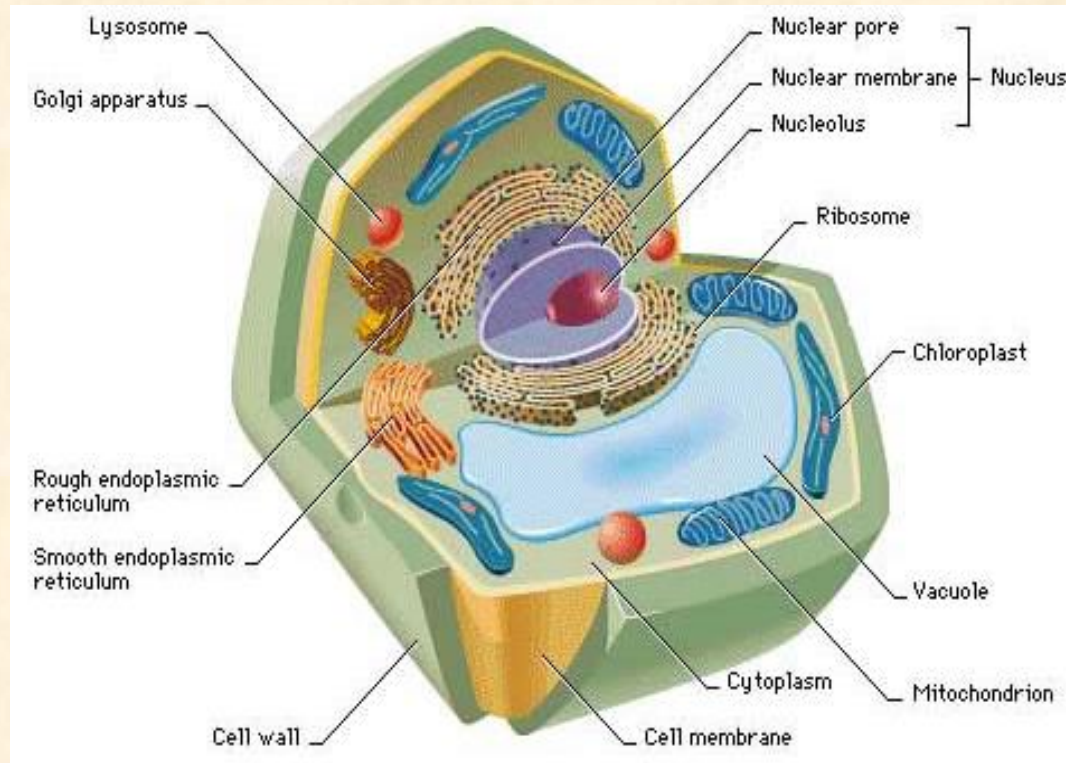


Organel – Organel Sel



Oleh

Trisia Lusiana Amir, S.Pd., M. Biomed

Fakultas Fisioterapi, Universitas Esa Unggul

2016

Sel Eukariotik

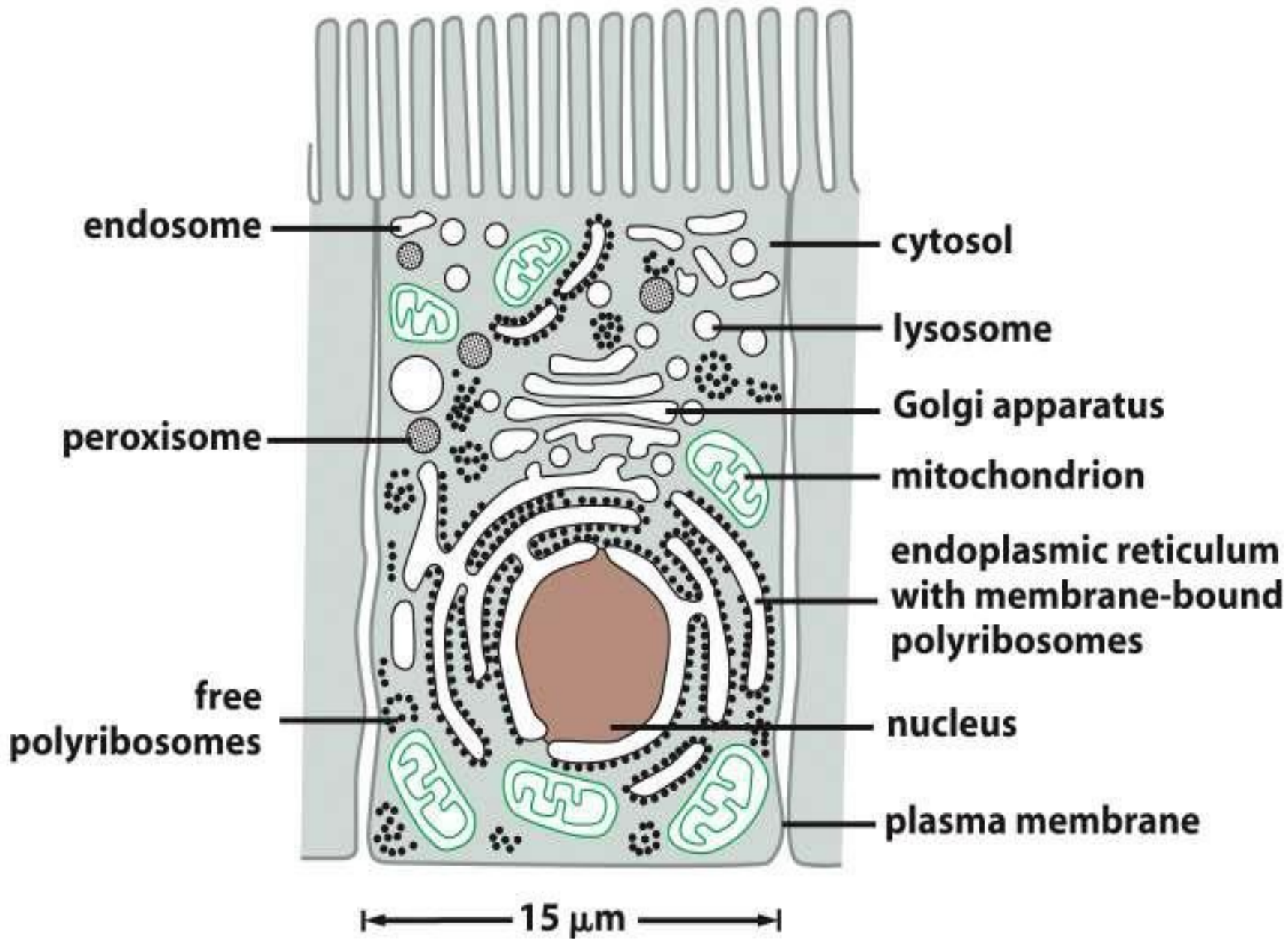
Membran Sel

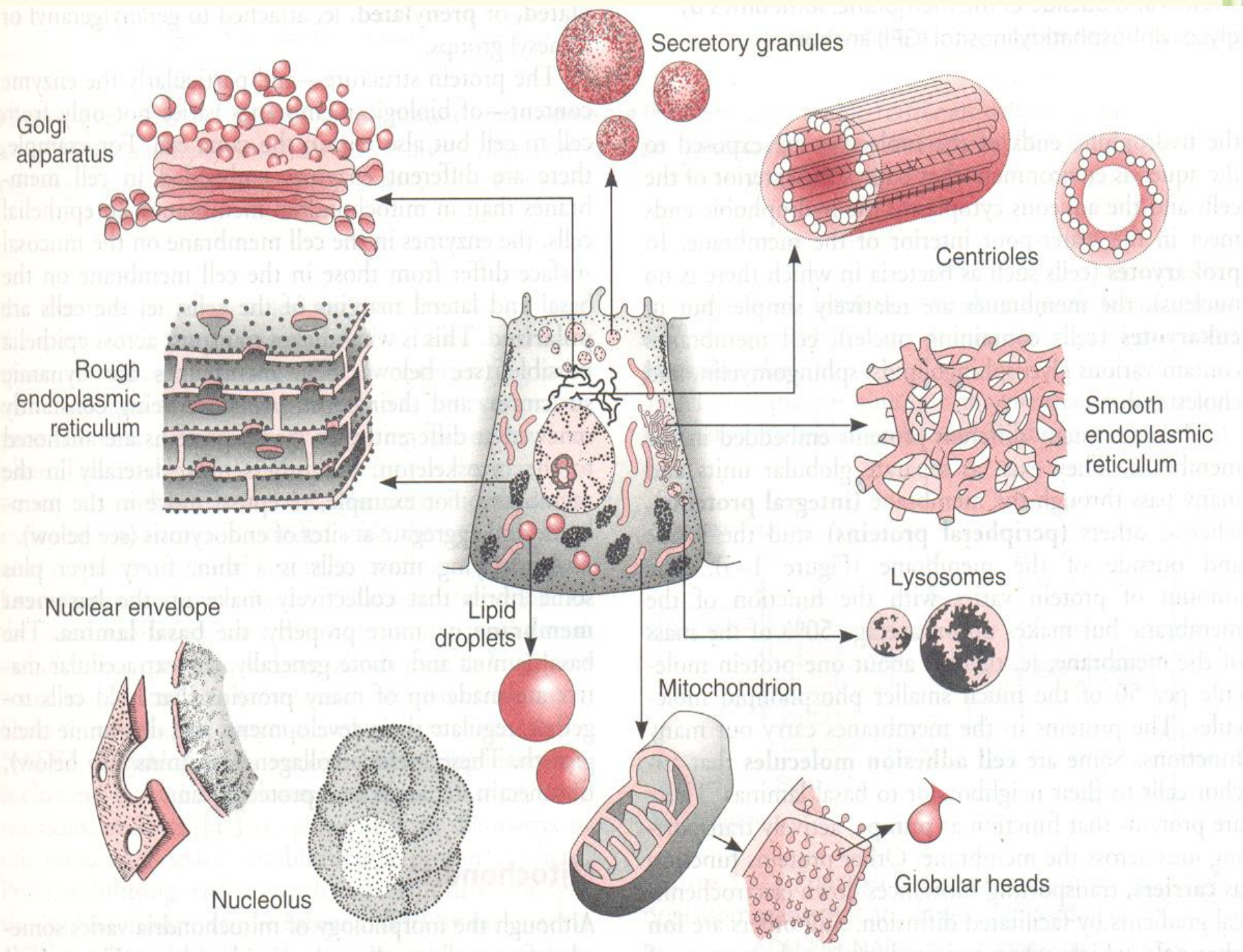
Sitoskeleton

Sitoplasma

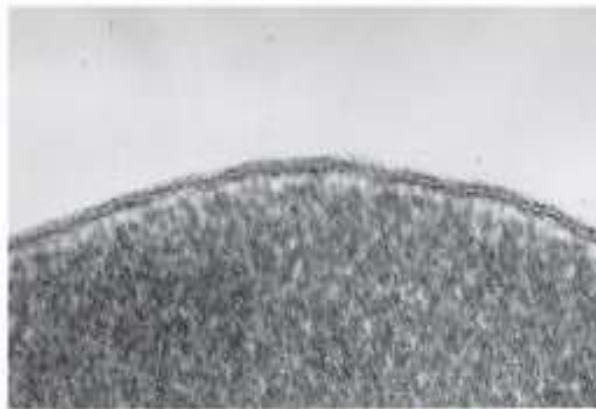
Inti Sel

Oeganel-Organel Sel

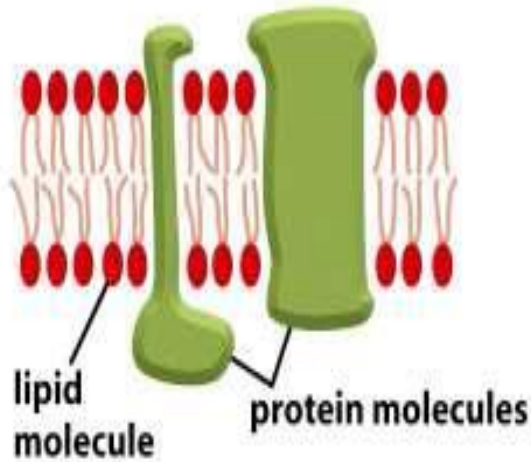




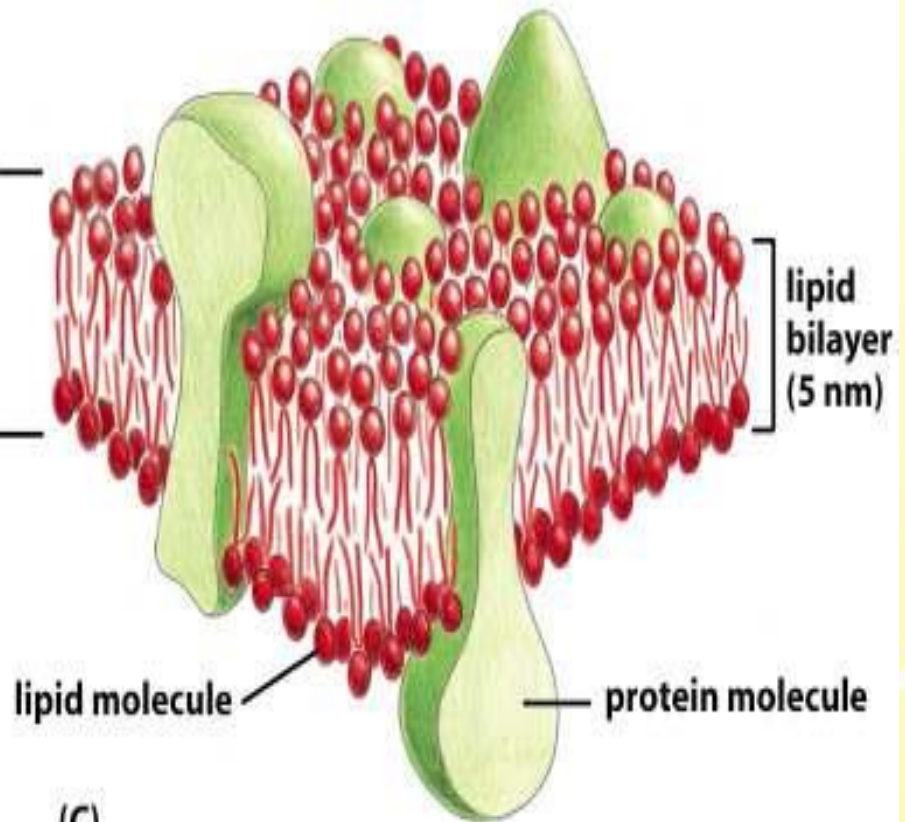
Membran Sel/ Plasma



(A)



(B)

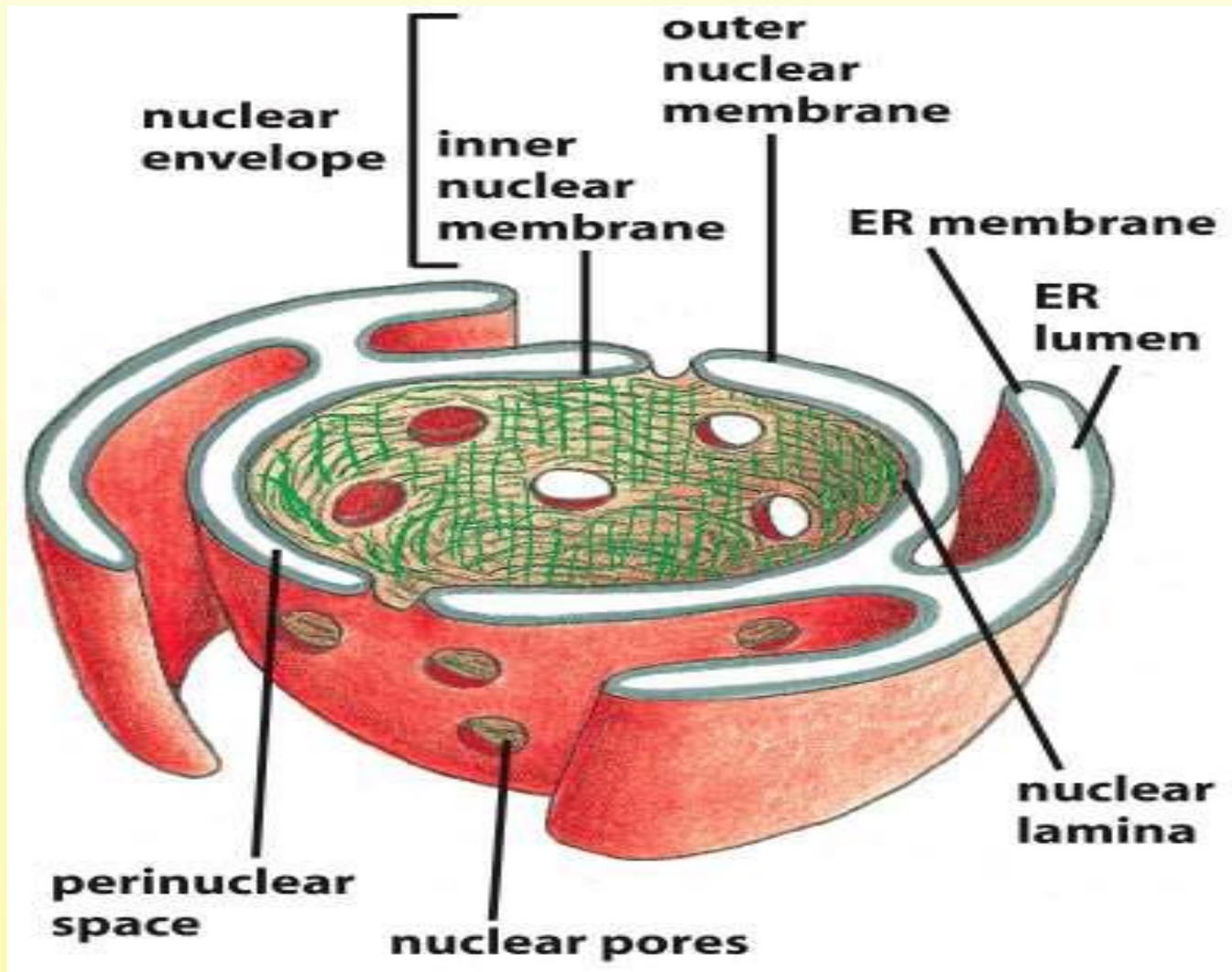


(C)

Fungsi Membran Sel:

1. Mengatur transportasi zat dari luar ke dalam sel dan sebaliknya (secara difusi, osmosis, transpor aktif, difusi terfasilitasi).
2. Mengatur komunikasi antar sel sebab di membran sel terdapat reseptor (hormon, neurotransmitter, dll)
3. Tempat melekatnya enzim: adenilat siklase, guanilat siklase, ATPase, dll.
4. Sebagai pelindung
5. Menjaga keseimbangan kadar ion dan air di dalam dan luar sel

Inti Sel (Nukleus)



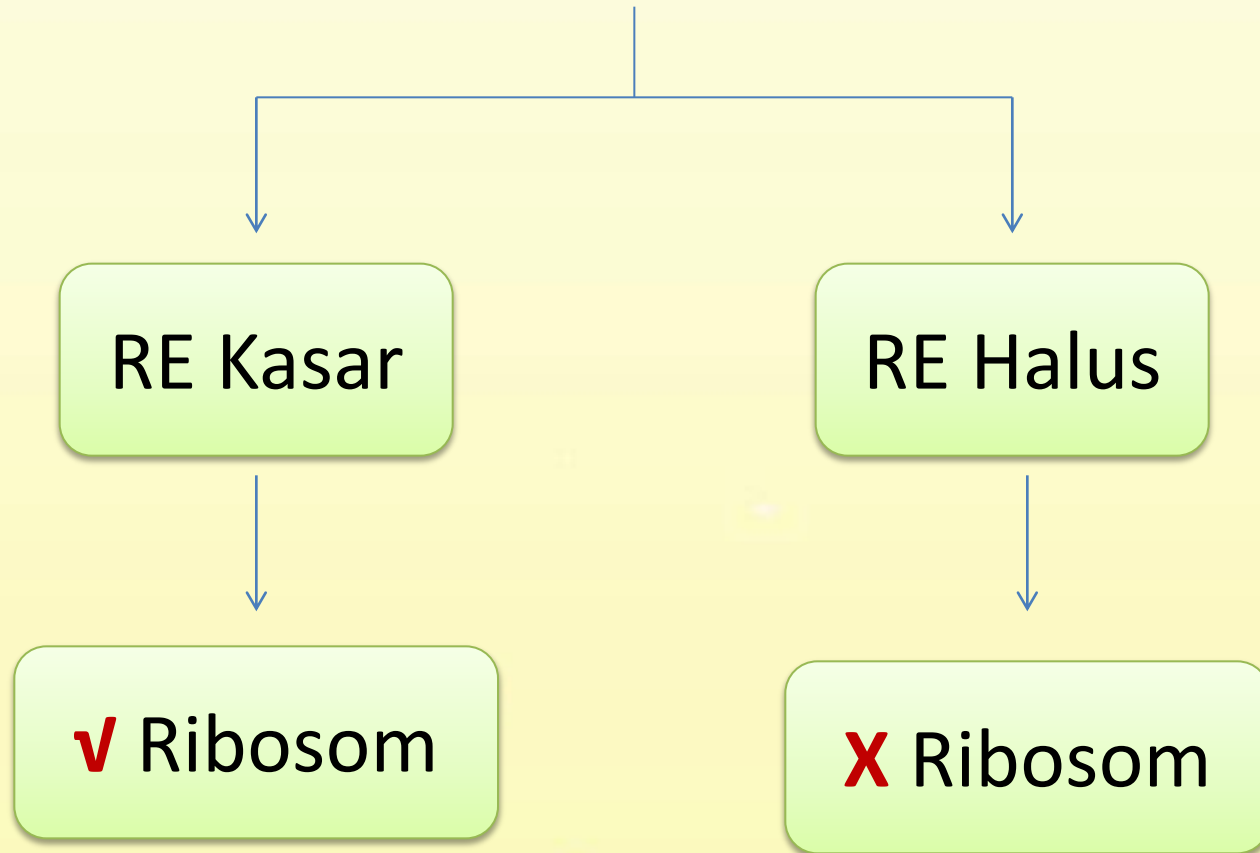
Nuclear envelope

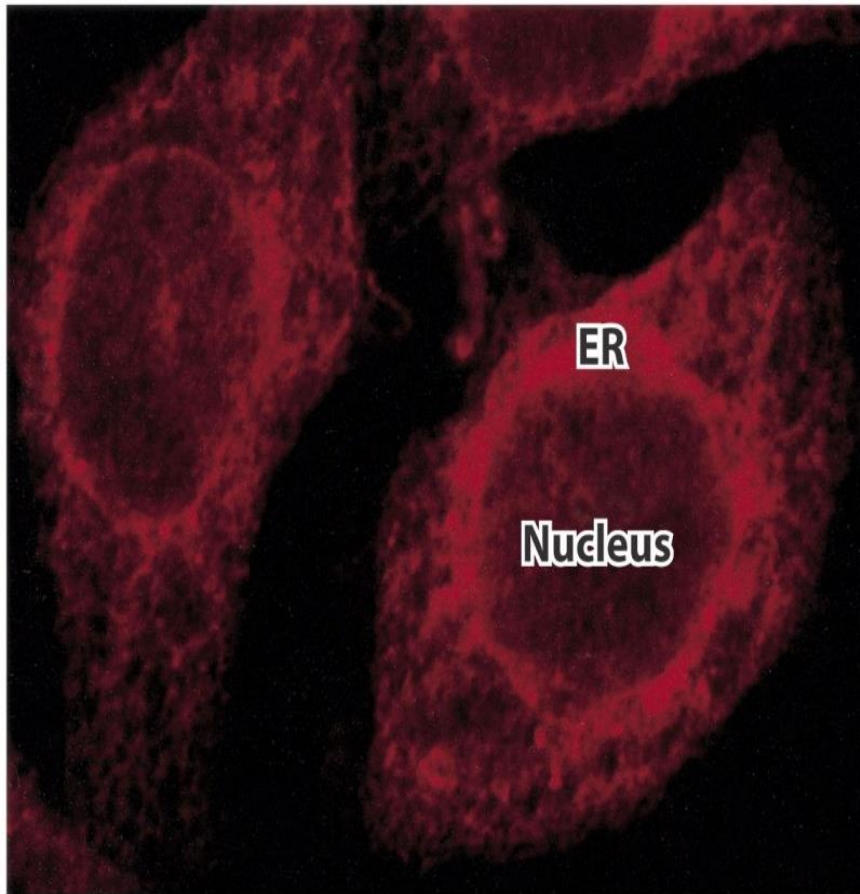
- Melingkupi DNA & membatasi *nuclear compartment*
- Terdapat pori-pori nukleus yg menembus membran

Inner nuclear membrane -mengandung protein spesifik yg bertindak sebagai *anchoring site* untuk kromatin & *nuclear lamina* (protein yang mensupport nuclear envelope)

Outer nuclear membrane -menyambung dengan ER membran, banyak terdapat ribosom yg terlibat dlm sintesa protein dan product ditransport ke ruang perinuclear space

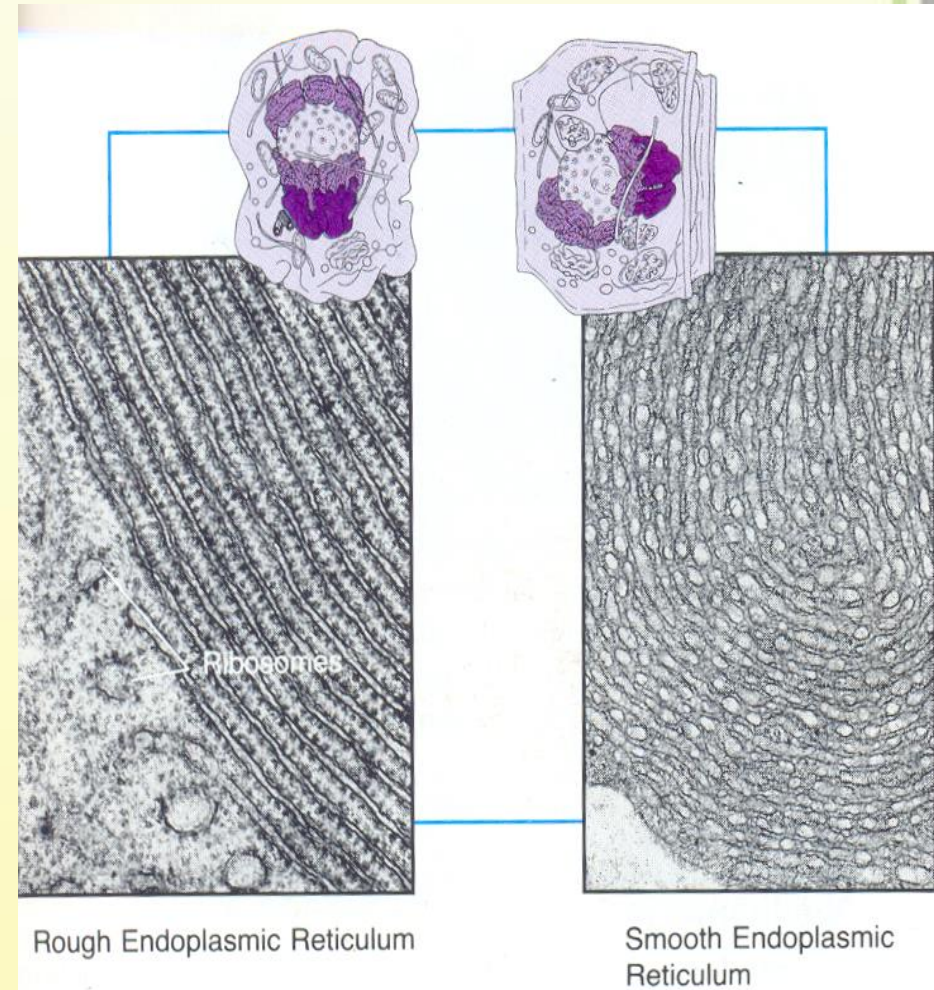
Retikulum Endoplasma (RE)





10 μm

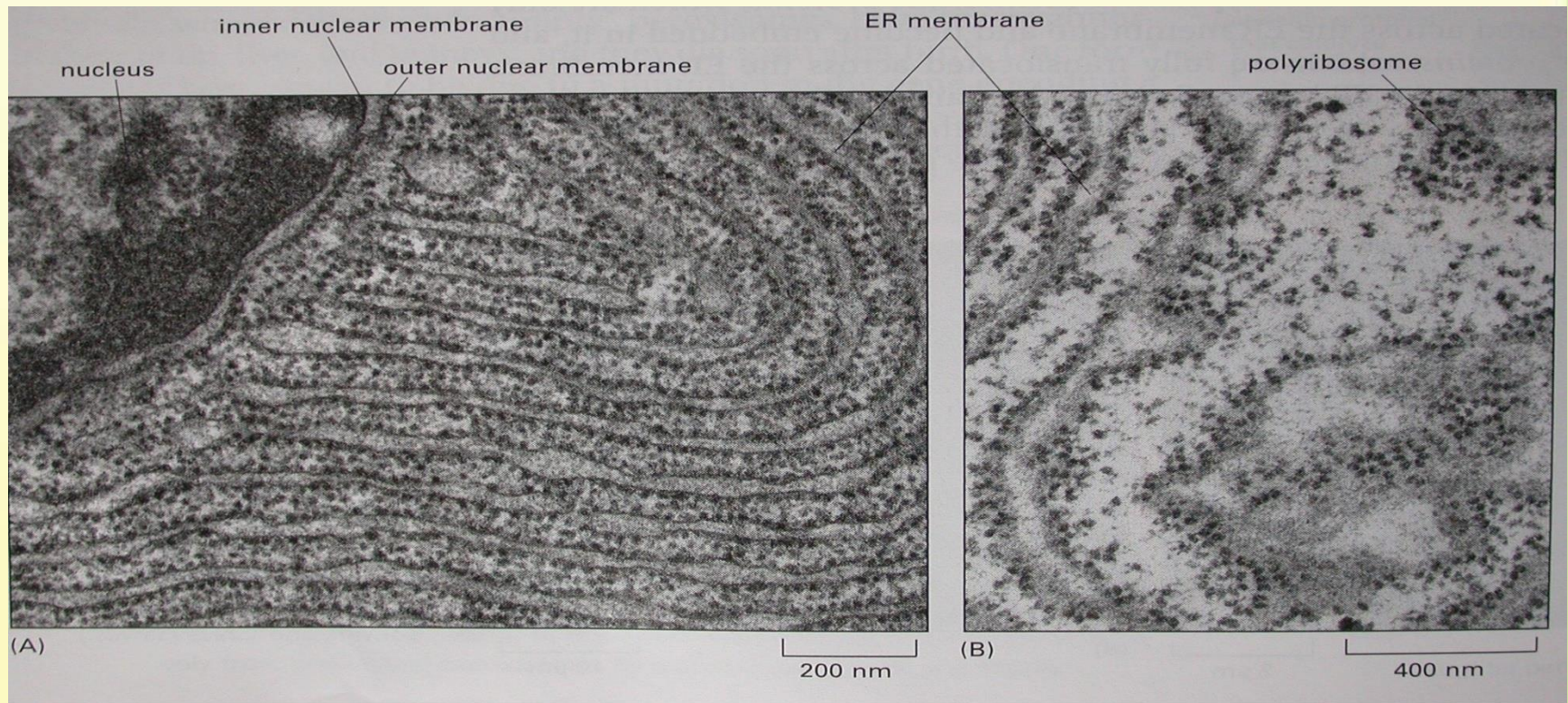
Figure 8-9d Cell and Molecular Biology, 4/e (© 2005 John Wiley & Sons)



- Constitutes more than half of total membrane of an average animal cell

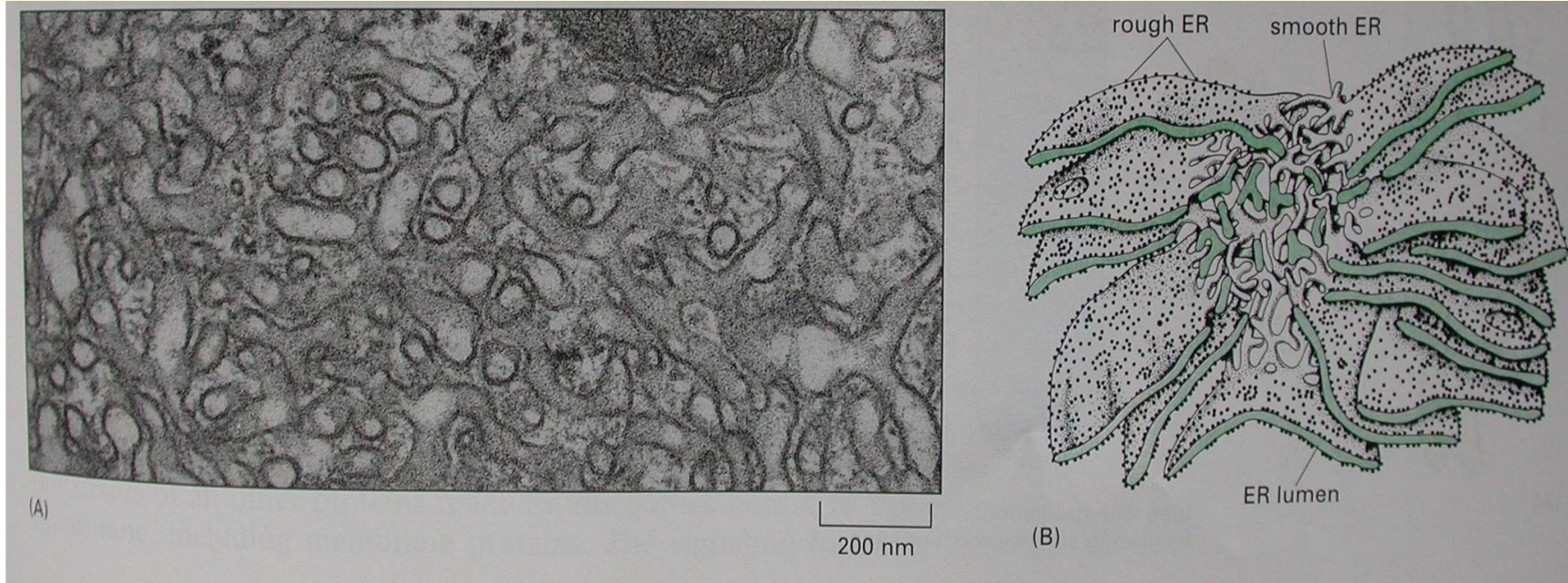
- Is organized into a netlike labyrinth of branching tubules and flattened sacs extending throughout the cytosol

a. the *rough endoplasmic reticulum* (RER)
has ribosomes bound to its cytosolic surface



RER is the starting point of the biosynthetic pathway:
the site of **synthesis protein, carbohydrate chains
and phospholipids**

b. the *smooth endoplasmic reticulum* (SER)
lacks associated ribosomes



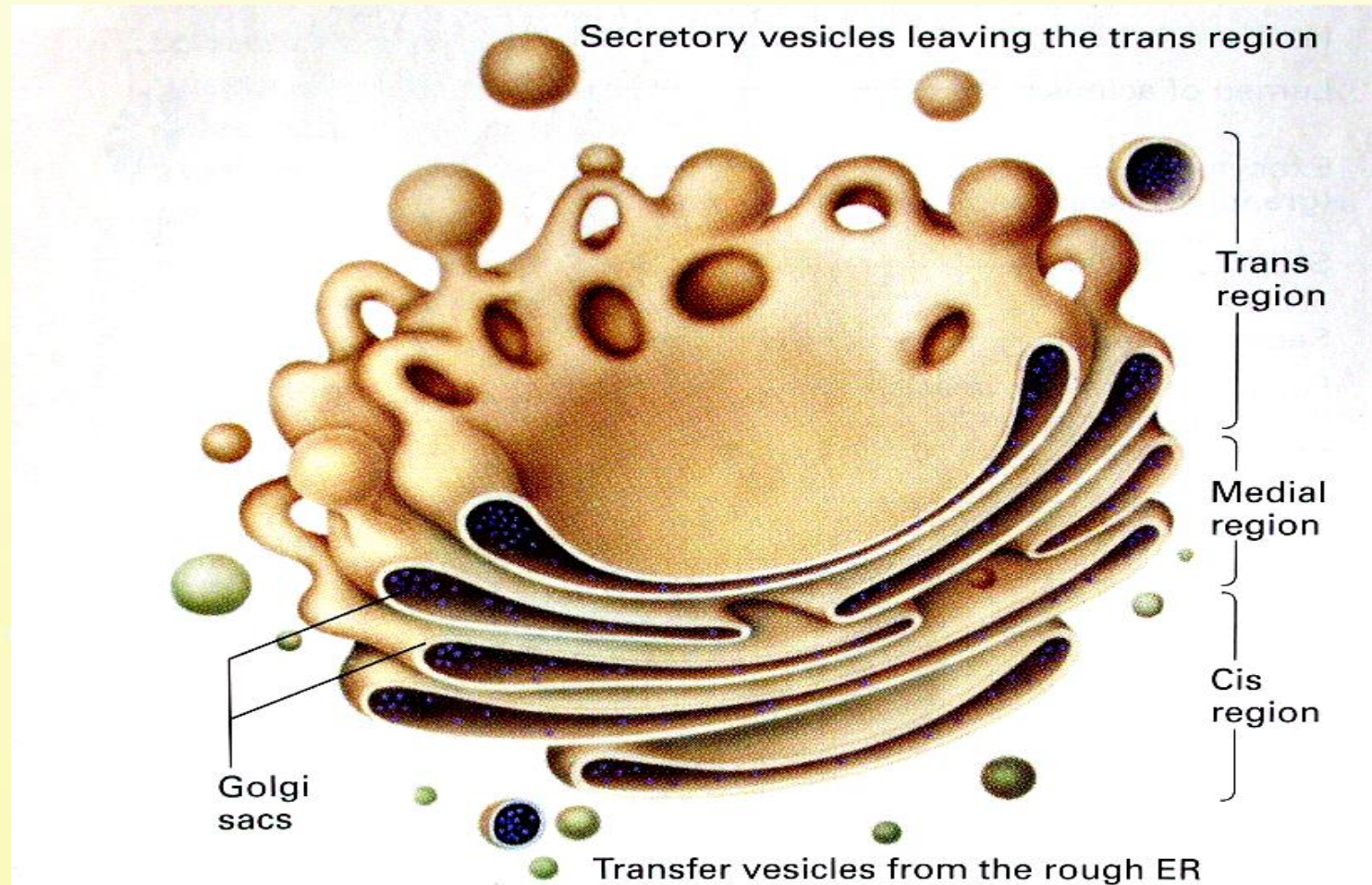
-extensively developed in a number of the cell types

-Function, i.e:

* **Synthesis of steroids hormones**

* **Detoxifications in the liver of a wide variety of organic compounds**

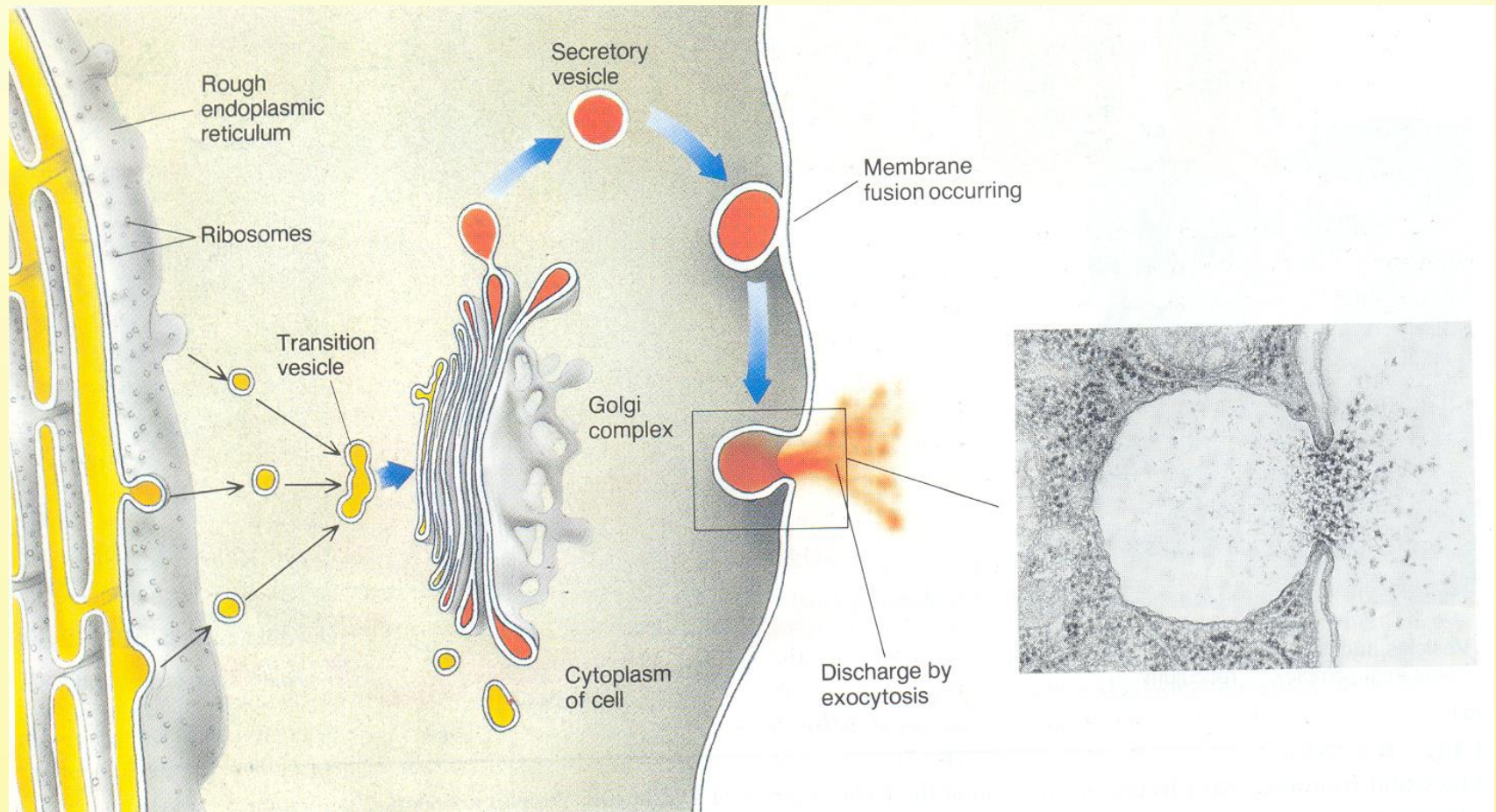
Badan Golgi



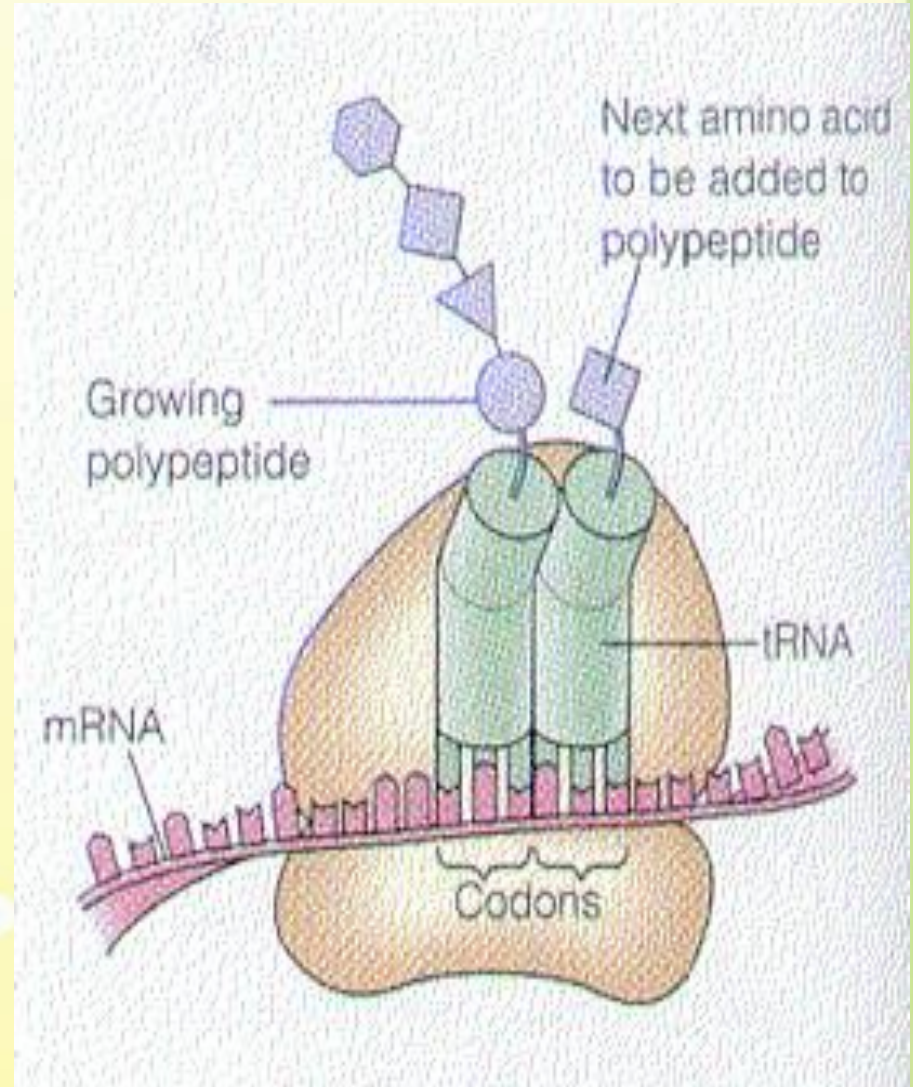
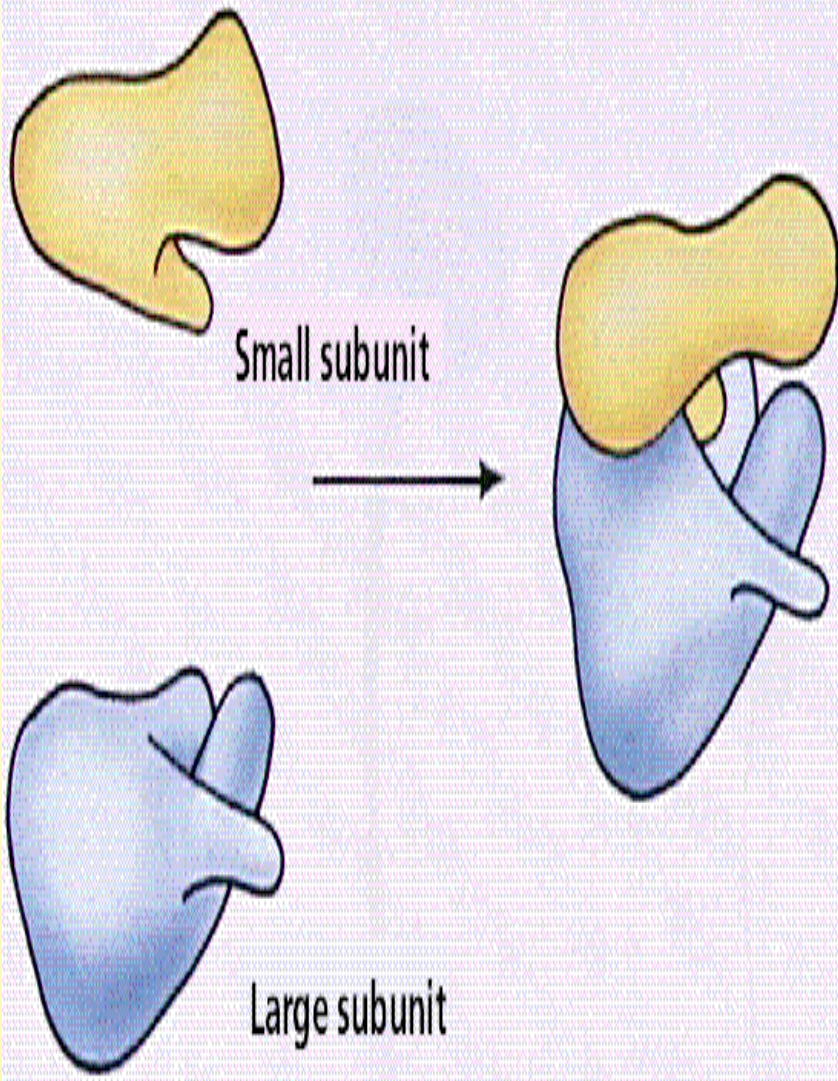
▲ **FIGURE 5-49 Three-dimensional model of the Golgi complex built by analyzing micrographs of serial sections through a secretory cell.** Transfer vesicles that have budded

Fungsi:

- Sekresi/ ekskresi sel
- Tempat untuk penyempurnaan (maturasi) protein & lipid membran sel atau yang disekresikan keluar sel.
- Membentuk lisosom



Ribosom

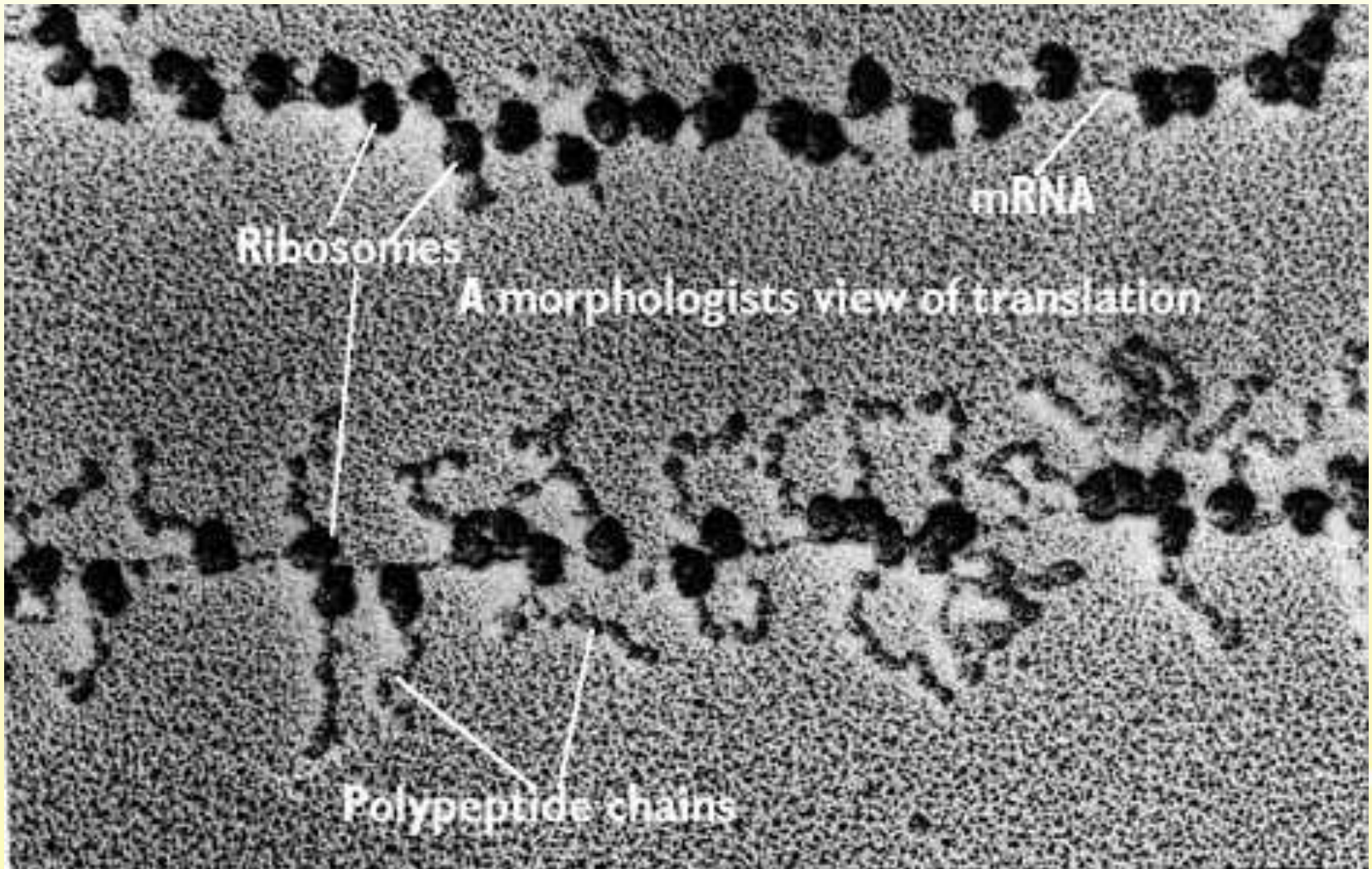


Function:

- play role in protein biosynthesis

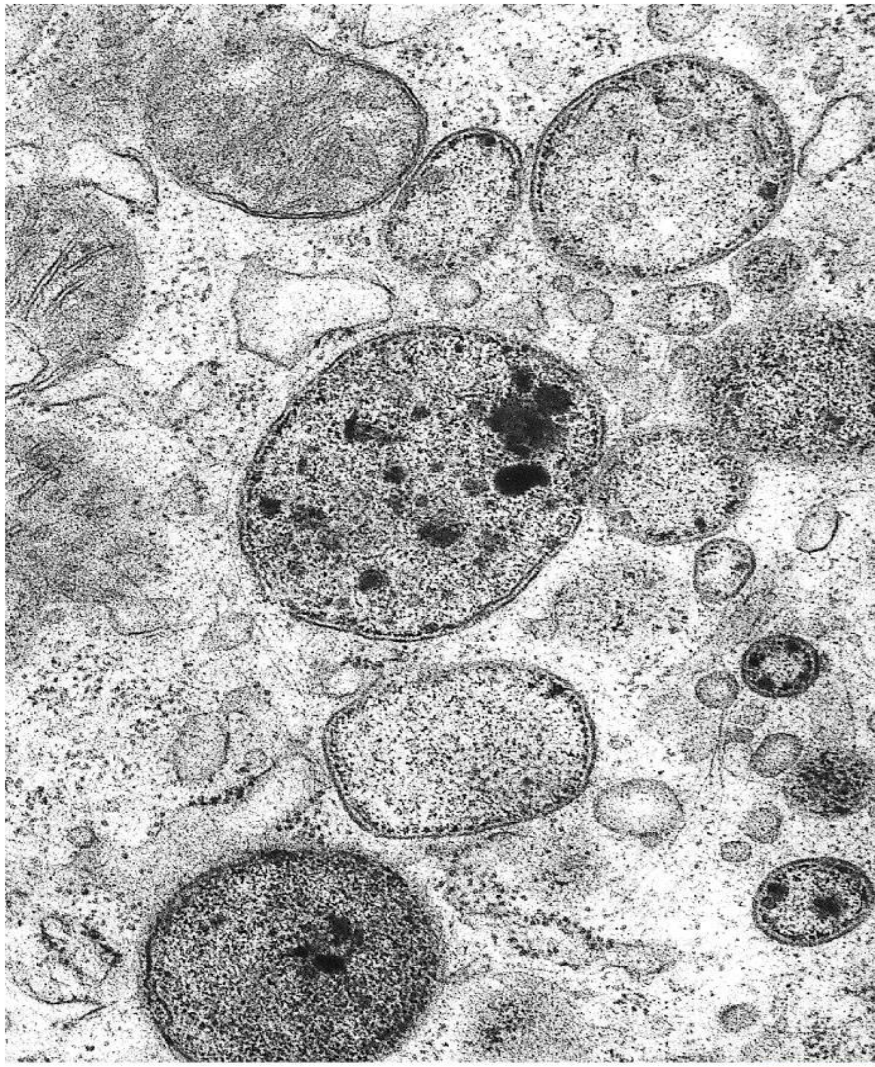
Characteristic:

- has no cell membrane
- are small granule (25 nm) that can produce more than 40% of protein (70 kinds of proteins) and 60 % RNA.
- found abundant in the surface of ER, but also found in mitochondria as well as in chloroplast
- Ribosome are produced in nucleolus.
- Each type of cell has different amount of ribosome
Example: *E. Coli* has 1,500 ribosome.



Polyribosomes

Lisosom



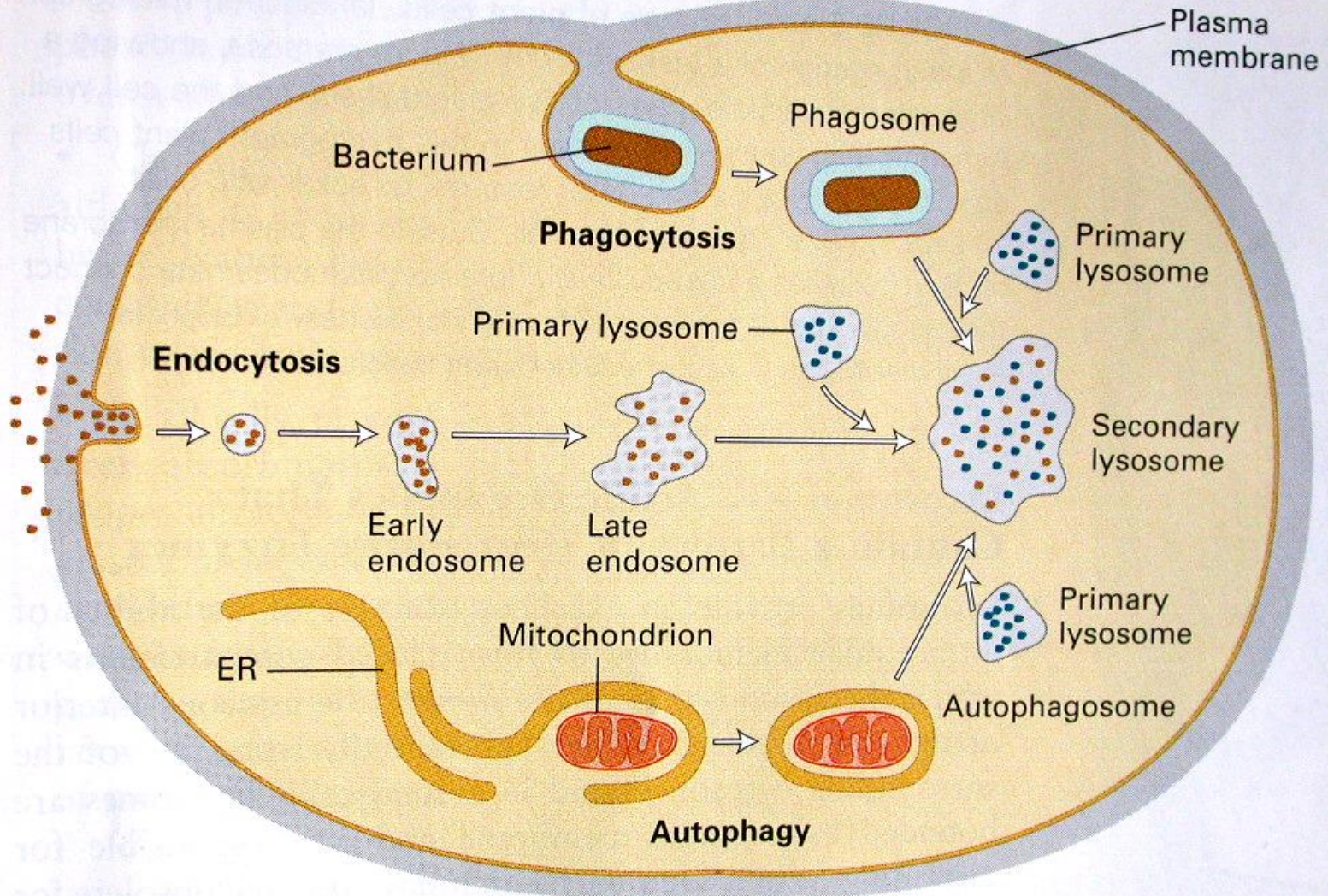
0.3 μm

Memiliki ukuran yg besar
(1 μm) hingga sangat kecil
(25-50 nm)

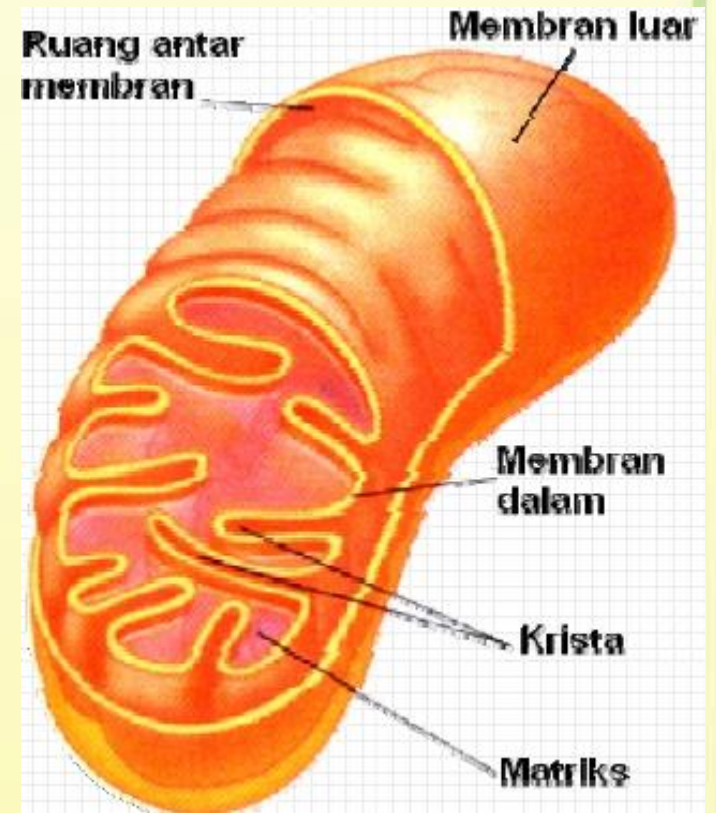
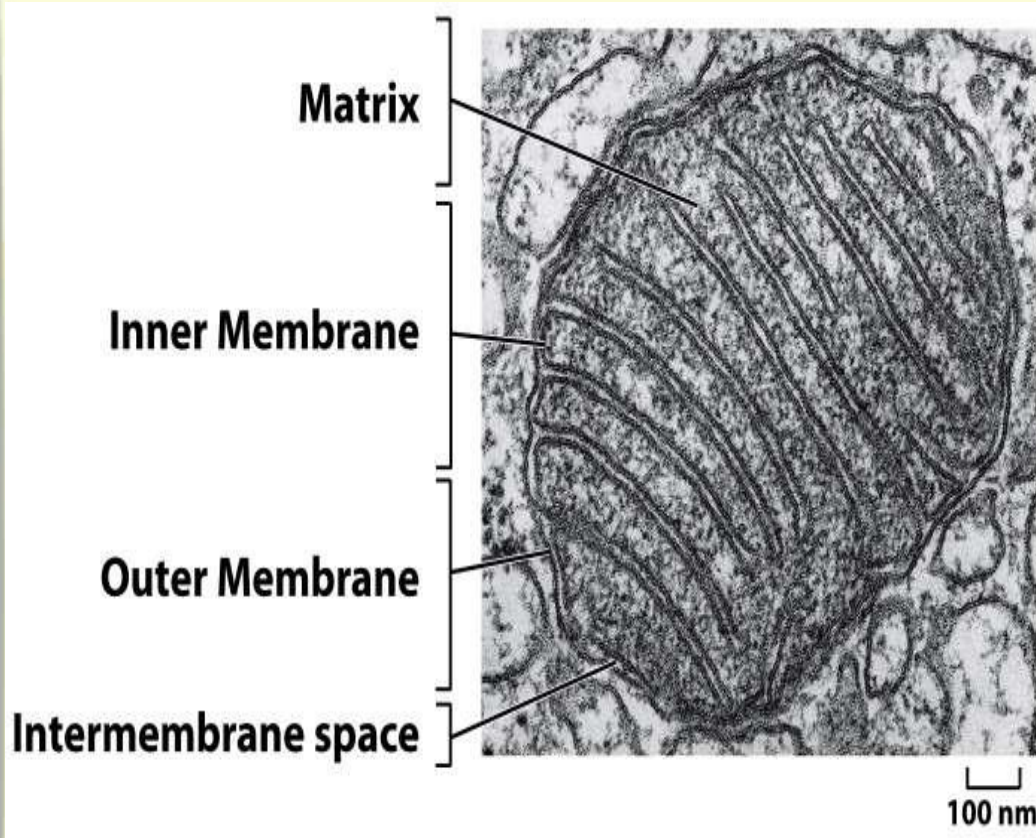
- Lisosom hanya terdapat pada sel hewan dan manusia.
- Di dalam lisosom terdapat enzim pencernaan misalnya: fosfatase asam, ribonuklease, deoskiribonuklease, sulfatase, glukoronidase, kolagenase, dll.
- fungsi lisosom : membantu proses penguraian zat-zat makanan/pencernaan, endositosis, autolisis.
- Sel yang banyak mempunyai lisosom adalah makrofag dan monosit.

Three pathways to degradation in lysosome

(a)



Mitokondria

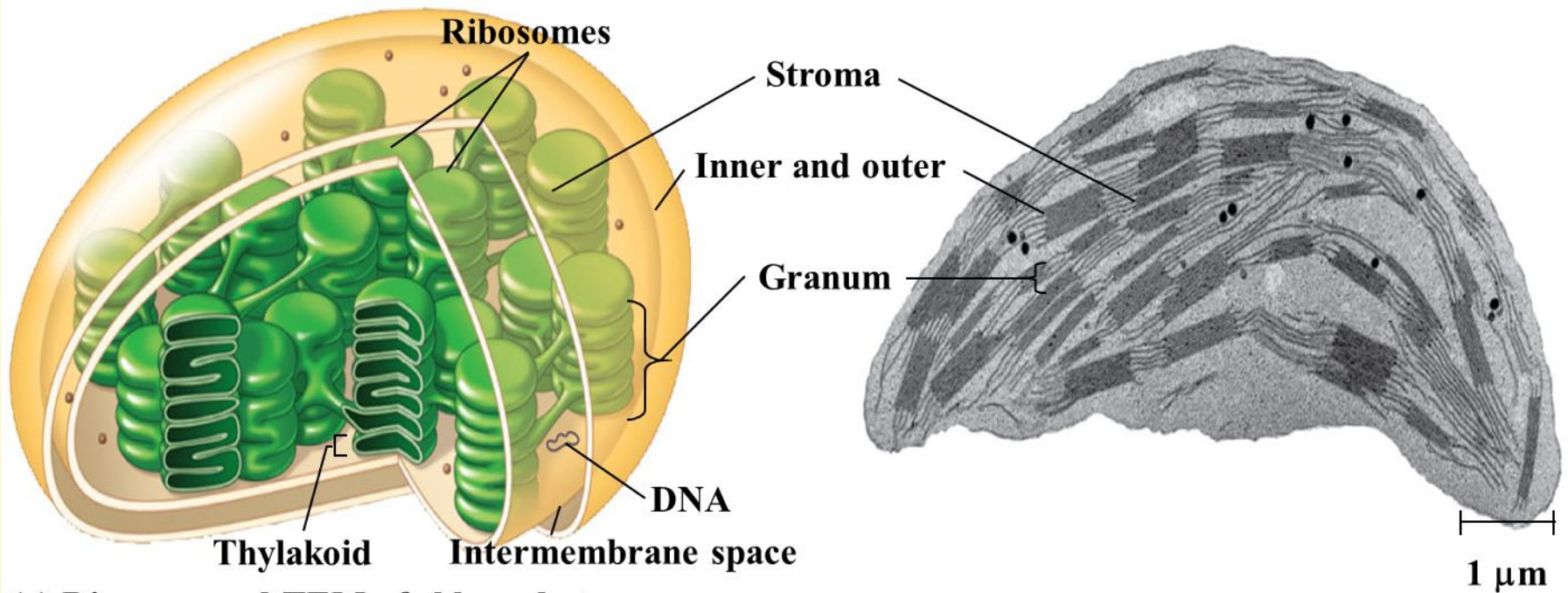


Fungsi: untuk Respirasi sel

Terdiri dari dua lapis membran, mbr luar & mbr dalam, berbentuk oval. Mbr dalam mbtk perlekukan ke arah dalam disebut kristae. Mbr dalam mbtk ruangan diisi cairan dsbt matriks mitokhondria. Di dalam matriks terdapat DNA, ribosom, dan enzim-enzim untuk reaksi aerob.

Di dalam matriks dan krista mitokhondria terjadi reaksi transformasi energi → menghasilkan ATP melalui reaksi aerob.

Plastida



(a) Diagram and TEM of chloroplast

Plastida terdiri dari:

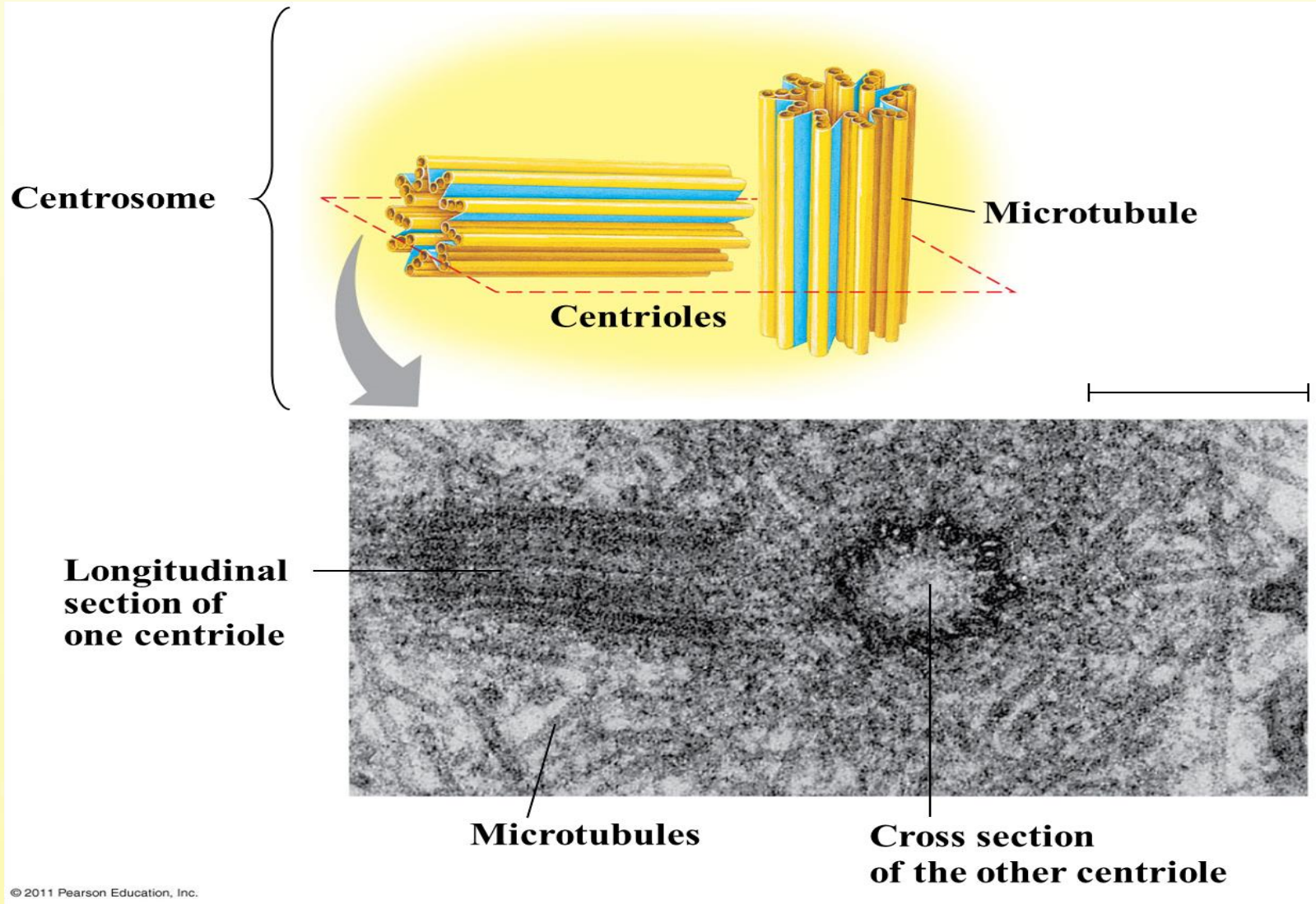
1. Kloroplas → mengandung klorofil
 - Tilakoid → tempat terjadinya fotosintesis
 - Stroma → menyimpan hasil fotosintesis
2. Kromoplas → mengandung karoten
3. Leukoplas → menyimpan cadangan makanan

Terdapat hanya pada sel tanaman

Tempat produksi makanan (**glucose**)

Dilindungi oleh membran ganda

Sentriol (Sentrosom)



- Organel sel yang berbentuk silinder
- Fungsinya: membantu proses pembelahan sel pada hewan
- Pada saat pembelahan membentuk kutub dan benang gelendong

Badan Mikro

Peroksisom

Kantong kecil yang berisi enzim katalase

Berfungsi: menguraikan H_2O_2 menjadi air dan oksigen

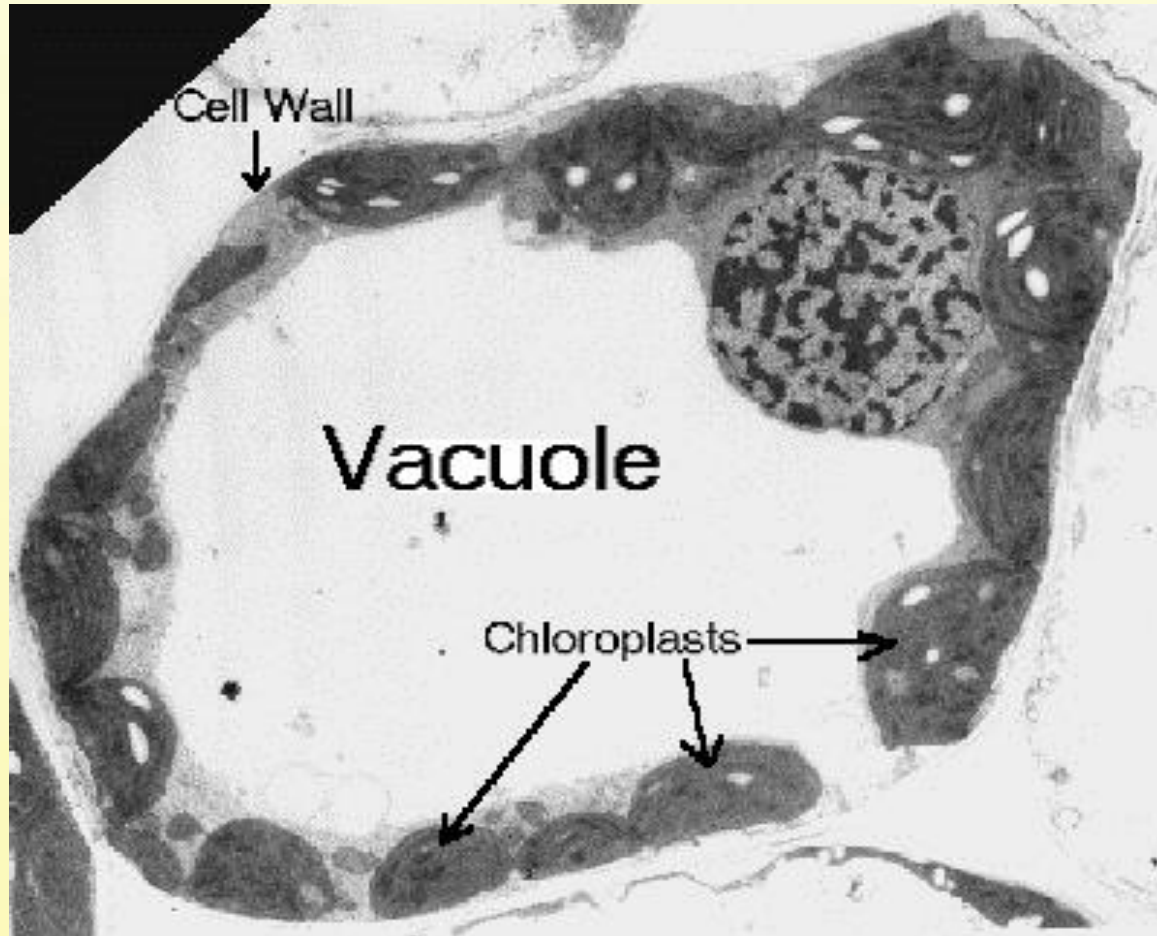
Banyak ditemukan pada sel hati

Glioksisom

Terdapat pada tumbuhan

Berfungsi: pengubahan senyawa lemak menjadi sukrosa

Vakuola



- Hanya terdapat pada sel tumbuhan
- Vakuola central yang besar terdapat pada sel tumbuhan
- Tempat penyimpanan air, makanan, enzim, pigmen.
- Mengatur tekanan turgor

Sitoskeleton

Sistem filamen yang terdapat dalam sel sehingga sel

- mempunyai bentuk dan dapat merubah bentuk
- dapat bergerak
- mengatur komponen internalnya utk tumbuh,
- membelah, merespon lingkungan yang berubah

Misalnya:

- Mendorong kromosom ke bagian tertentu saat mitosis
- Kontraksi otot

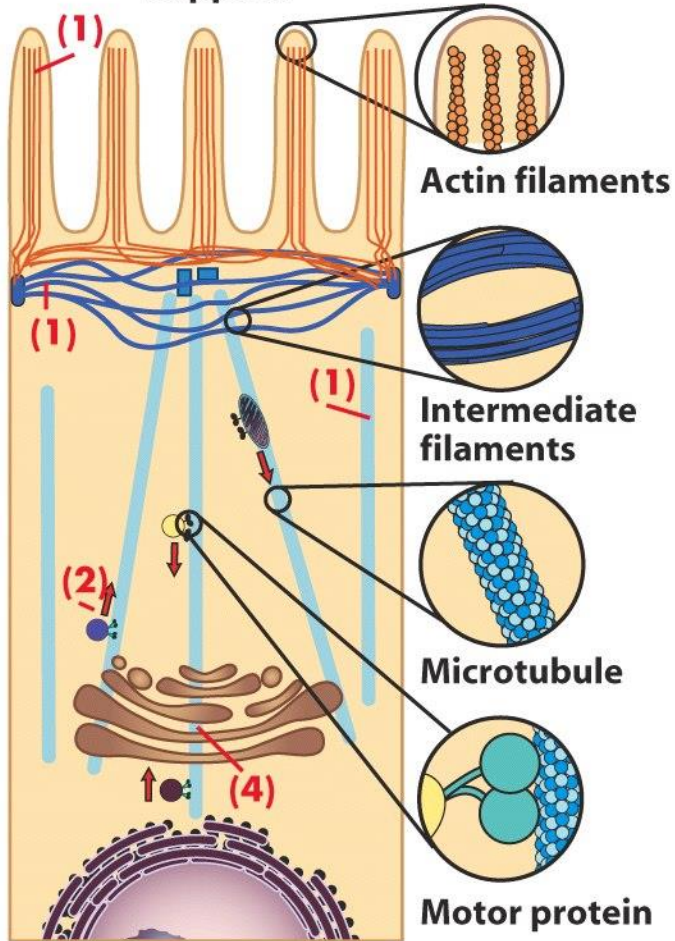
Key to Cytoskeletal Functions

(1) Structure and Support

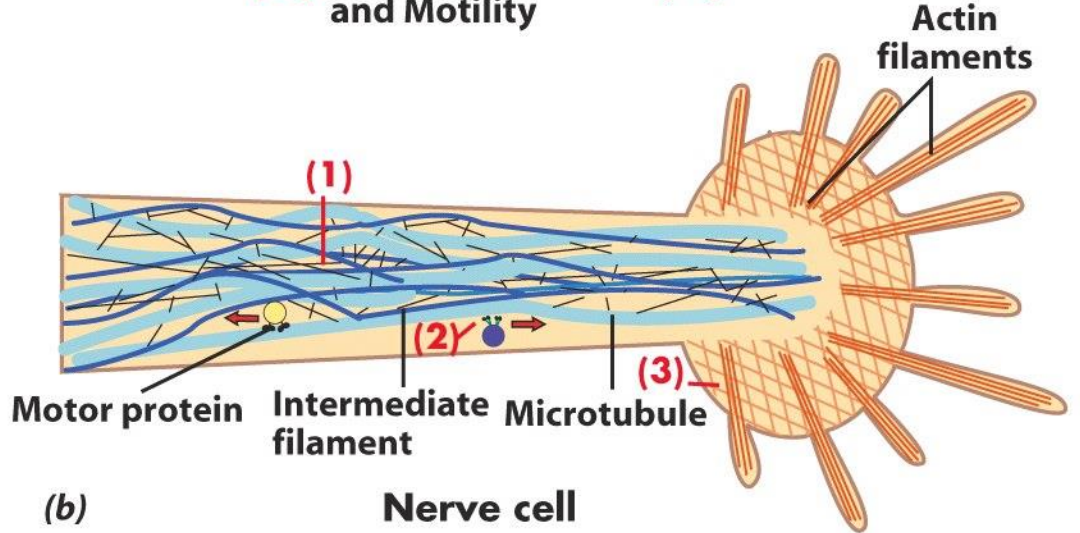
(2) Intracellular Transport

(3) Contractility and Motility

(4) Spatial Organization



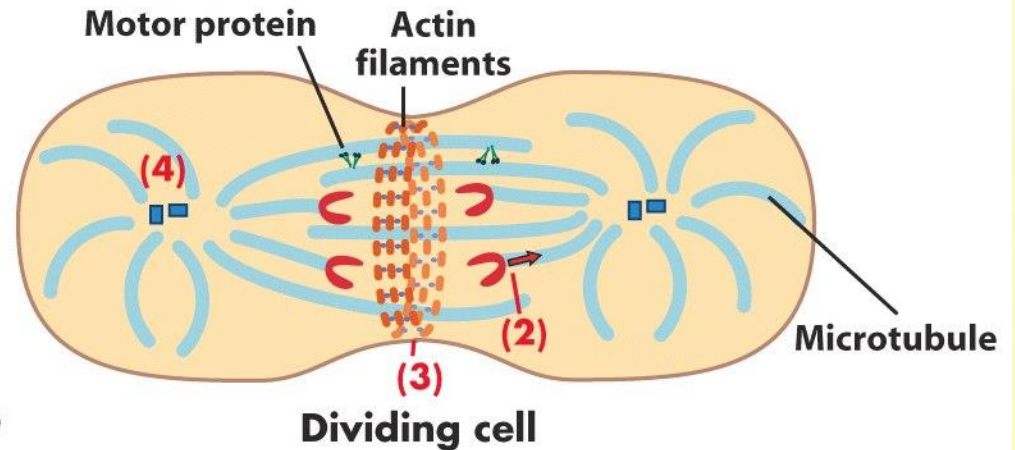
(a) Epithelial cell



(b)

Nerve cell

(c)

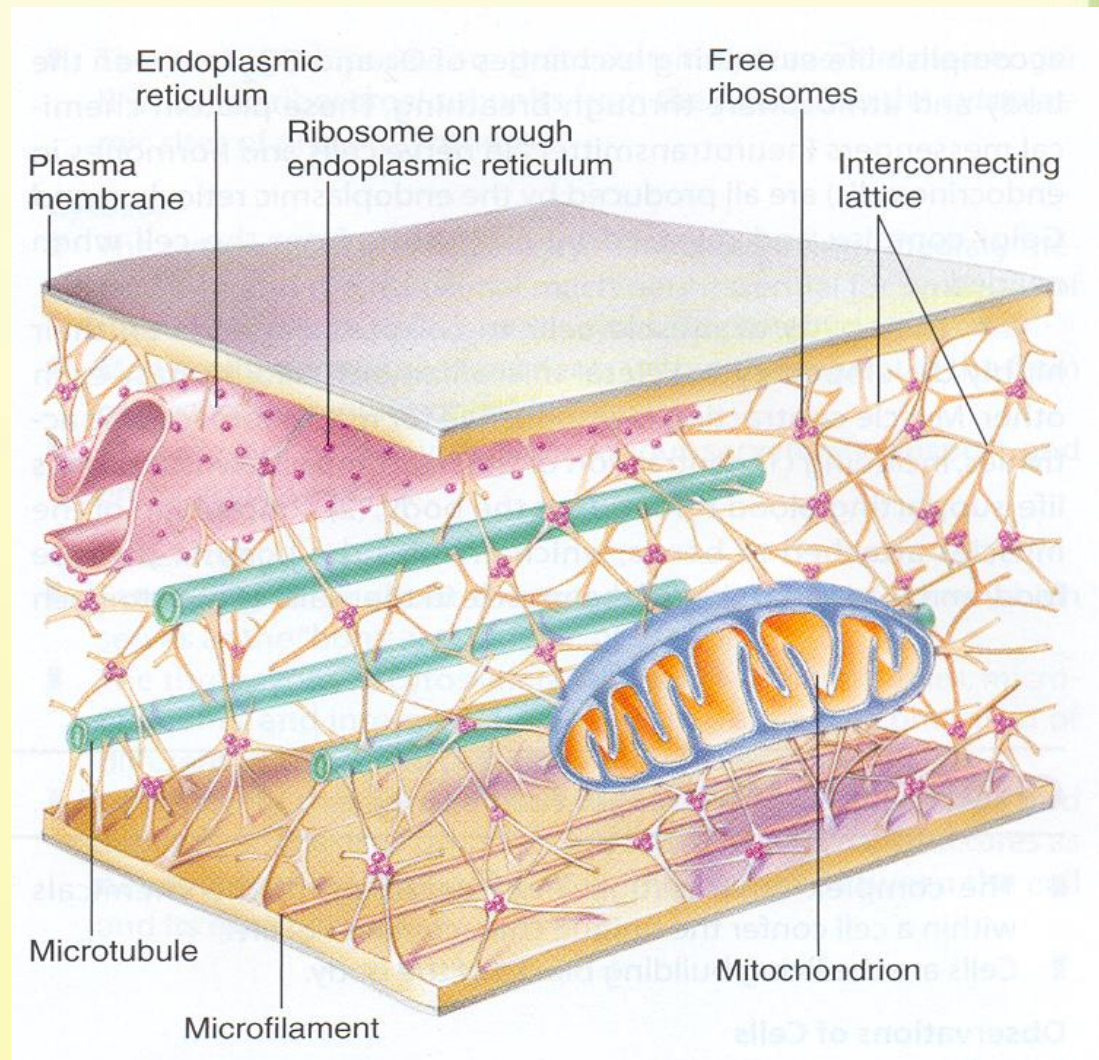


Dividing cell

Mikrotubulus dan mikrofilamen

Mikrotubulus dan mikrofilamen berfungsi sitoskeleton (rangka sel) dan pergerakan sel.

Mikrotubulus berukuran lebih besar dibanding mikrofilamen.



Tipe-tipe filamen:

1. Filamen aktin = mikrofilamen

Menentukan bentuk permukaan sel
dibentuk oleh molekul (protein) subunit aktin

2. Mikrotubul

Menentukan posisi organel2 sel yang diselubungi membran dan untuk transport intraseluler
dibentuk oleh molekul (protein) subunit tubulin

3. Filamen intermediat

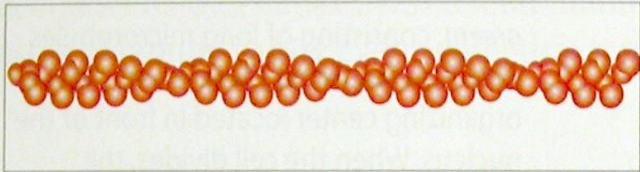
Menentukan kekuatan mekanis dari sel
dibentuk oleh molekul (protein) subunit filamen yg panjang dan fibrous

Filamen aktin (mikrofilamen)

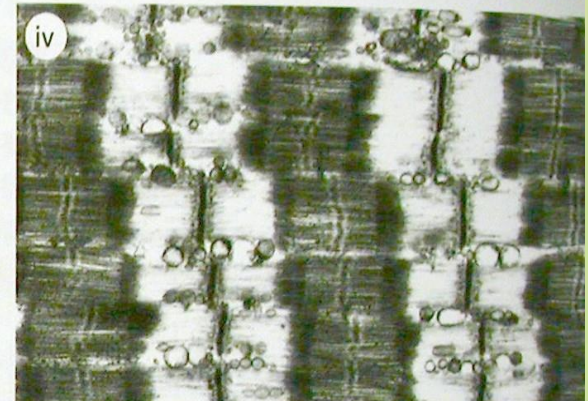
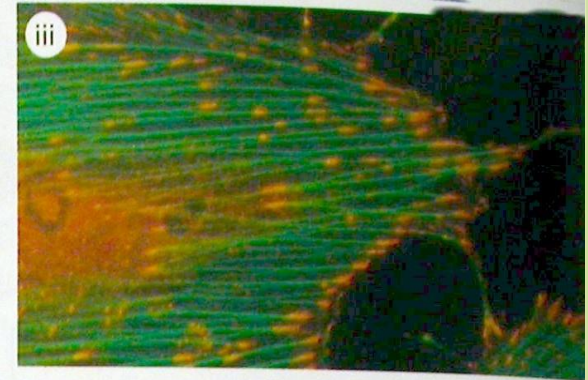
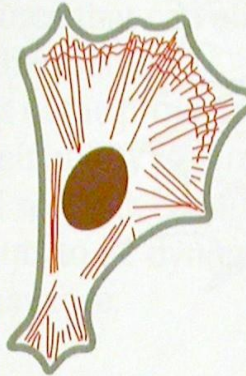
ACTIN FILAMENTS



100 nm



25 nm



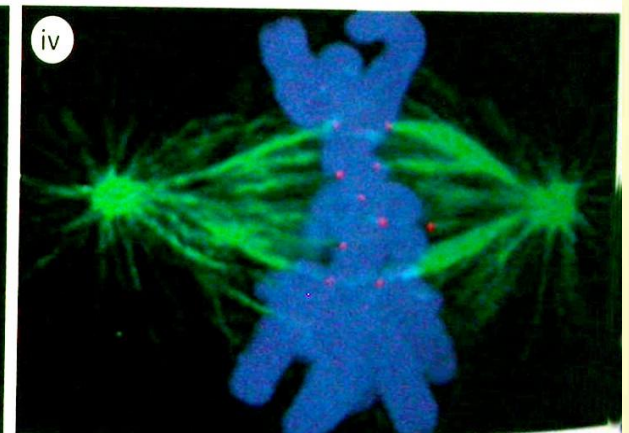
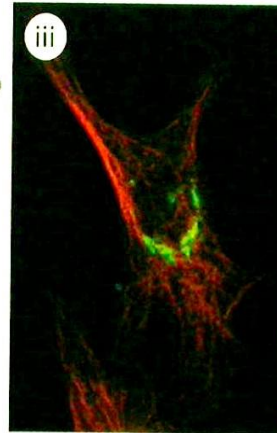
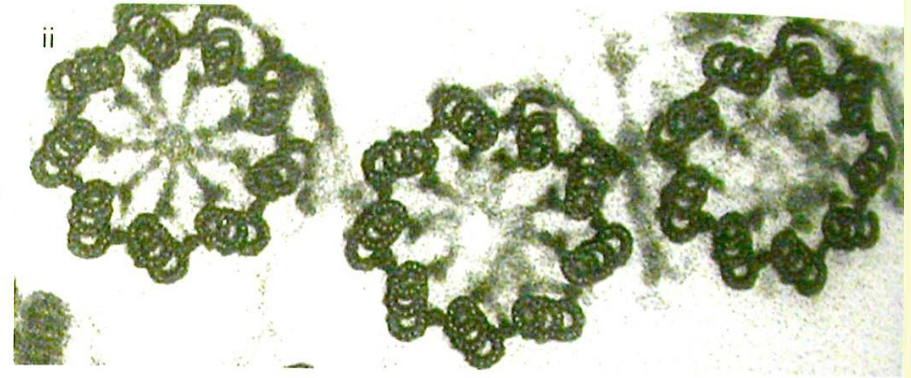
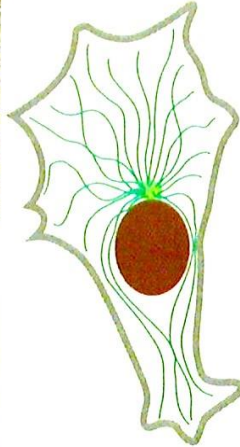
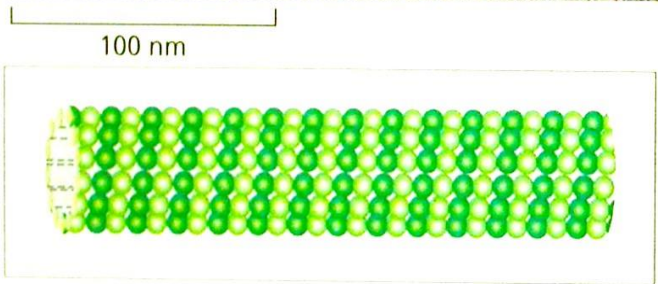
Actin filaments (also known as *microfilaments*) are two-stranded helical polymers of the protein actin. They appear as flexible structures, with a diameter of 5–9 nm, and they are organized into a variety of linear bundles, two-dimensional networks, and three-dimensional gels. Although actin filaments are dispersed throughout the cell, they are most highly concentrated in the *cortex*, just beneath the plasma membrane.

Micrographs courtesy of Roger Craig (i and iv); P.T. Matsudaira and D.R. Burgess (ii); Keith Burridge (iii).

Dibentuk oleh molekul (protein) subunit **aktin**

Mikrotubul

MICROTUBULES



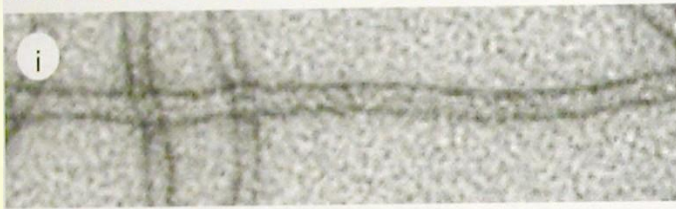
Microtubules are long, hollow cylinders made of the protein tubulin. With an outer diameter of 25 nm, they are much more rigid than actin filaments. Microtubules are long and straight and typically have one end attached to a single microtubule-organizing center (MTOC) called a *centrosome*.

Micrographs courtesy of Richard Wade (i); D.T. Woodrow and R.W. Linck (ii); David Shima (iii); A. Desai (iv).

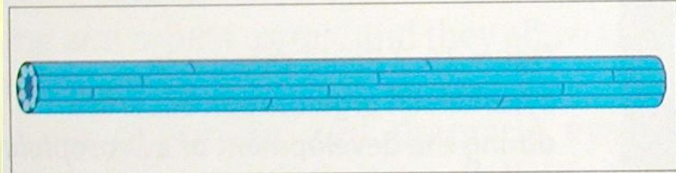
Dibentuk oleh molekul (protein) subunit **tubulin**

Filamen intermediat

INTERMEDIATE FILAMENTS



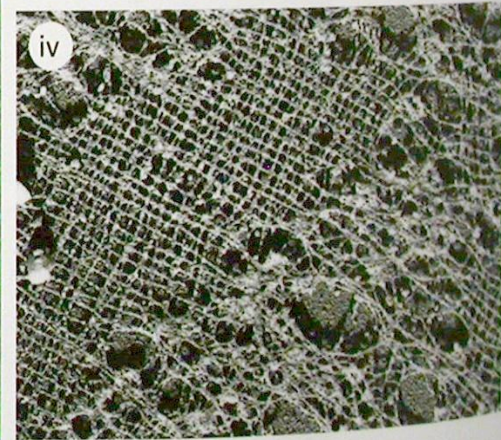
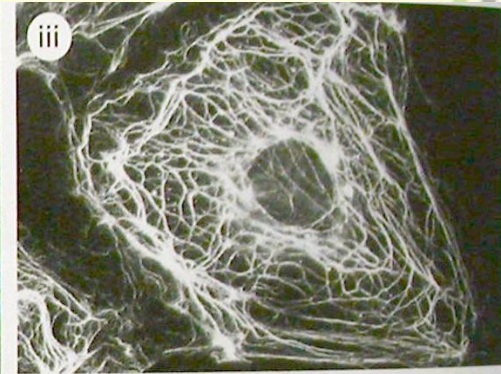
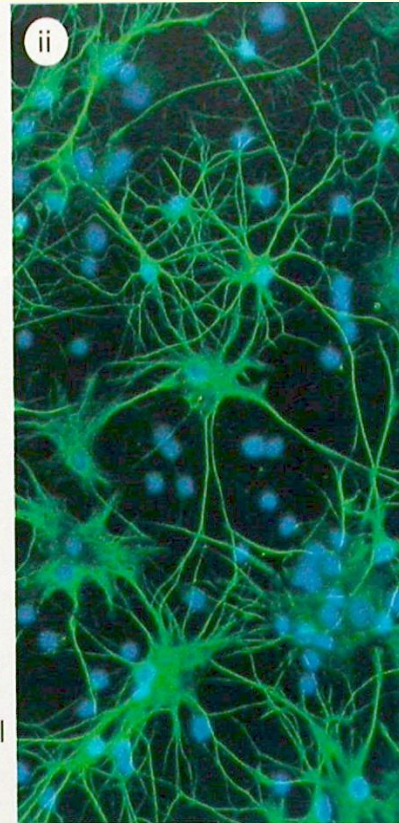
100 nm



25 nm

Intermediate filaments are ropelike fibers with a diameter of around 10 nm; they are made of intermediate filament proteins, which constitute a large and heterogeneous family. One type of intermediate filament forms a meshwork called the nuclear lamina just beneath the inner nuclear membrane. Other types extend across the cytoplasm, giving cells mechanical strength. In an epithelial tissue, they span the cytoplasm from one cell-cell junction to another, thereby strengthening the entire epithelium.

Micrographs courtesy of Roy Quinlan (i); Nancy L. Kedersha (ii); Mary Osborn (iii); Ueli Aebi (iv).

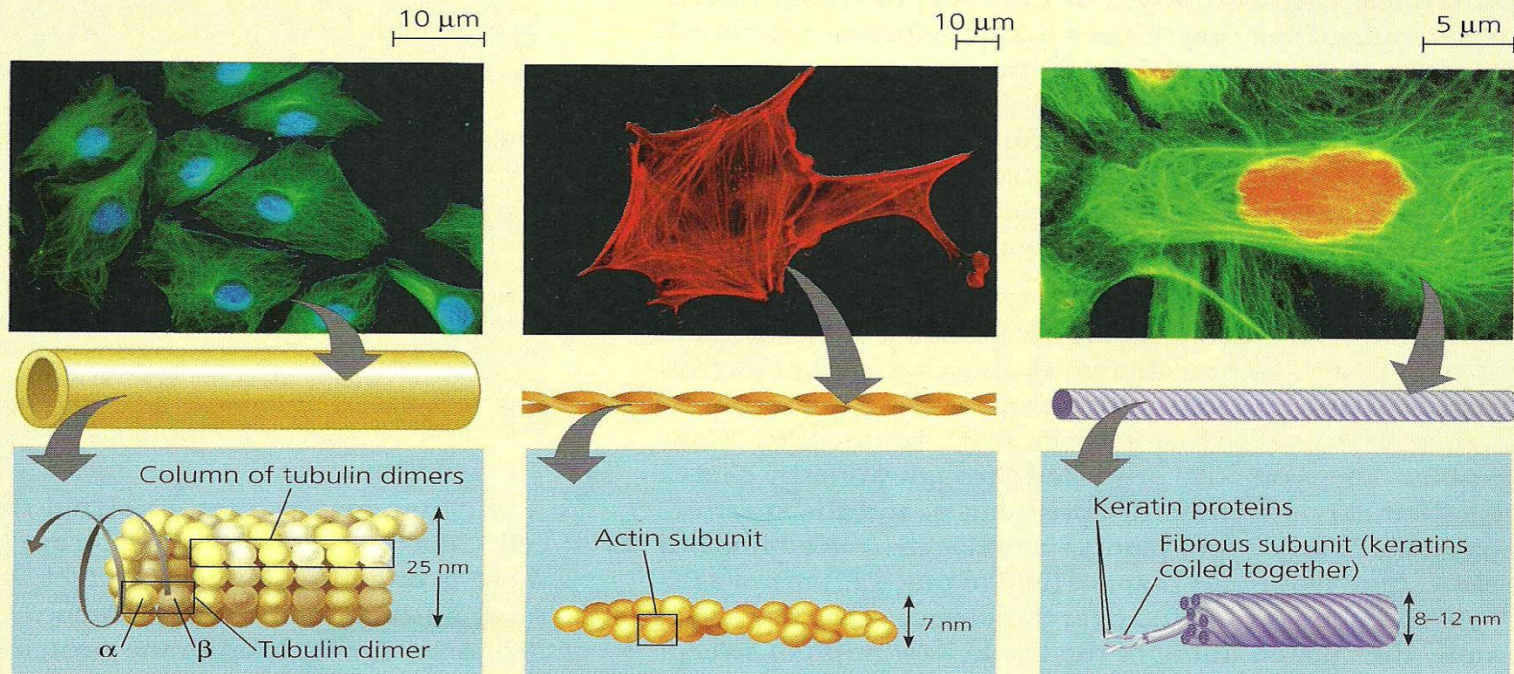


Dibentuk oleh molekul (protein) subunit: **filamen yang panjang dan fibrous**

Table 6.1 The Structure and Function of the Cytoskeleton

Property	Microtubules (Tubulin Polymers)	Microfilaments (Actin Filaments)	Intermediate Filaments
Structure	Hollow tubes; wall consists of 13 columns of tubulin molecules	Two intertwined strands of actin, each a polymer of actin subunits	Fibrous proteins supercoiled into thicker cables
Diameter	25 nm with 15-nm lumen	7 nm	8–12 nm
Protein subunits	Tubulin, a dimer consisting of α -tubulin and β -tubulin	Actin	One of several different proteins of the keratin family, depending on cell type
Main functions	Maintenance of cell shape (compression-resisting “girders”) Cell motility (as in cilia or flagella) Chromosome movements in cell division Organelle movements	Maintenance of cell shape (tension-bearing elements) Changes in cell shape Muscle contraction Cytoplasmic streaming Cell motility (as in pseudopodia) Cell division (cleavage furrow formation)	Maintenance of cell shape (tension-bearing elements) Anchorage of nucleus and certain other organelles Formation of nuclear lamina

Micrographs of fibroblasts, a favorite cell type for cell biology studies. Each has been experimentally treated to fluorescently tag the structure of interest.

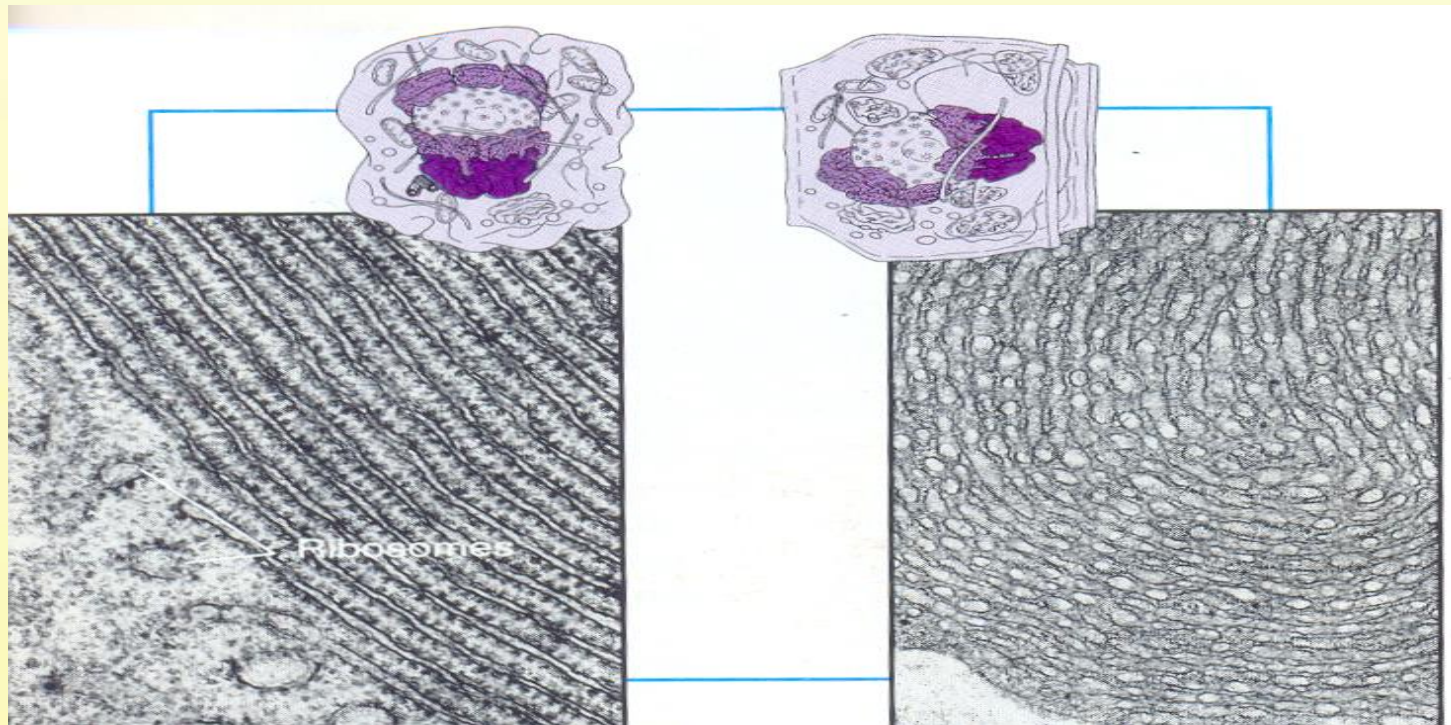




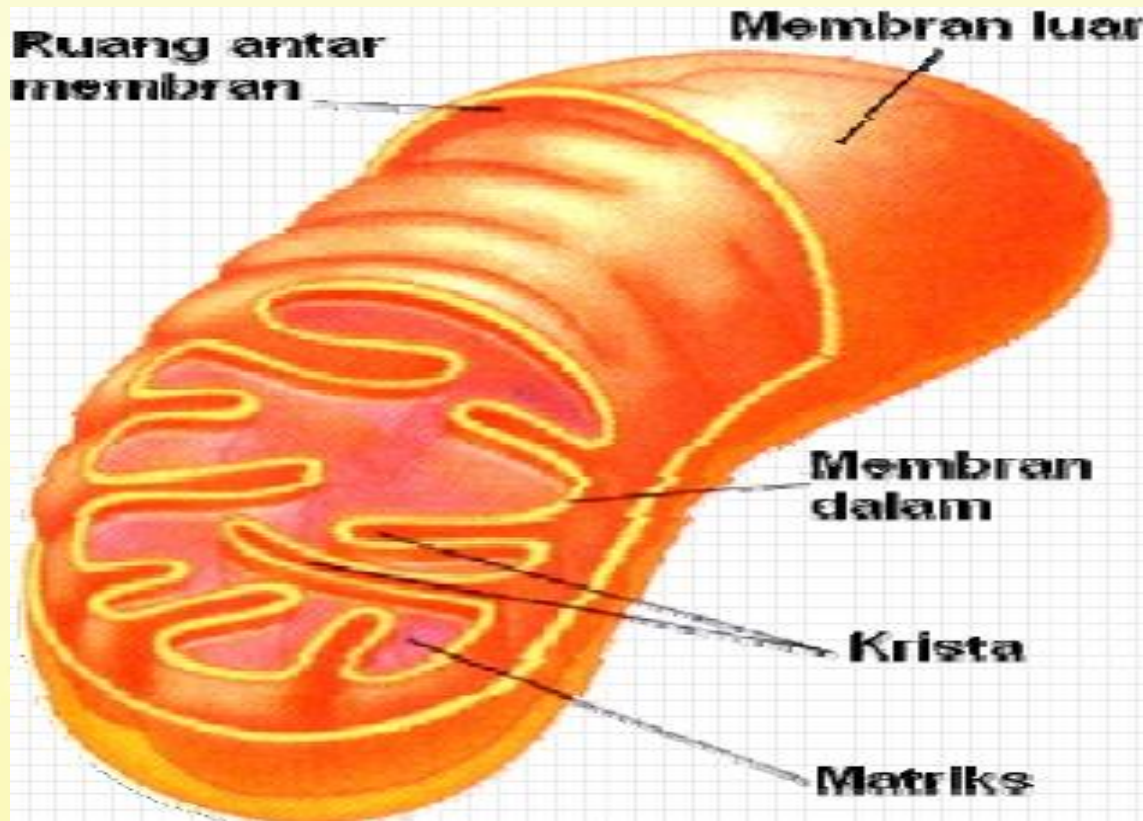
Terima Kasih

Post test

1. Sentkan nama organel berikut dan apa beda tipe organel berikut!



2. Apa nama organel berikut dan apa fungsi utamanya?



3. Fungsi utama dari ribosom adalah.....dan lisosom berfungsi untuk.....

4. Organel apakah yang berperan dalam reaksi berikut



dan apa enzim yang berperan dalam reaksi tersebut?

5. Sebutkan 2 organel yang hanya ditemukan pada sel tumbuhan!