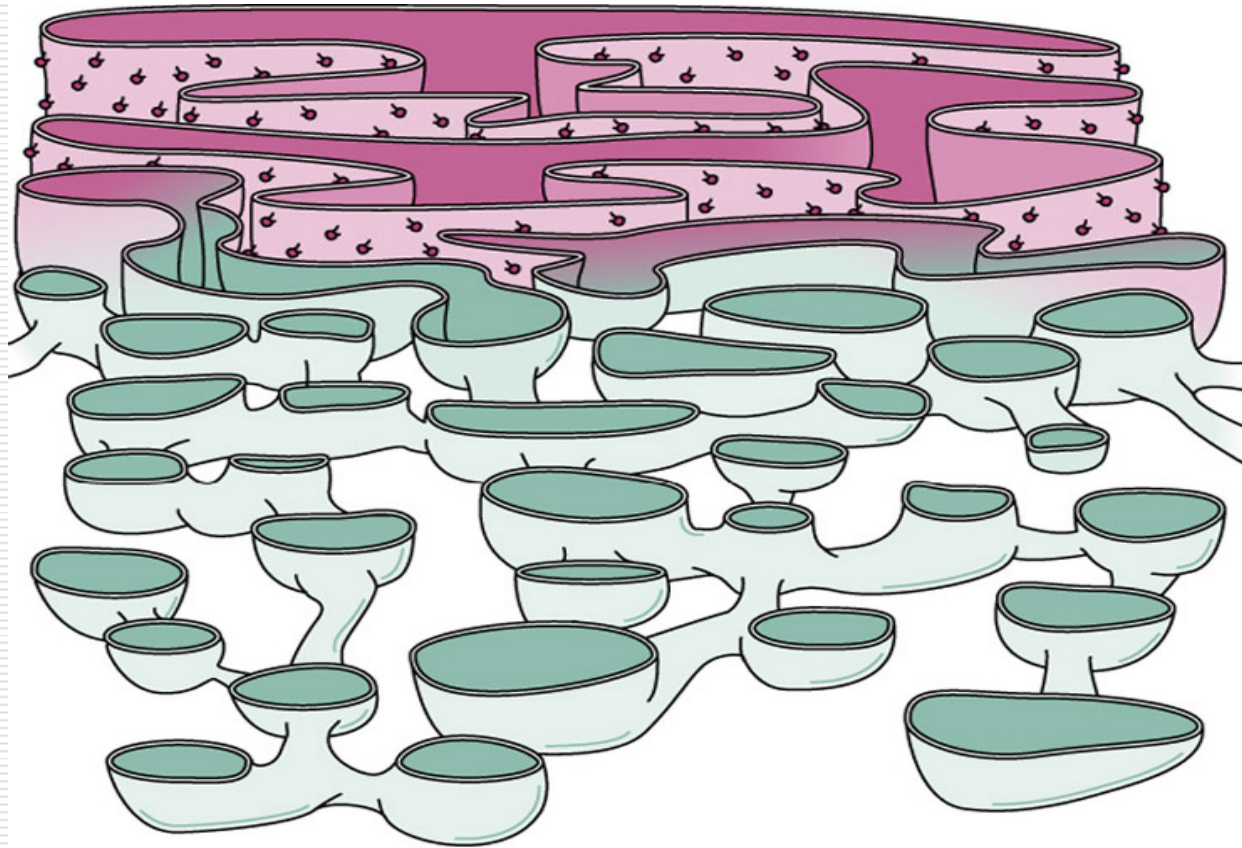
B Bound polyribosomes, showing protein synthesis and segregation into the rough endoplasmic reticulum



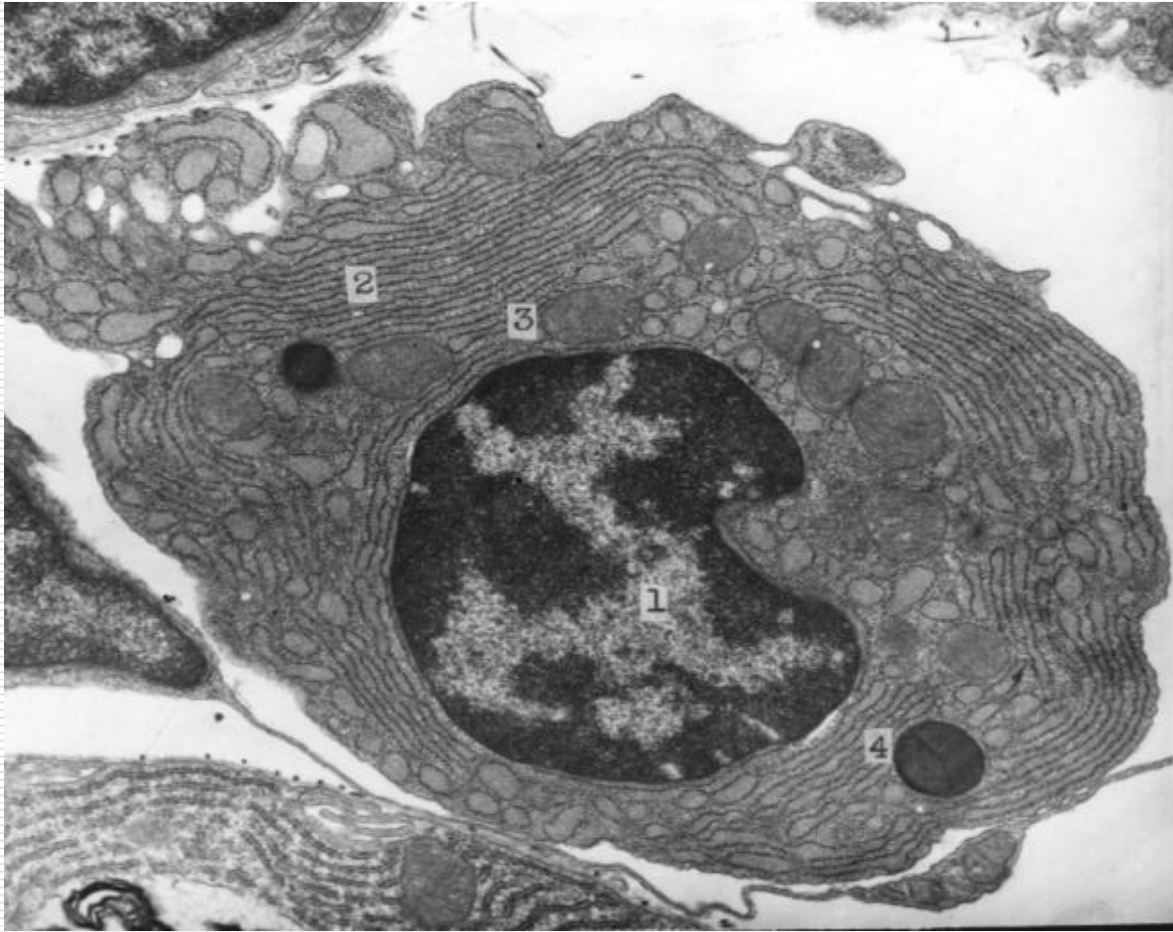
Free and attached ribosomes



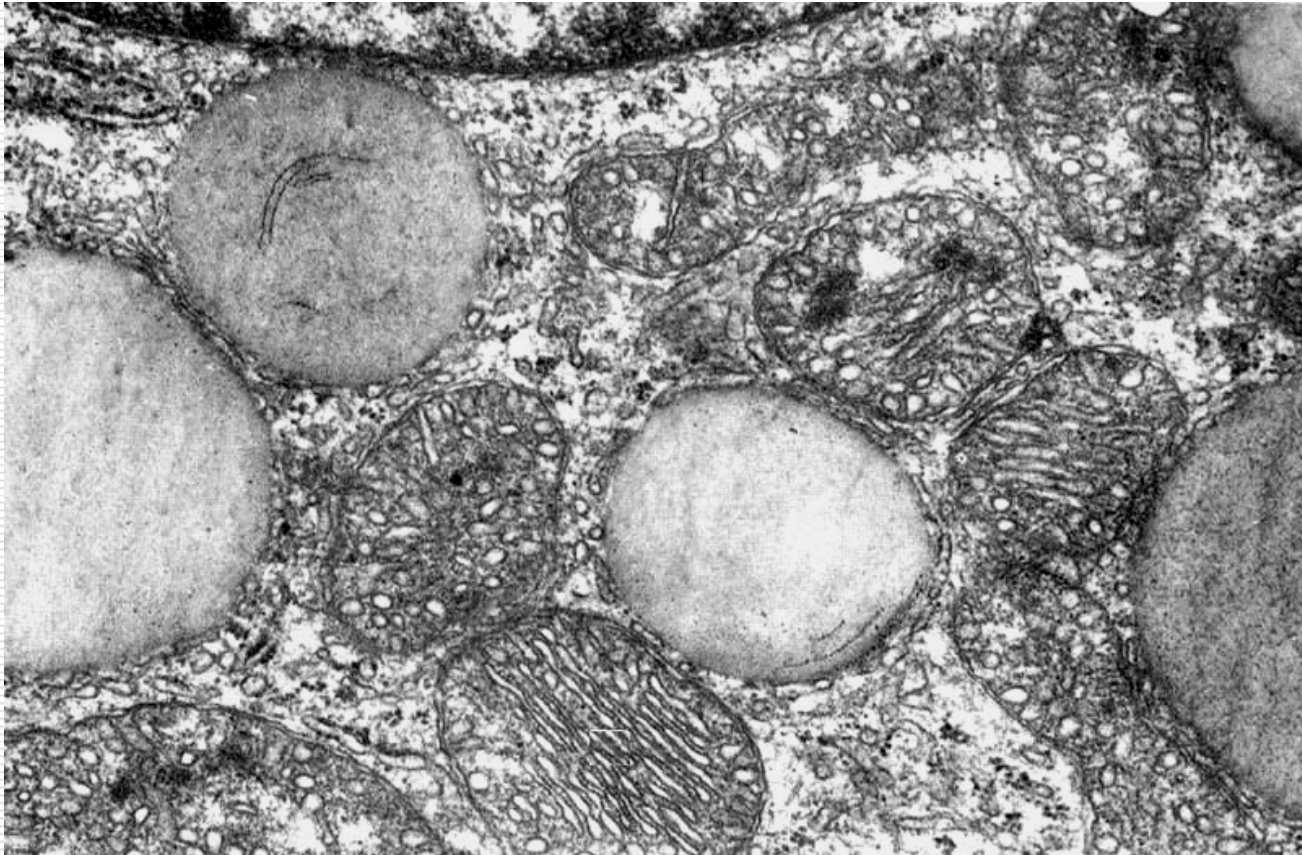
Endoplasm reticulum (model)



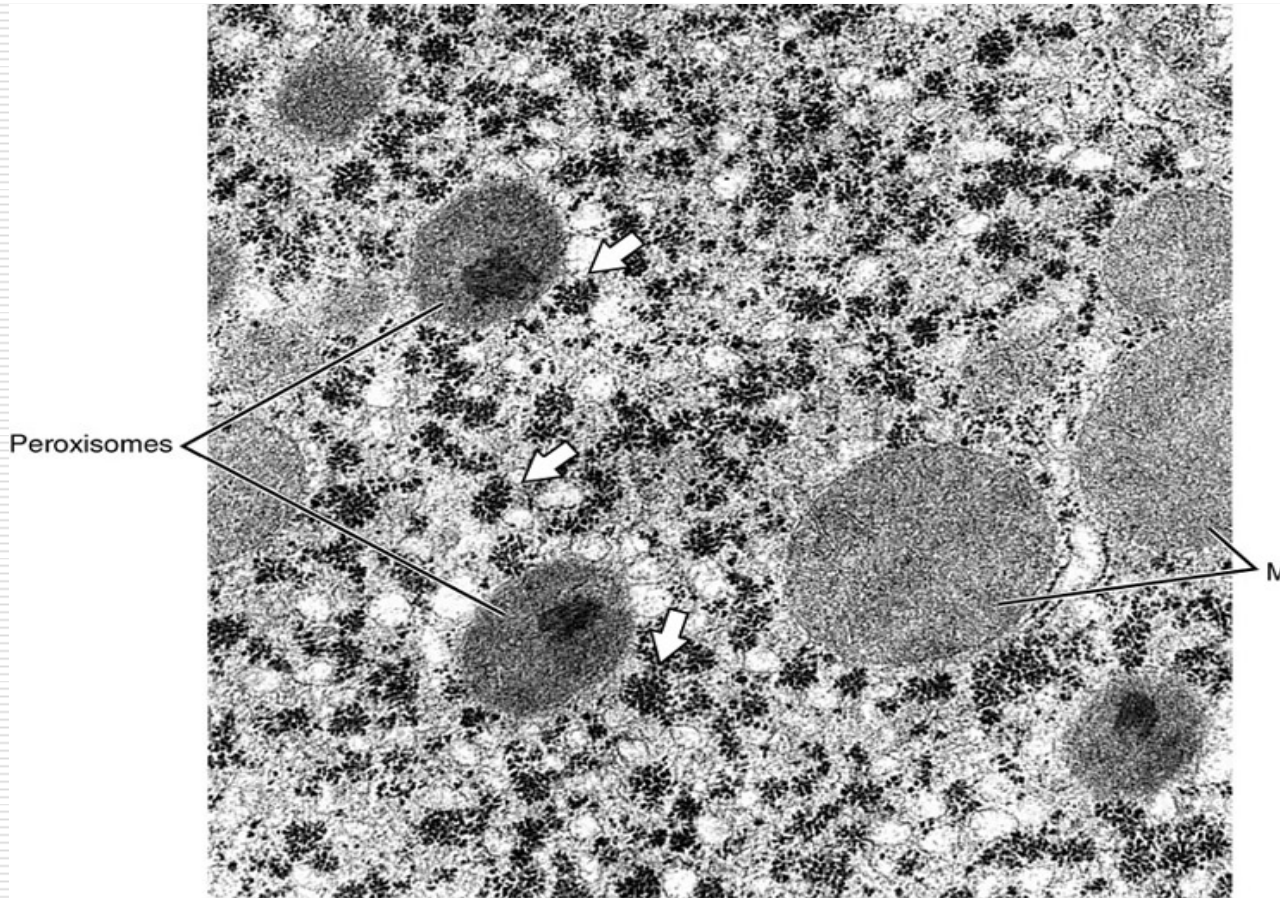
RER



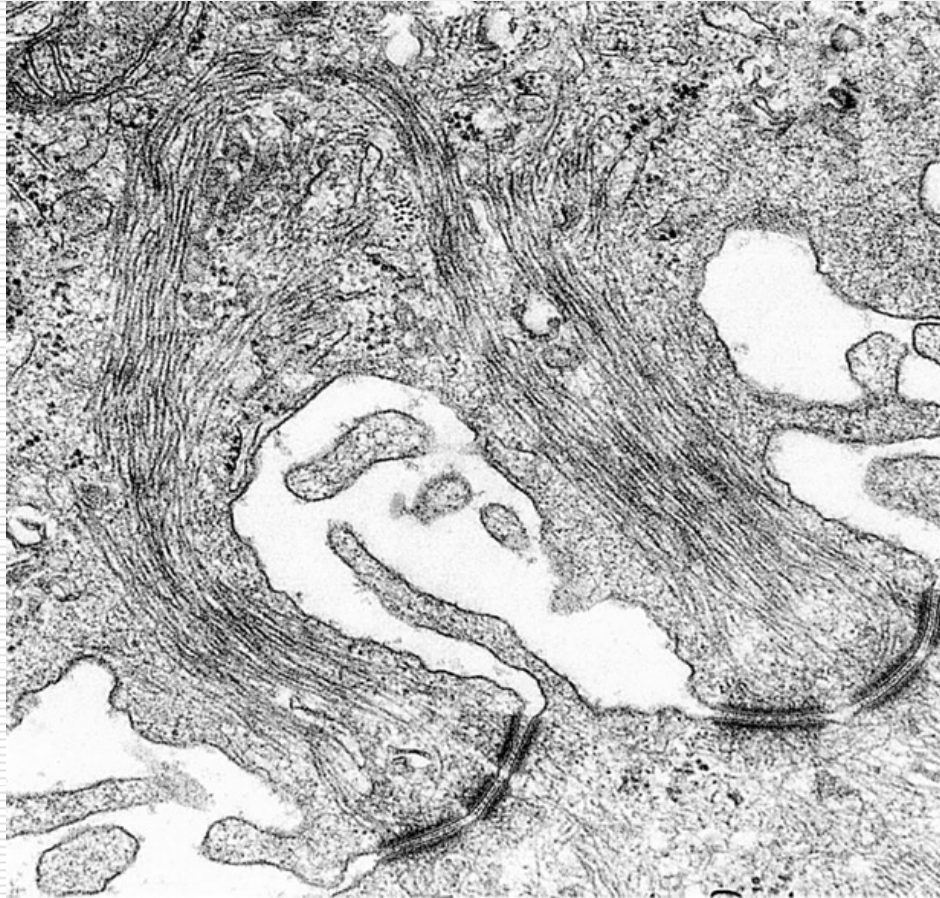
SER



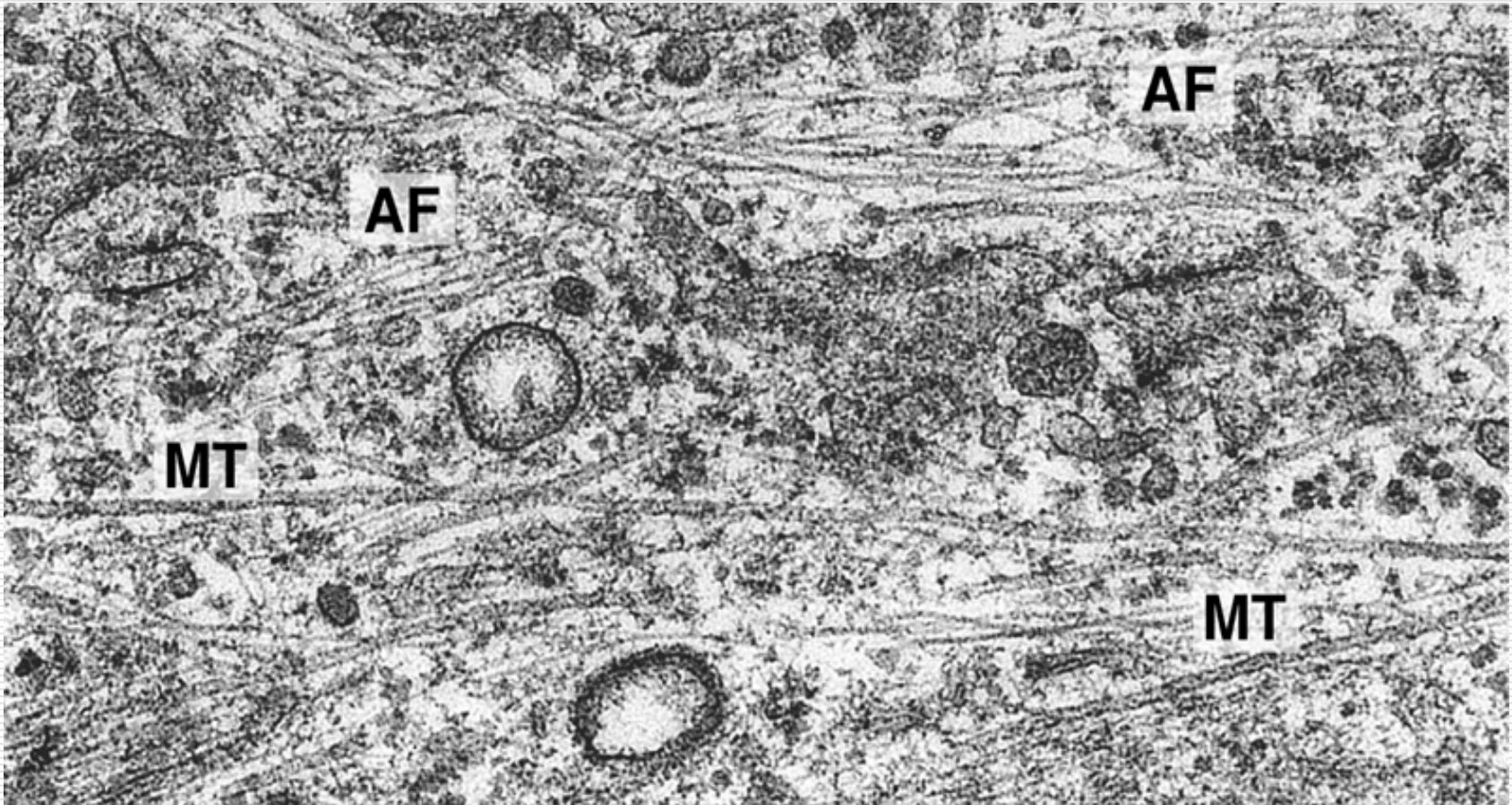
Glycogen granules and microbody (peroxisome)



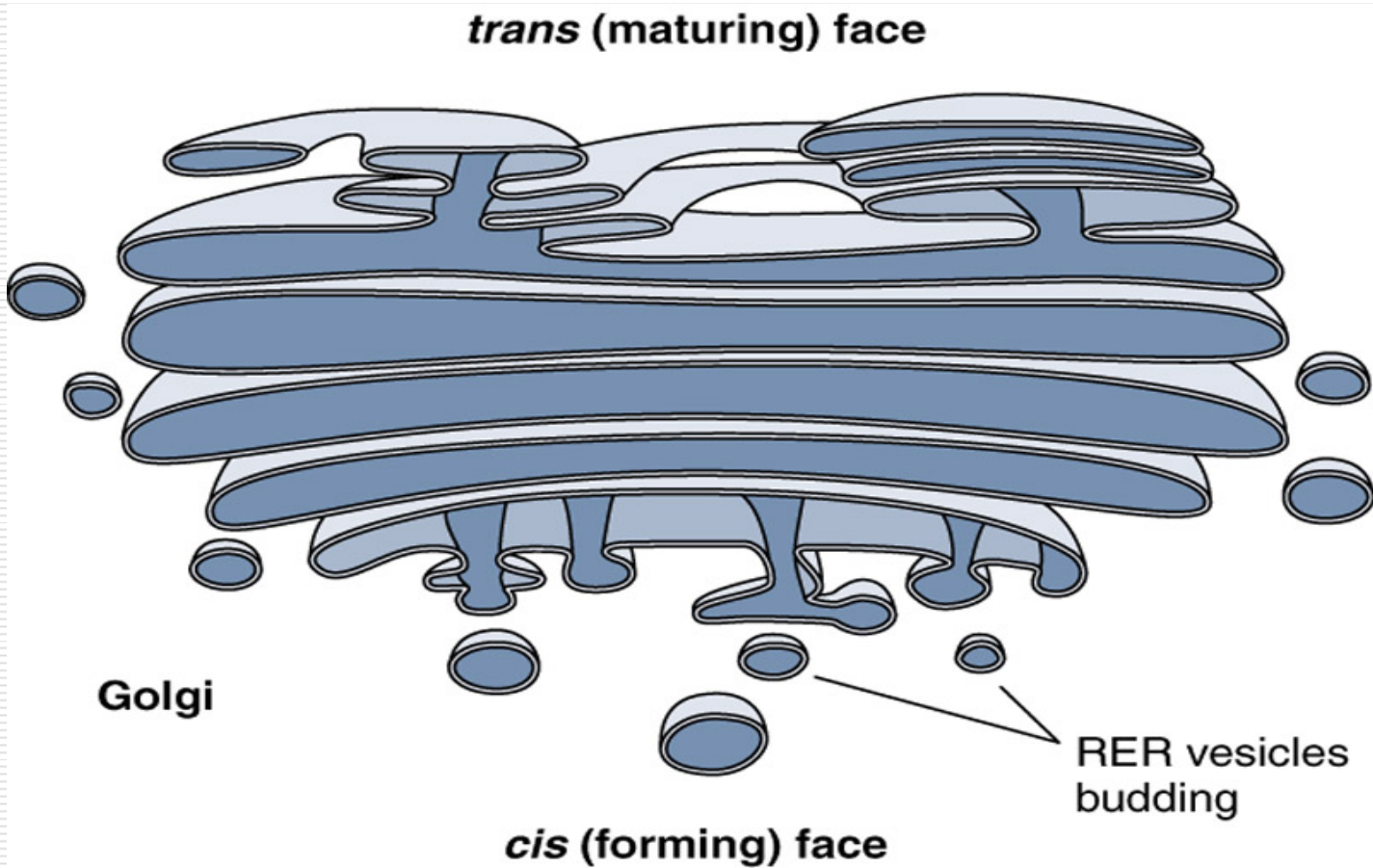
Intermediate filament



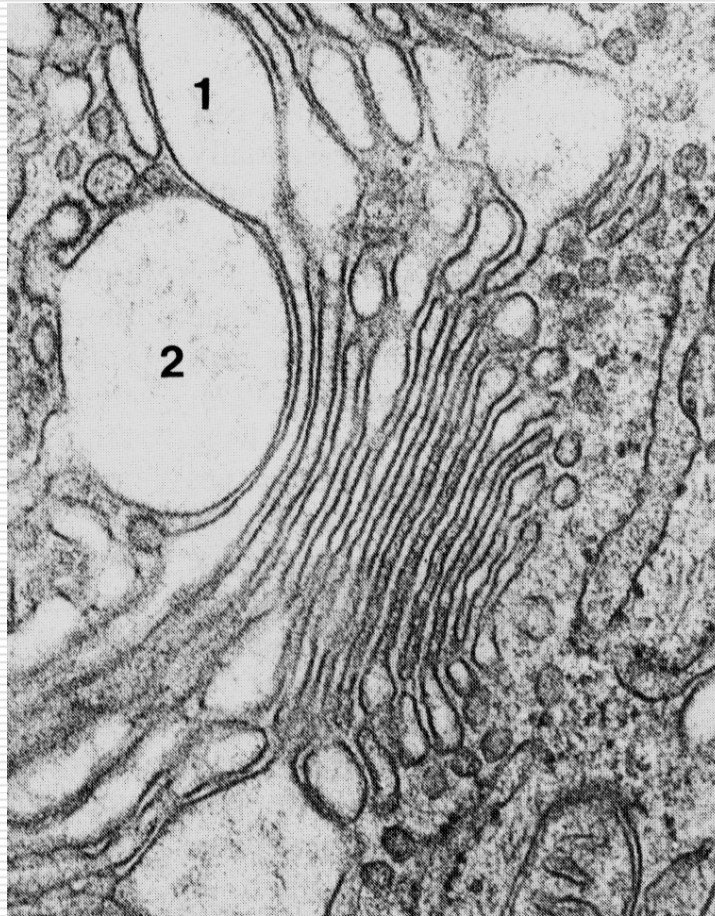
Microtubule and microfilament



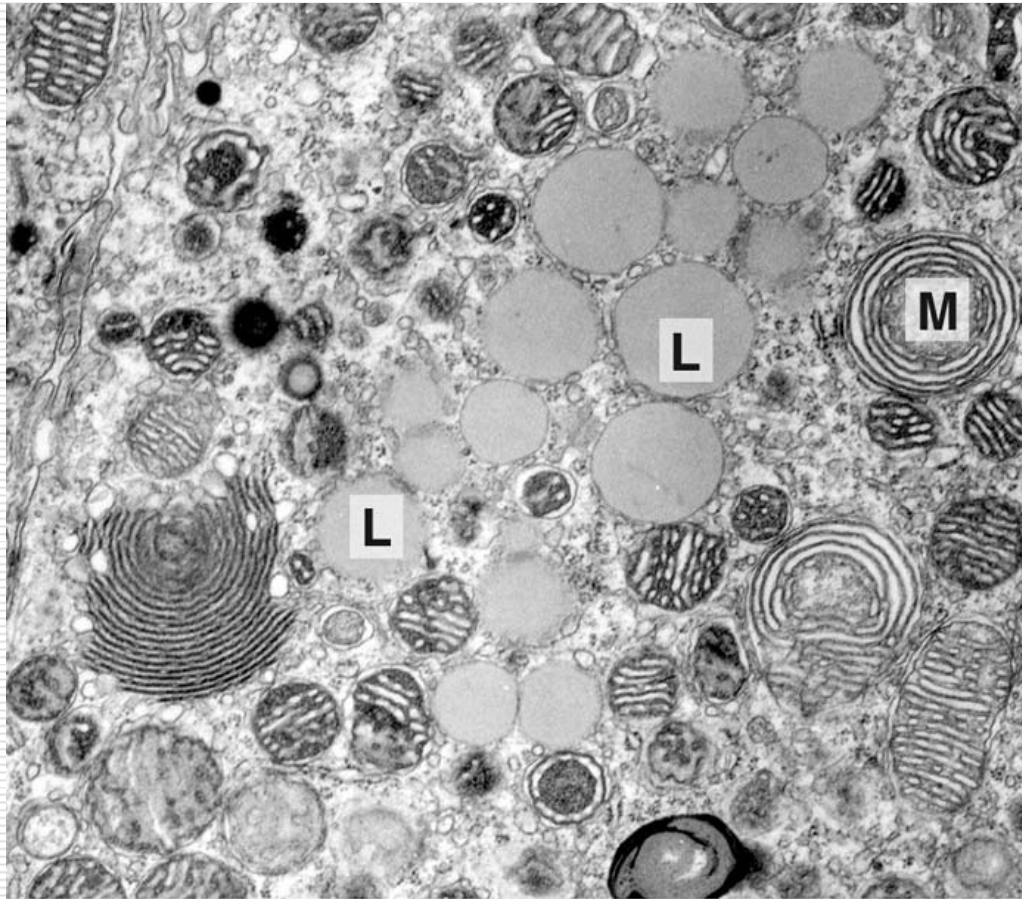
Golgi (modle)



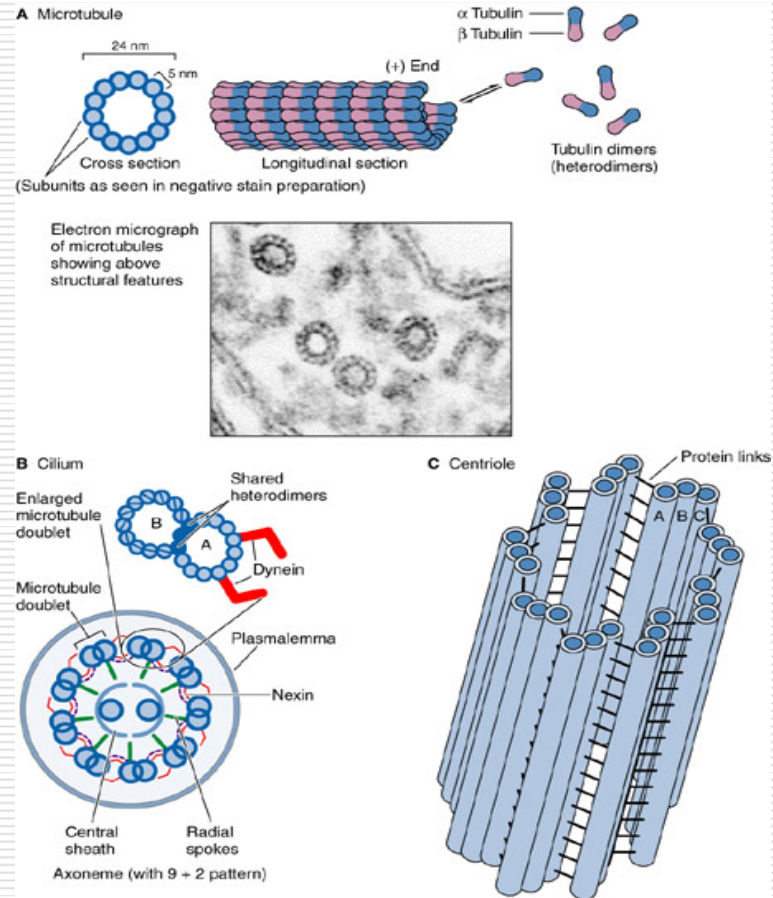
Golgi complex



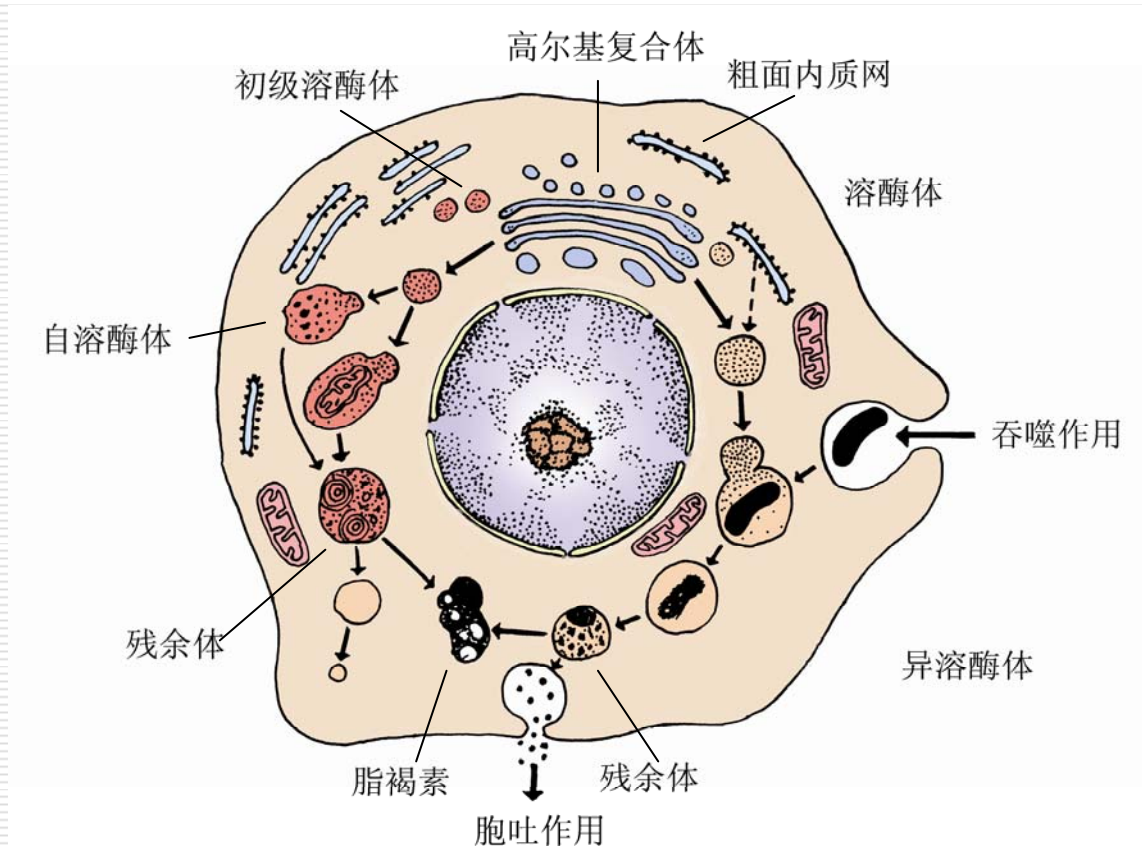
Lipid droplets



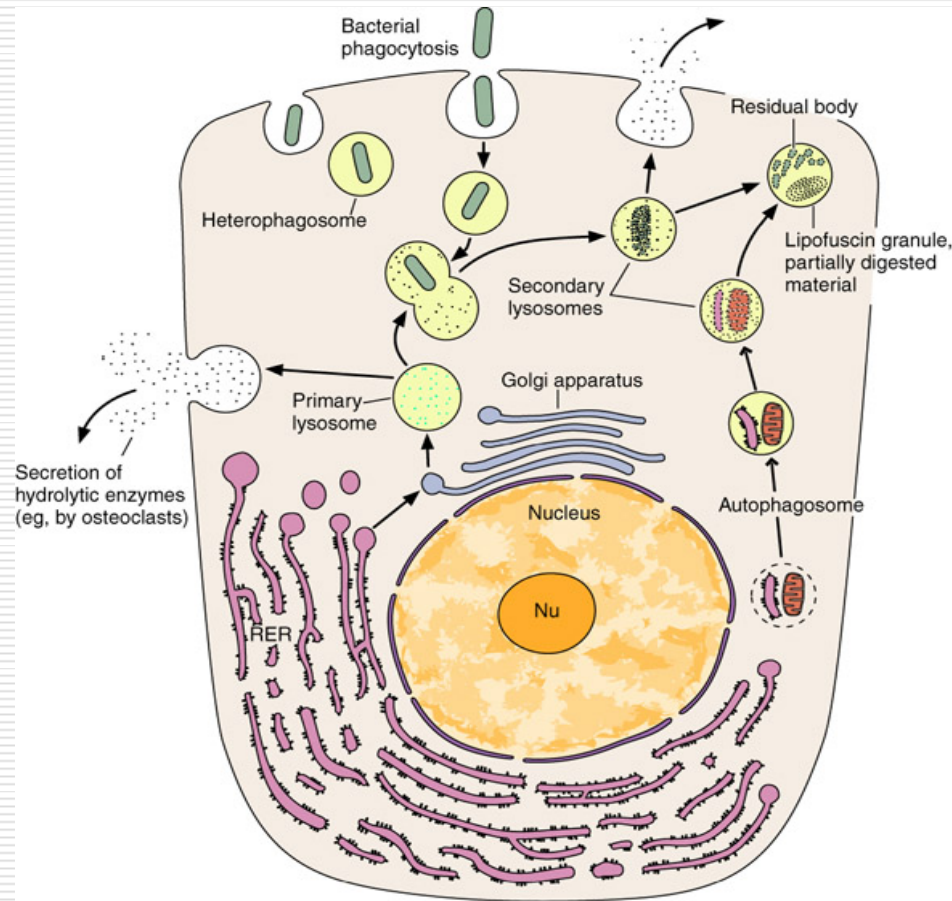
Centriole



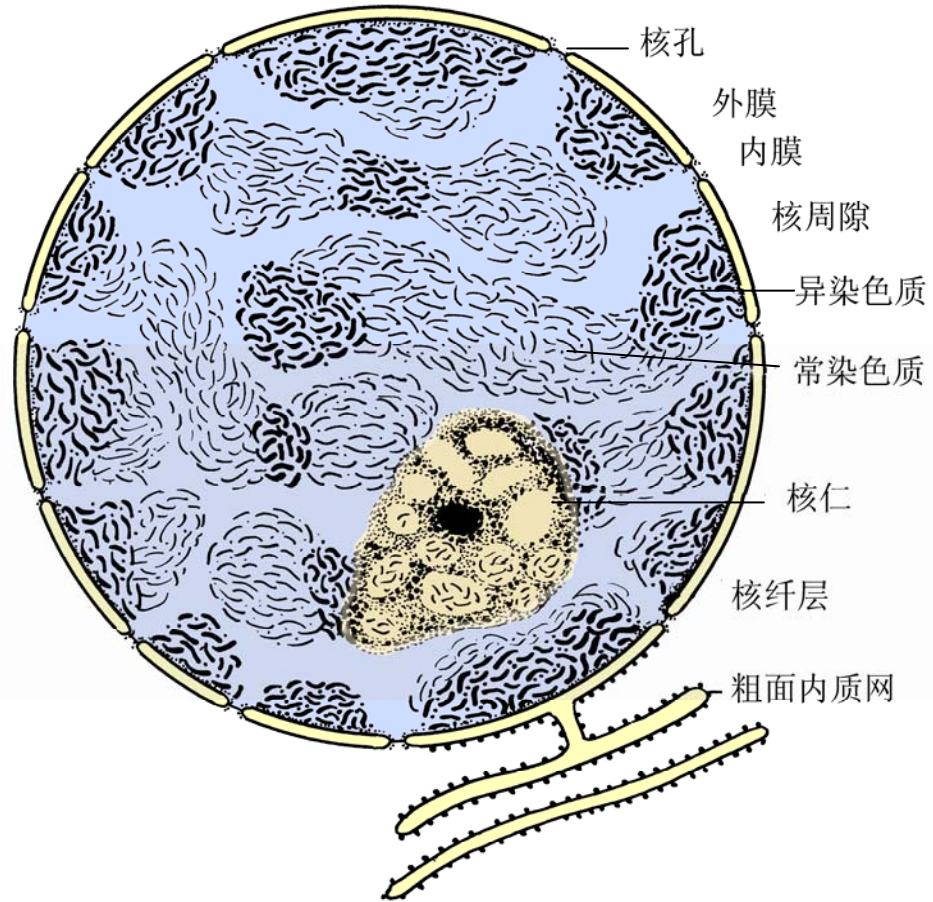
The function of lysosome



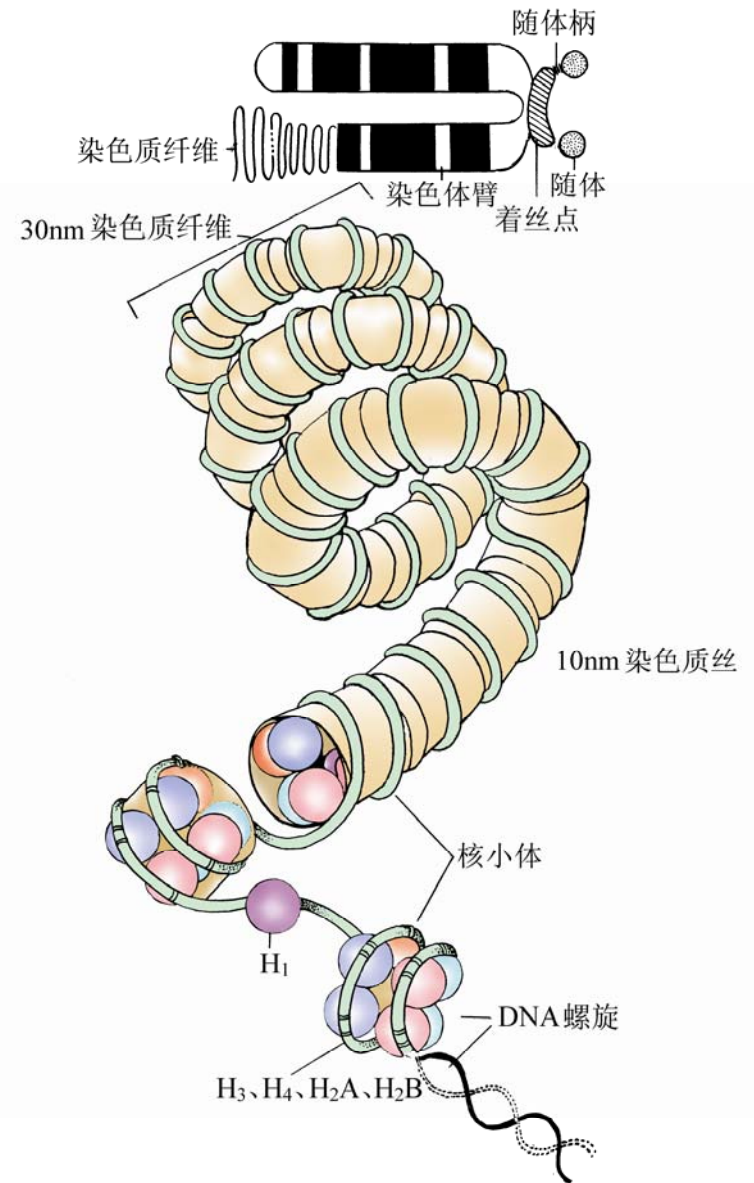
Endocytosis and exocytosis



Nucleus



Chromatin and Chromosome



Vimentin filament

