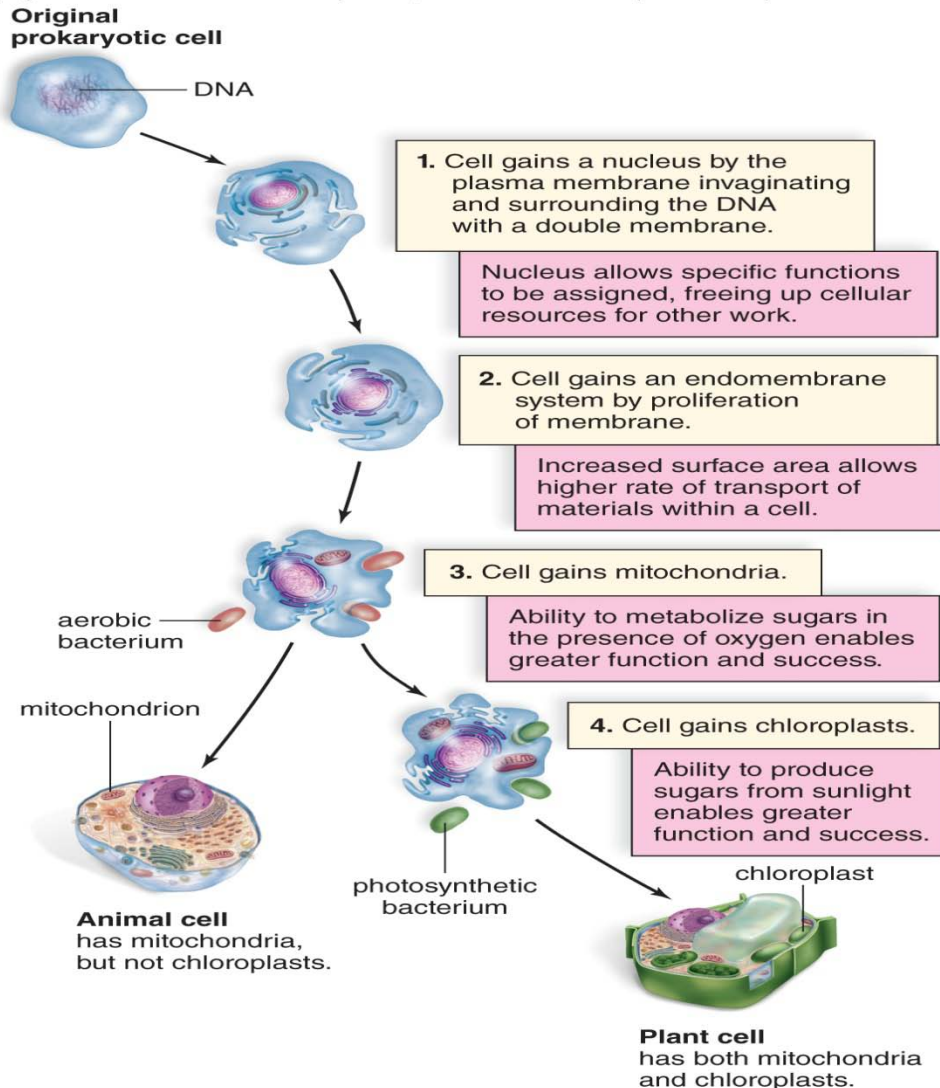


Cell Topics

- 1) cell**
- 2) cell organelles**
- 3) cell transport**
- 4) cell energy**

Cell Evolution

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prokaryote -> eukaryote

1) nucleus

- protected by membrane

2) ER

- internal transportation

3) mitochondria

- internal energy supply

4) chloroplast

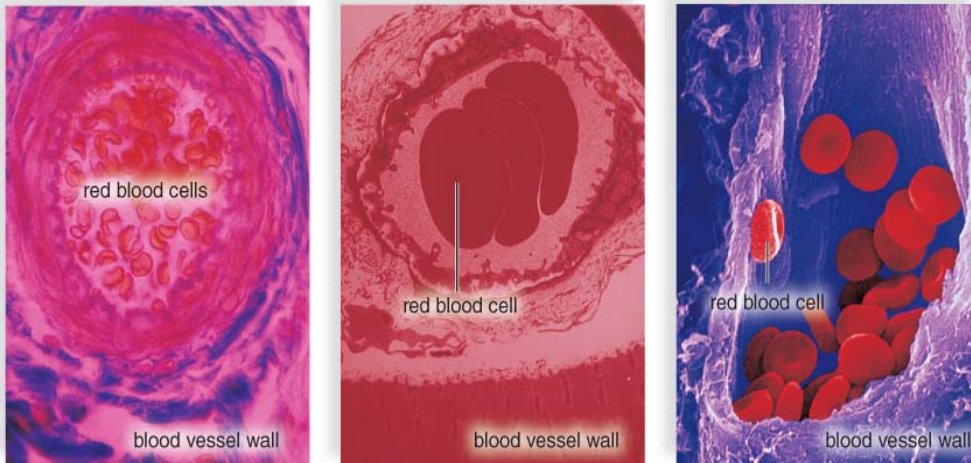
- plant only,
photosynthesis

How to see cells

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Table 3.1		Resolving Power of the Eye and Common Microscopes
	Magnification	Resolving Power
Eye	N/A	0.1 mm (100 μ m)
Light microscope	1,000 \times	0.0001 mm (0.1 μ m)
Transmission electron microscope	50,000 \times	0.000001 mm (0.01 μ m)

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a. Light micrograph
 a: © David M. Phillips/Visuals Unlimited; b: © Alfred Pasiaka/ Photo Researchers;
 c: © 2013/Warren Rosenberg/Biological Photo Service

Blood

eye: between 2 dots (..) (1/10 mm)
 - red fluid

microscopes:
light (one /ten thousandth mm)
 - clusters of RBC,
 unclear blood vessel walls

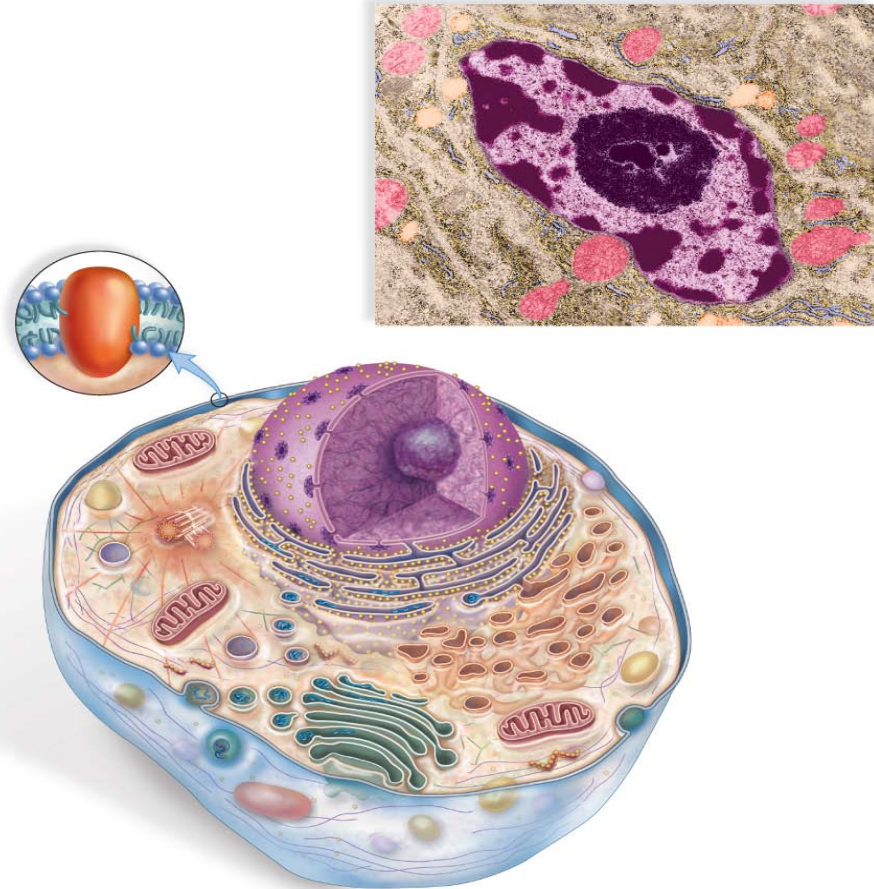
electron (one/millionth mm)
 - individual RBC,
 layers of blood vessel walls

Cell Organelles

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organelles
= little organs

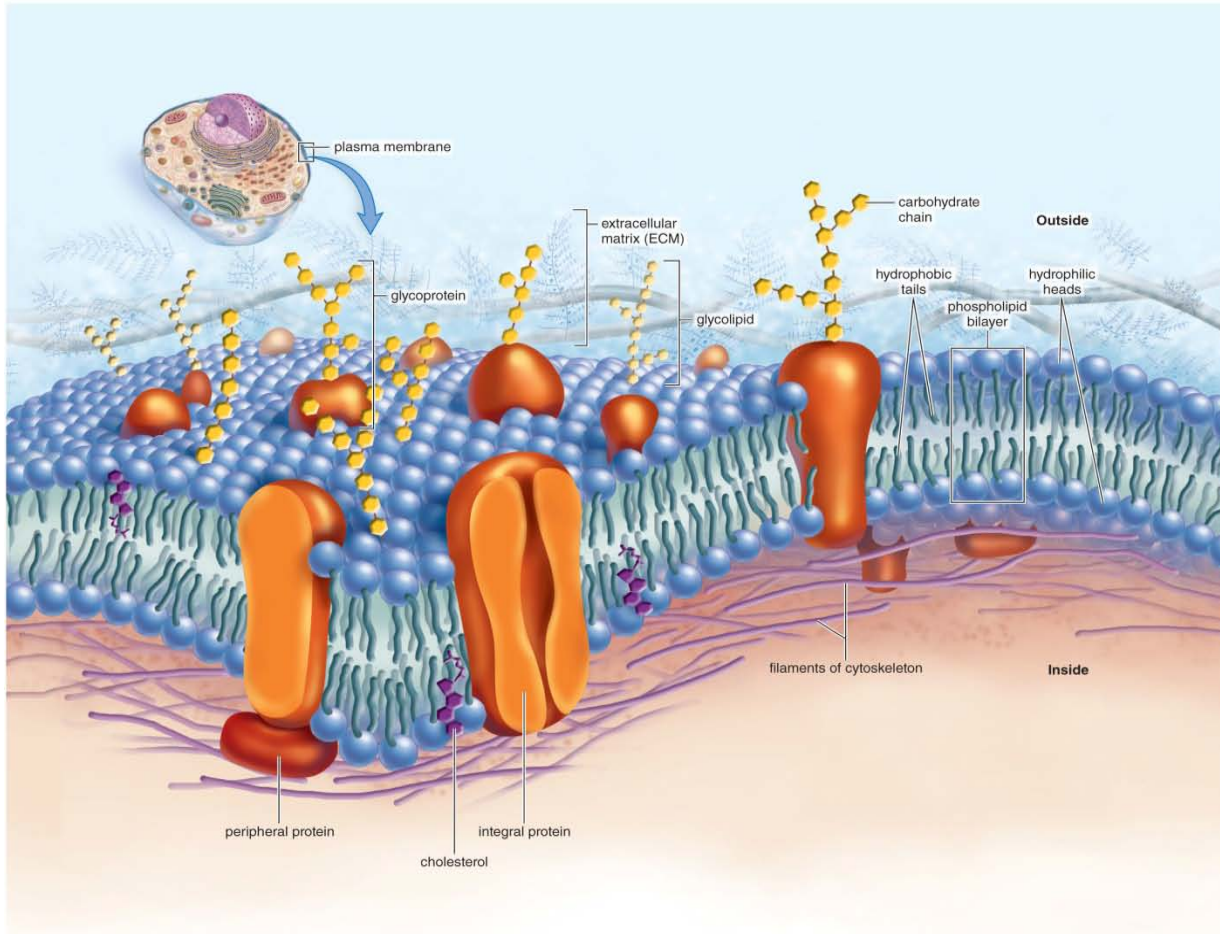
- 1) cell membrane
- 2) nucleus & ribosomes
- 3) ER & golgi app.
- 4) cell skeleton
- 5) mitochondria



(top right): © Dennis Kunkel/Visuals Unlimited

Cell Membrane

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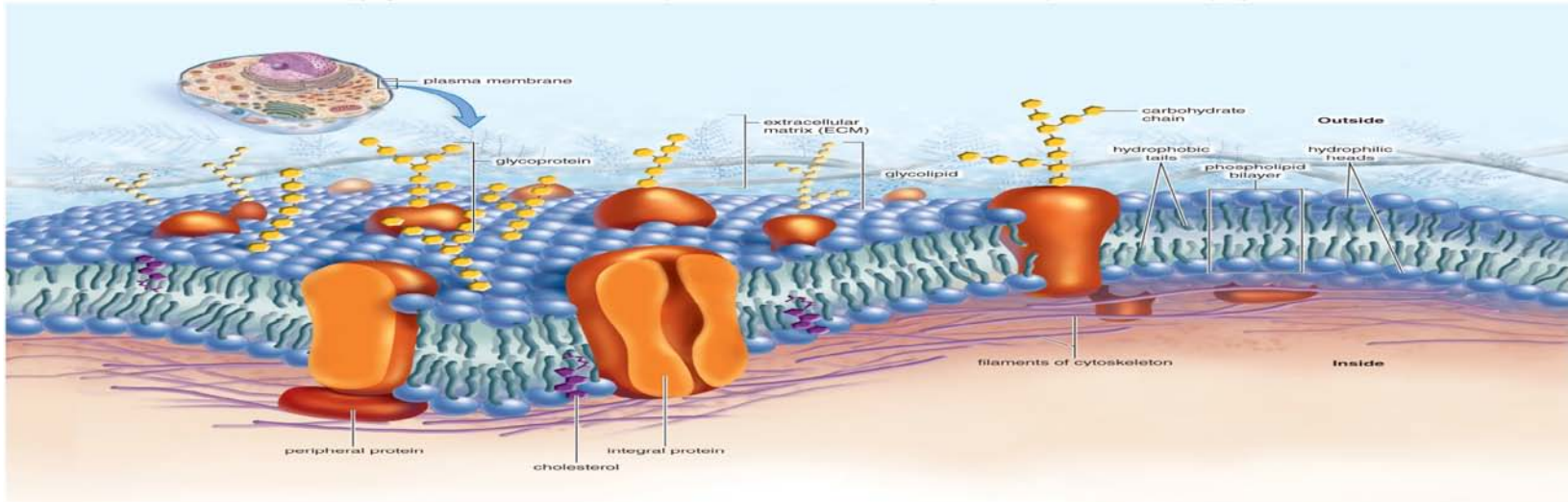


terms:

- 1) fluid mosaic model
- 2) phospholipid bilayer
 - hydro-phobic
 - hydro-philic
- 3) sugar chains
 - markers
 - move RBC
- 4) protein channels
 - transport materials

Cell Membrane Components

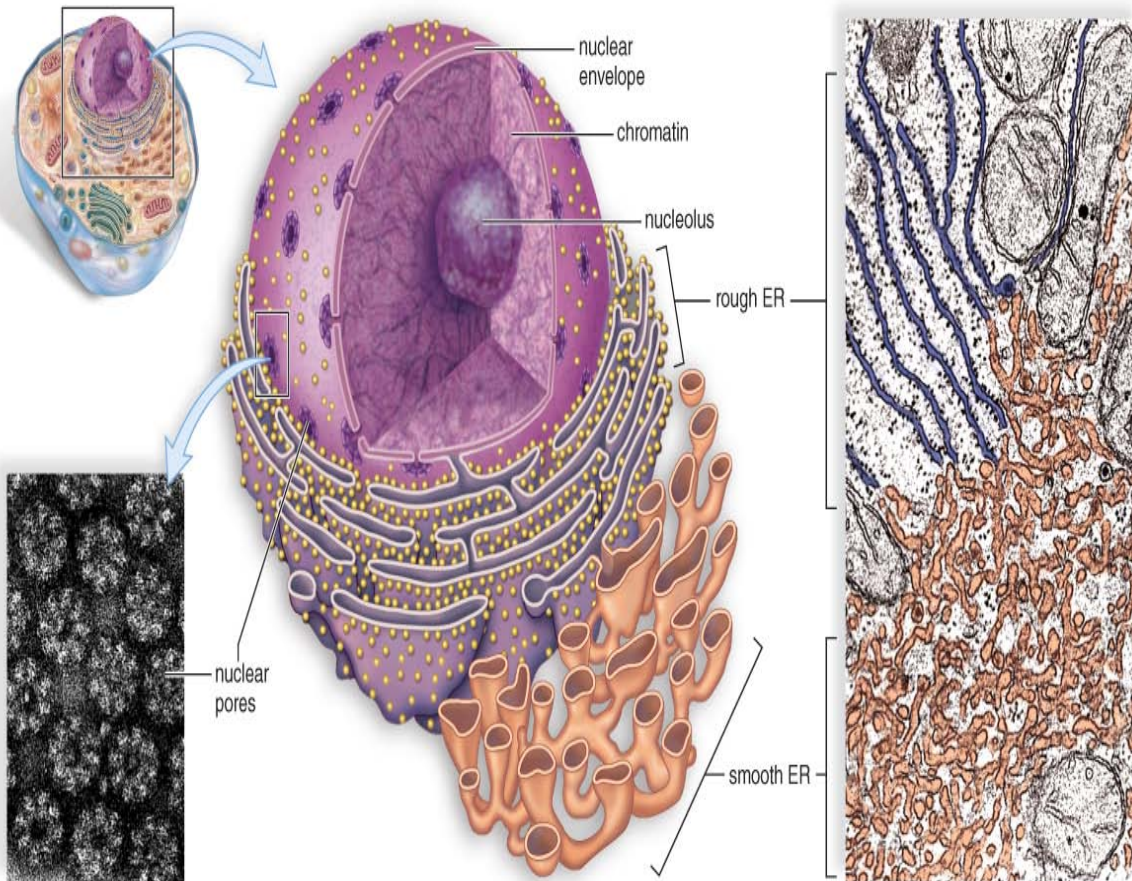
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- 1) membrane - barrier, boundary
- 2) receptors - sense external cell activities
- neg. charged - keeps RBC apart
- 3) fillers - firms up cell membrane
- 4) channels - firms up membrane; enzymes
- 5) transport - material movement in & out of cell

Nucleus & Ribosomes

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(nuclear pores): Courtesy E.G. Pollock; (ER): © R. Bolender & D. Fawcett/Visuals Unlimited

nucleus

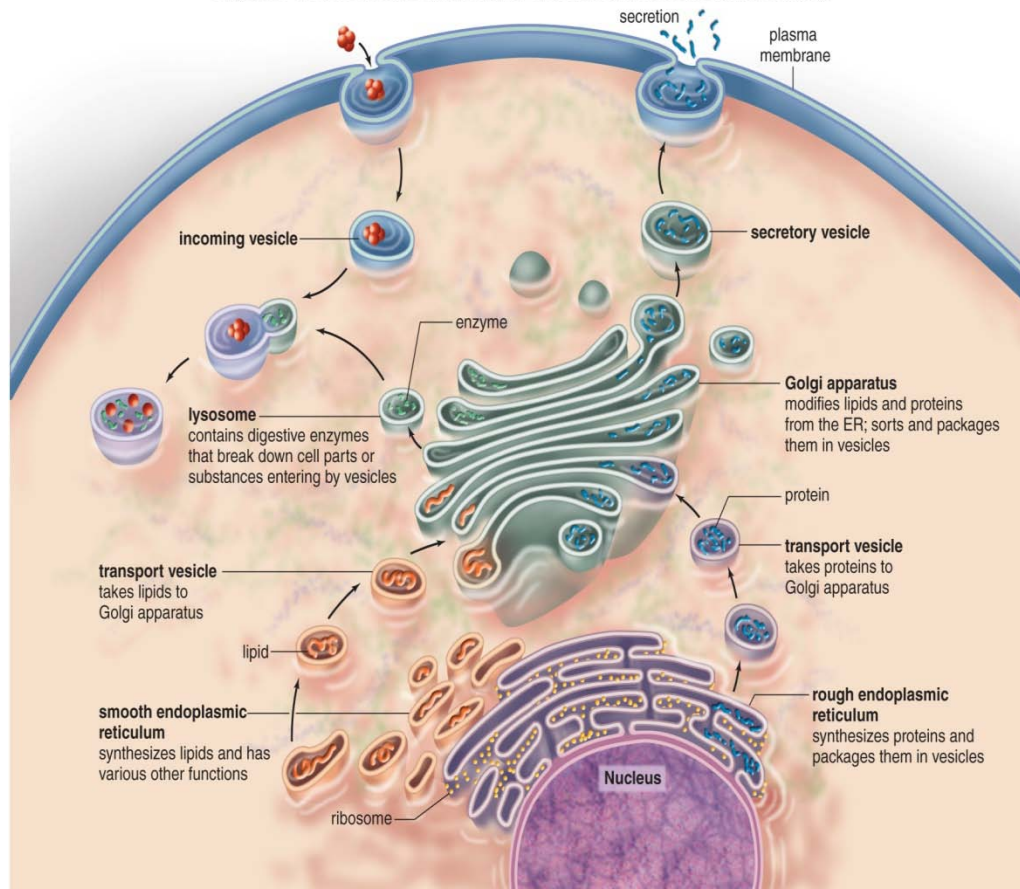
- DNA (heredity)
- chromatin
- chromosomes
- nucleolus
- nuclear envelope

ribosomes

- RNA
- protein synthesis

ER & Golgi Apparatus

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ER

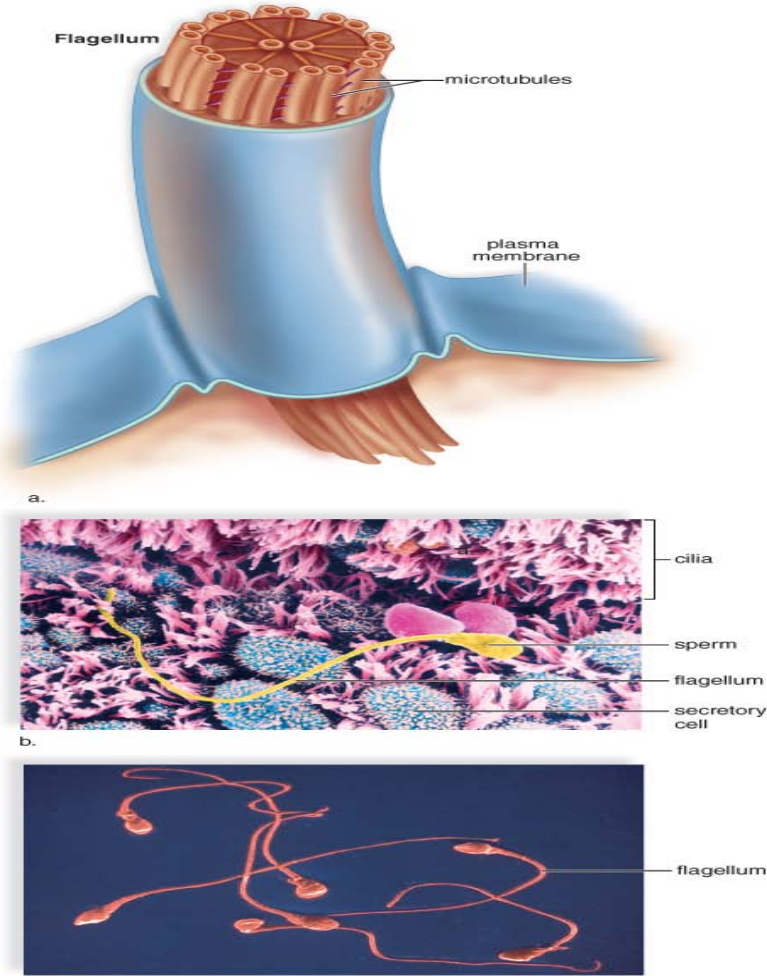
- membrane system
- partitions cell
- vesicles
- transport materials
- eg, lysosome w/
digestive enzymes

Golgi App.

- membrane system
- modifies cell products
- packaging for
internal or external
transport

Cell Skeleton

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b: © Y. Nikas/Photo Researchers; c: © David M. Phillips/Photo Researchers;

cyto-skeleton:

- cell shape, cell movements

flagella

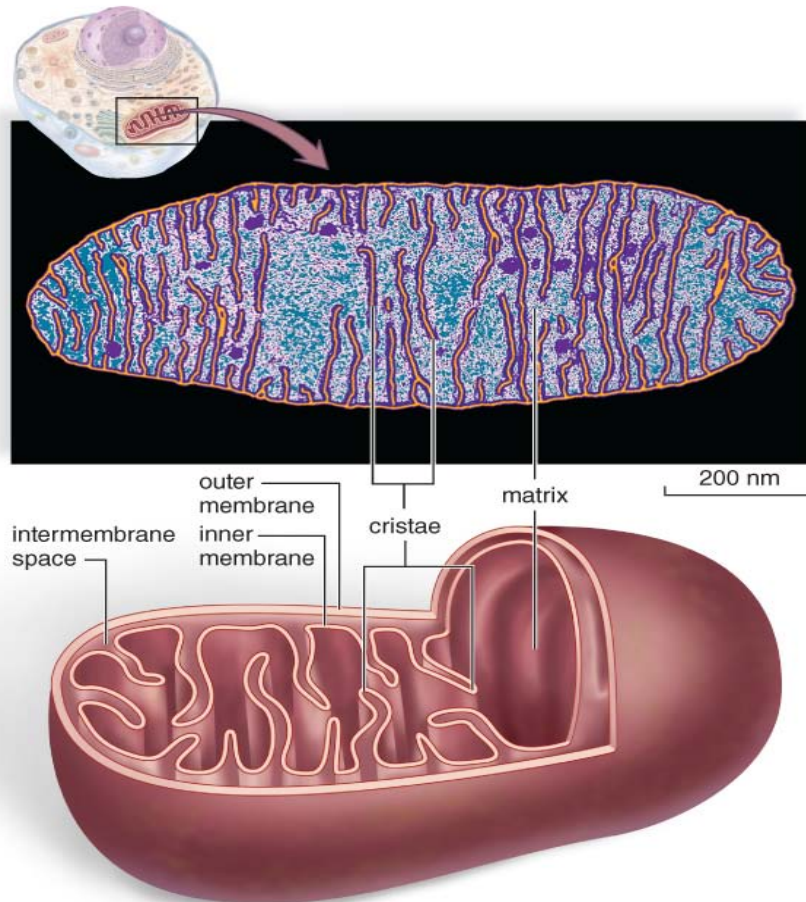
- micro-tubule pinwheel moves the cell by whipping movements
- sperm

cilia

- micro-tubules moves outside cell material waving movements
- trachae - move phlegm
- oviduct - move egg

Mitochondrion

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powerhouse
- prod. cell energy

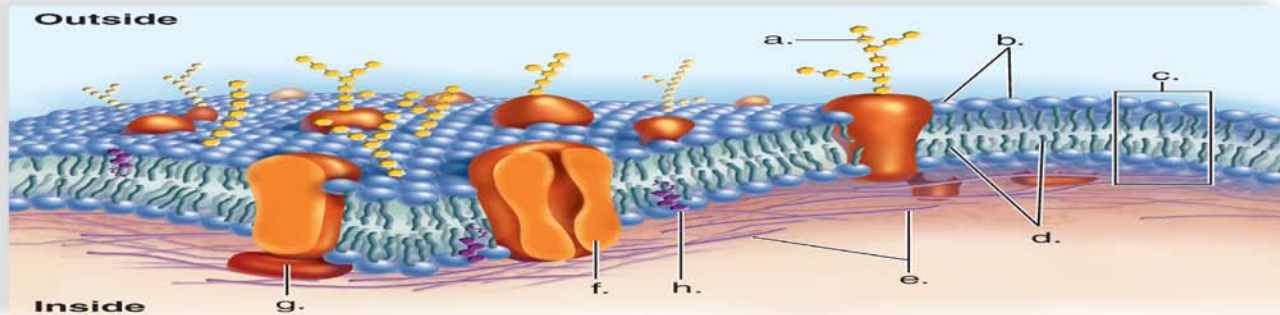
cell respiration:

1) aerobic:
glucose + O₂ ->
32 ATP + CO₂ + H₂O

2) anaerobic:
glucose ->
2 ATP + H₂O
+ lactic acid

Cell Transport

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a) Passive Transport

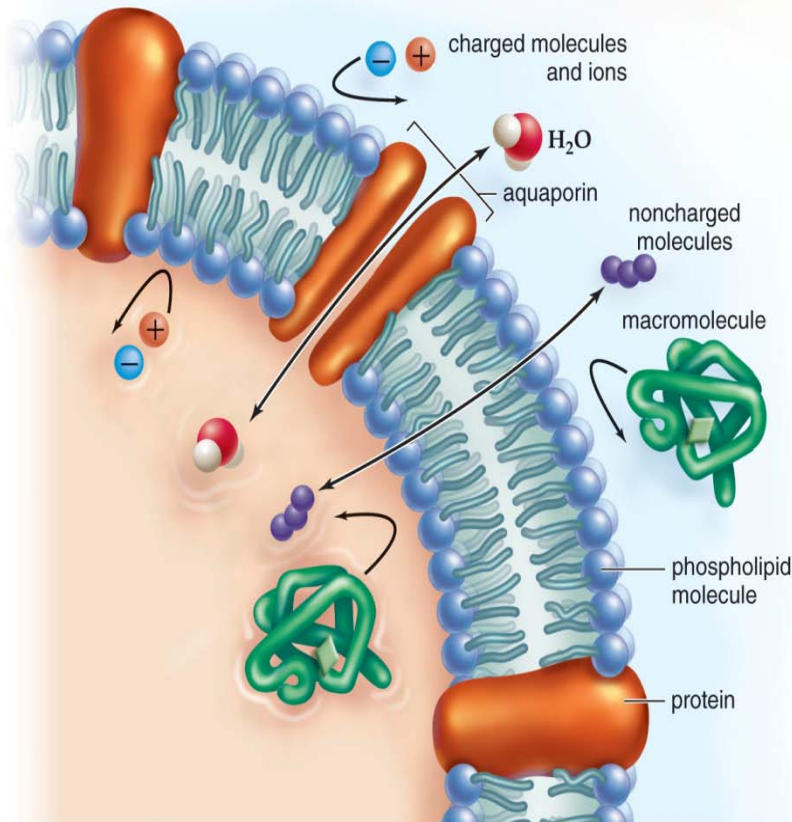
- 1) energy is needed
 - 2) permeable membrane (pores)
 - 3) material moved $\uparrow \rightarrow \downarrow$ (with gradient)
- examples: diffusion, osmosis, facilitated transport

b) Active Transport

- 1) energy is needed
 - 2) permeable membrane
 - 3) material moved $\downarrow \rightarrow \uparrow$ (against gradient)
- examples: pump, bulk transport

Passive Transport

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criteria:

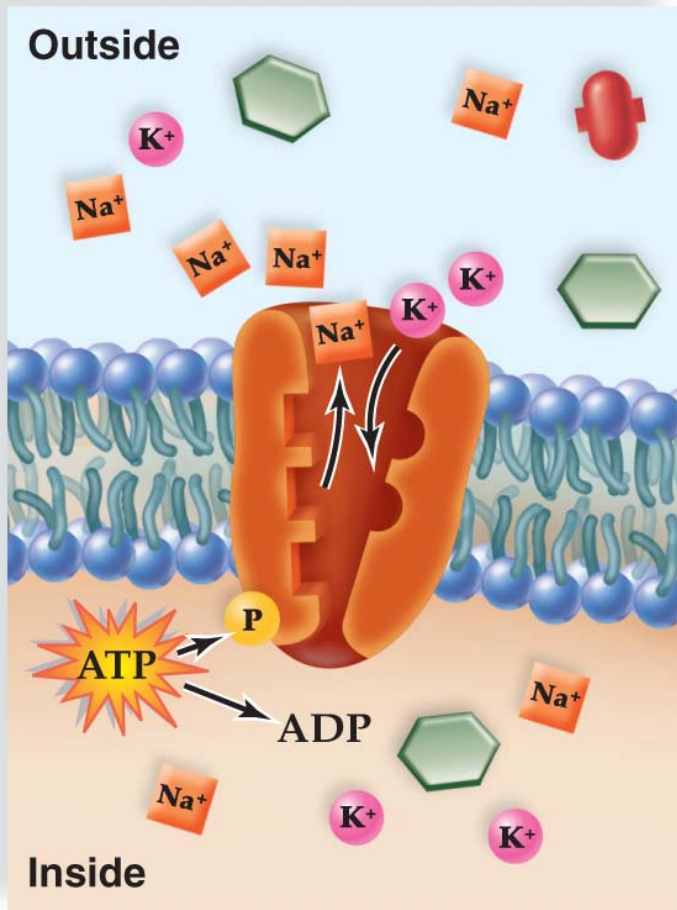
- 1) energy is needed
- 2) permeable membrane (pores)
- 3) material moved
[↑] -> [↓]
(with gradient)

examples:

- 1) diffusion
- 2) osmosis
- 3) facilitated transport

Active Transport

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criteria:

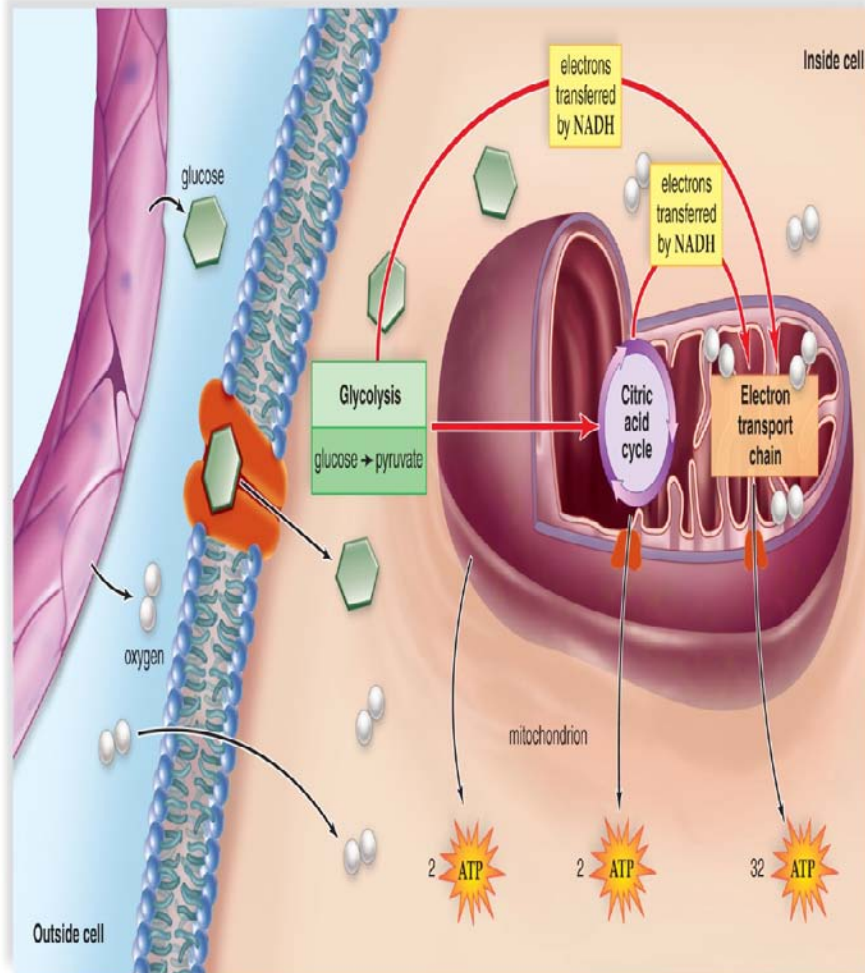
- 1) energy (ATP) needed
- 2) permeable membrane
- 3) material moved
[↓] -> [↑]
(against gradient)

examples:

- 1) nerve pump
(Na out, K in)
- 2) bulk transport

How is cell energy made?

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2 ways:

**1) anaerobic respiration
(glycolysis, fermentation)**

a) no air (oxygen)

**b) glucose ->
2 ATP + lactic acid**

c) place: cytoplasm

2) aerobic respiration

a) air (oxygen)

**b) glucose + O₂ ->
26 ATP + CO₂ + H₂O**

c) place: mitochondria

Compare ATP Prod.

cell respiration vs glycolysis

1) more energy per glucose: 36 vs 2 ATP

2) not sore, no lactic acid vs some

3) ordinary use vs emergency use

ATP uses:

cell transport, chem. reactions, muscle contractions