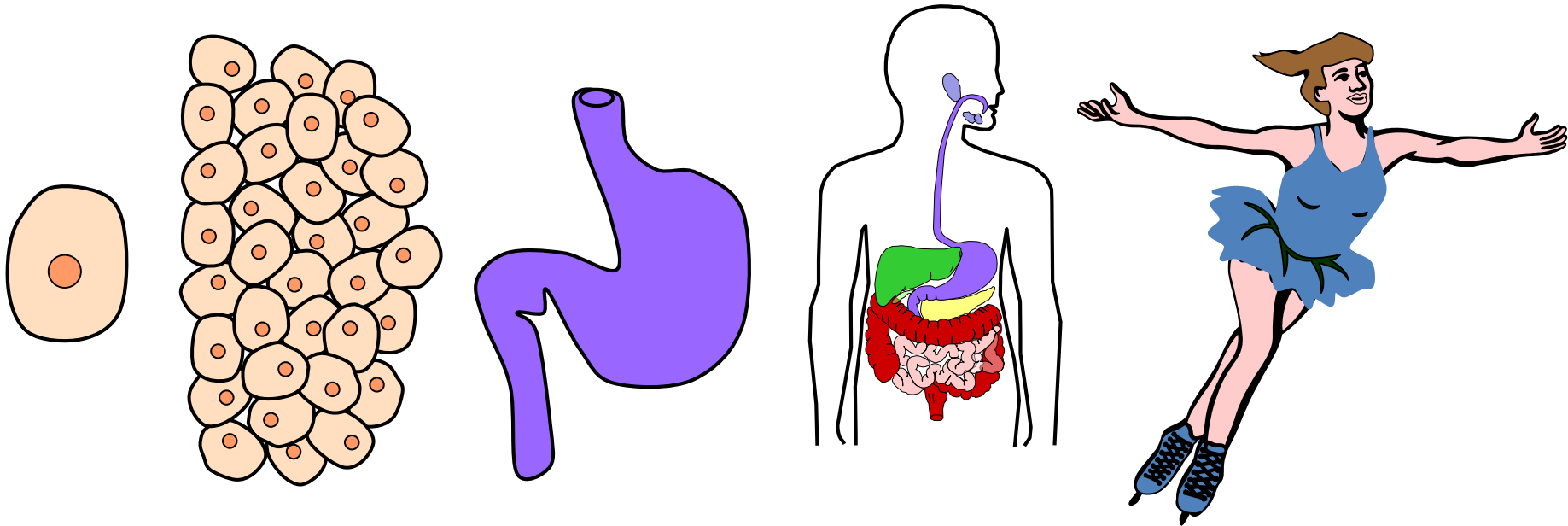


Cell Structure and Function

- I can list the levels of organization in an organisms
- I can identify types of cells (prokaryotes or eukaryotes) when looking at an image or given an example
- I can label prokaryotes and eukaryotes cell structures
- I can identify differences in plants, animals, and bacterial cells
- I can list cell structures, their functions and indicate where they are found

The Levels of Organization

Multicellular organisms are arranged from simple to complex according to their level of cellular grouping.



cell

tissue

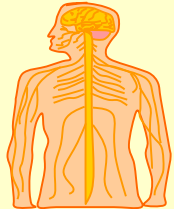

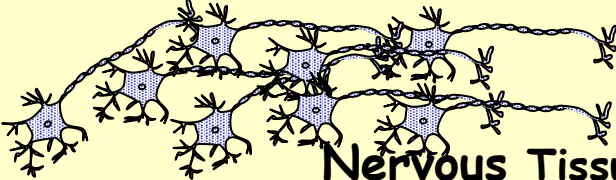
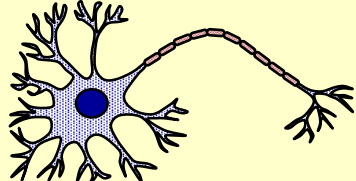
organ

organ
system

organism

Levels of Organization

- What is the benefit of being made of all of these cells?

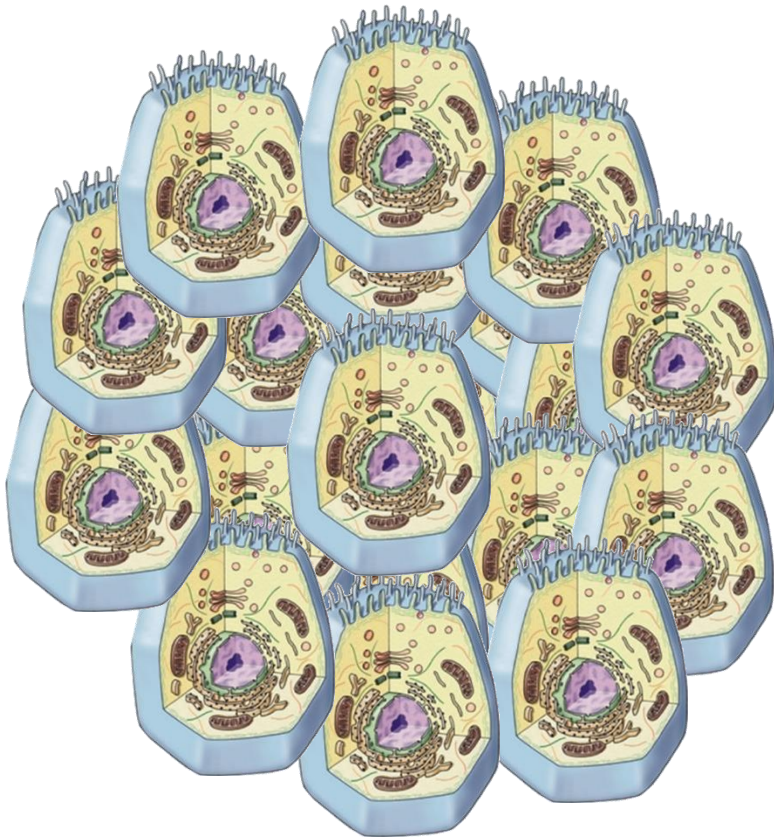
Level	Function	Example
Organ system	Different organs function together	 Nervous System
Organ	Different tissues function together	 Brain
Tissues	Similar cells function together	 Nervous Tissue
Cells	Cells can perform special jobs	 Neuron

Why study cells?

□ Cells → Tissues → Organs → Bodies

▣ **bodies are made up of cells**

▣ **cells do all the work of life!**



The Work of Life

- What jobs do cells have to do for an organism to live...
 - ▣ “breathe” - respire
 - gas exchange: O_2 in vs. CO_2 out
 - ▣ eat
 - take in & digest food
 - ▣ make energy
 - ATP
 - ▣ build molecules
 - proteins, carbohydrates, fats, nucleic acids
 - ▣ remove wastes
 - ▣ control internal conditions
 - homeostasis
 - ▣ respond to external environment
 - ▣ build more cells
 - growth, repair, reproduction & development



The Jobs of Cells

- Cells have 3 main jobs

- ▣ make energy

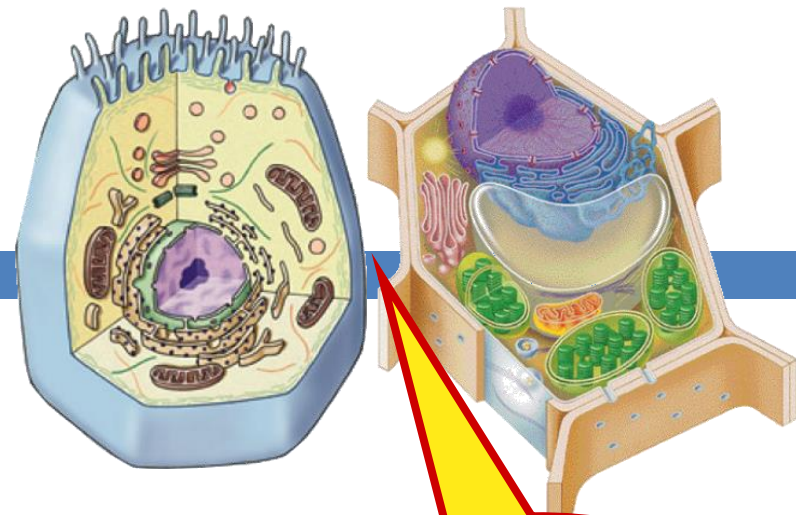
- need energy for all activities
 - need to clean up waste produced while making energy

- ▣ make proteins

- proteins do all the work in a cell, so we need lots of them

- ▣ make more cells

- for growth
 - to replace damaged or diseased cells



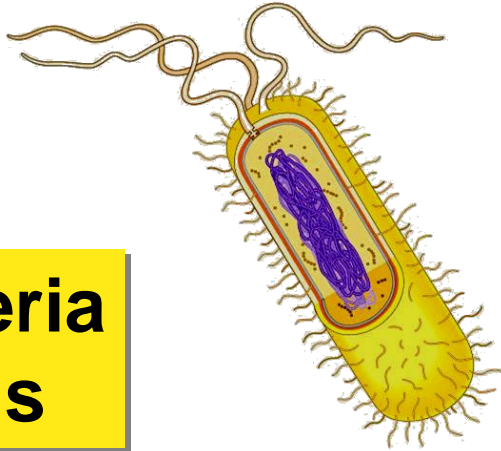
Our organelles
do all these
jobs!

Two Types of Cells

Prokaryote

- no organelles

**bacteria
cells**

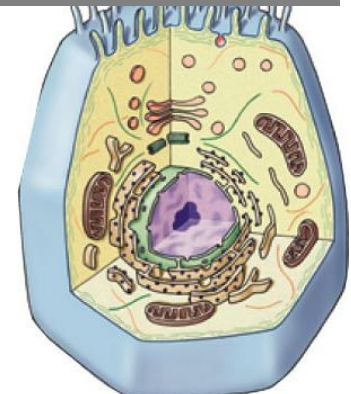
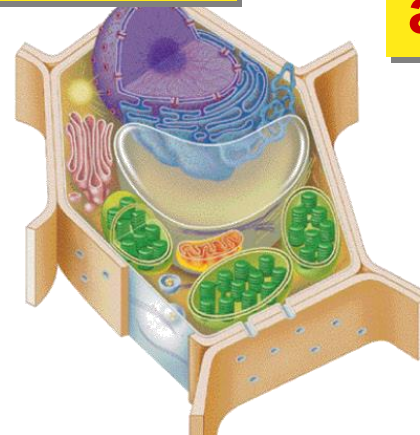


Eukaryotes

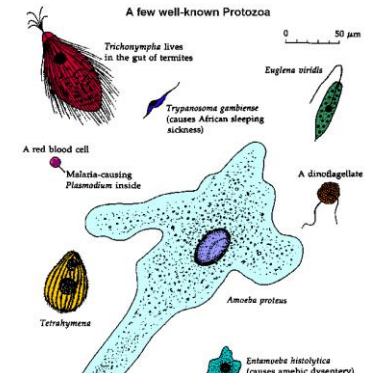
- organelles

plant cells

animal cells



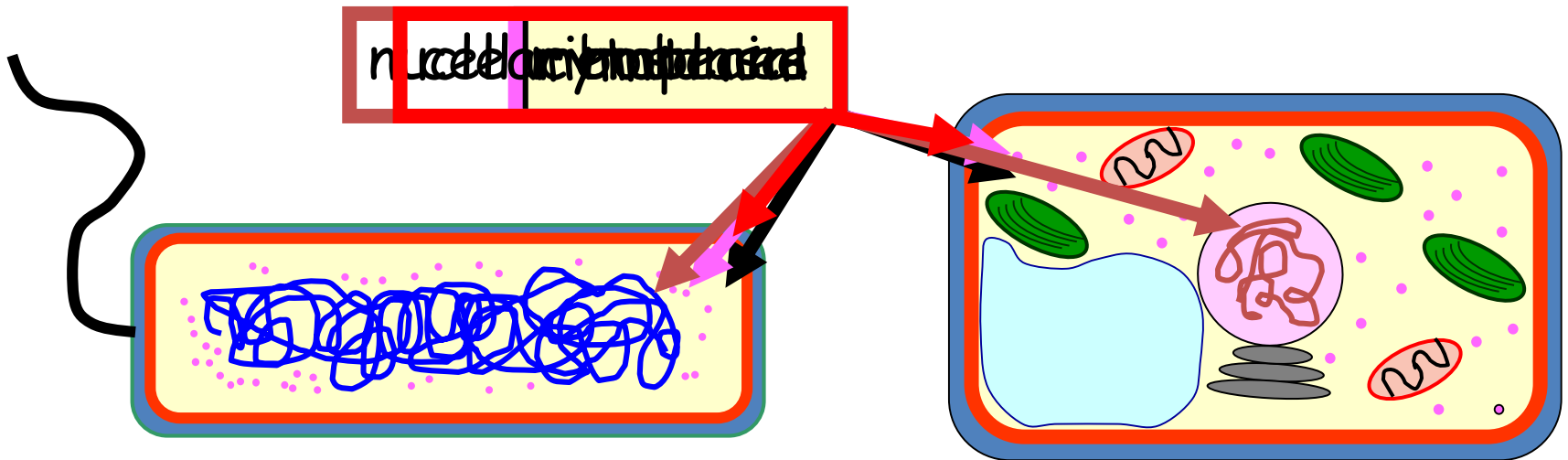
fungus cells



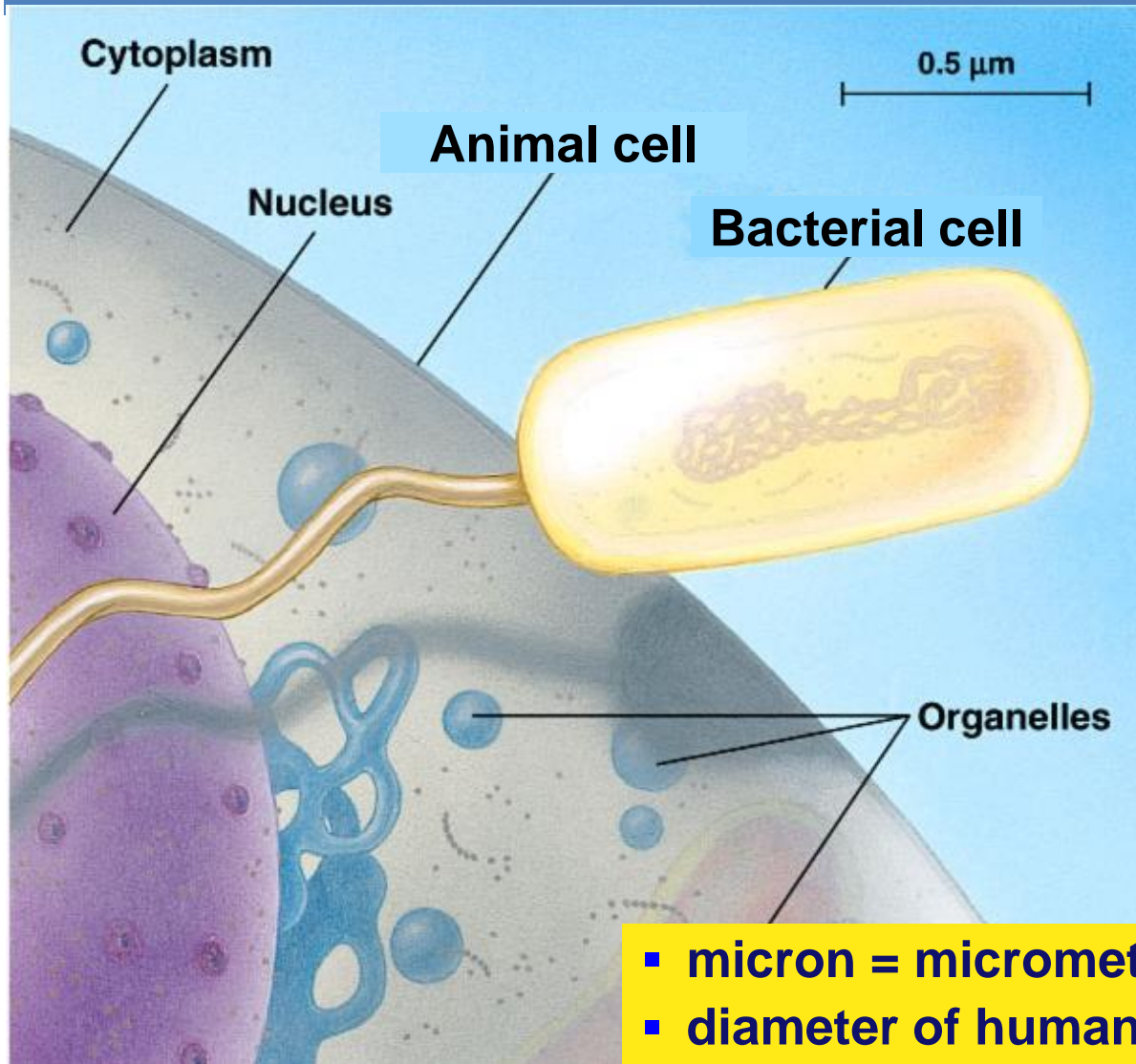
protist cells

4 characteristics of ALL cells (prokaryotes & eukaryotes)

- All cells have
 - ▣ cell membrane
 - ▣ cytoplasm
 - ▣ ribosomes
 - ▣ nuclear material



Cell size comparison



most bacteria

- 1-10 microns

eukaryotic cells

- 10-100 microns

- micron = micrometer = 1/1,000,000 meter
- diameter of human hair = ~20 microns

Different Types of Cells

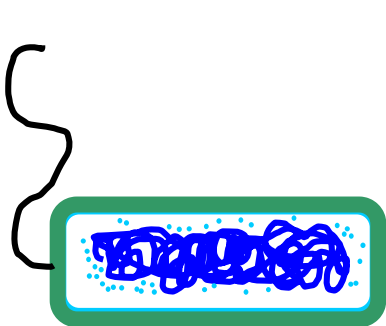
☐ Prokaryotic

no nucleus

small ribosomes

no membrane
bound organelles

only in bacteria



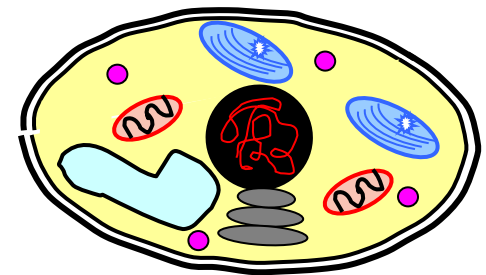
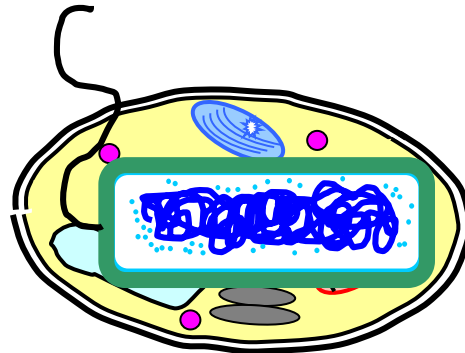
☐ Eukaryotic

nucleus

larger ribosomes

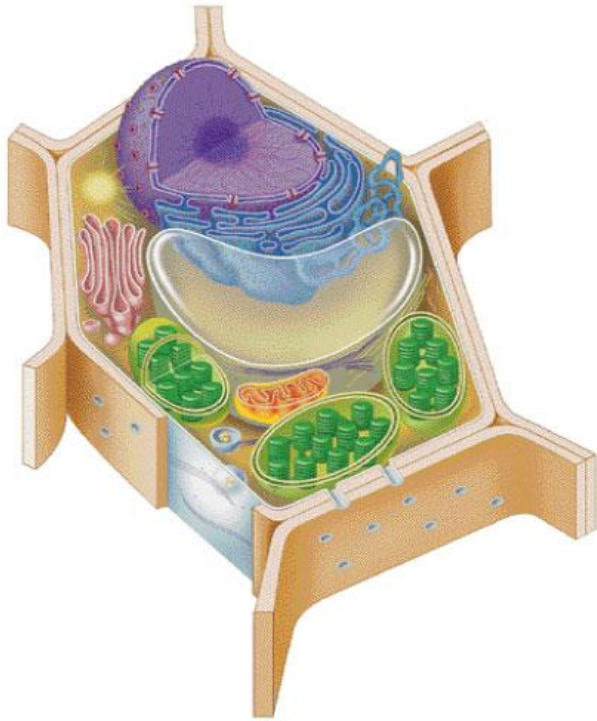
membrane bound
organelles

protists, fungi,
plants, animals

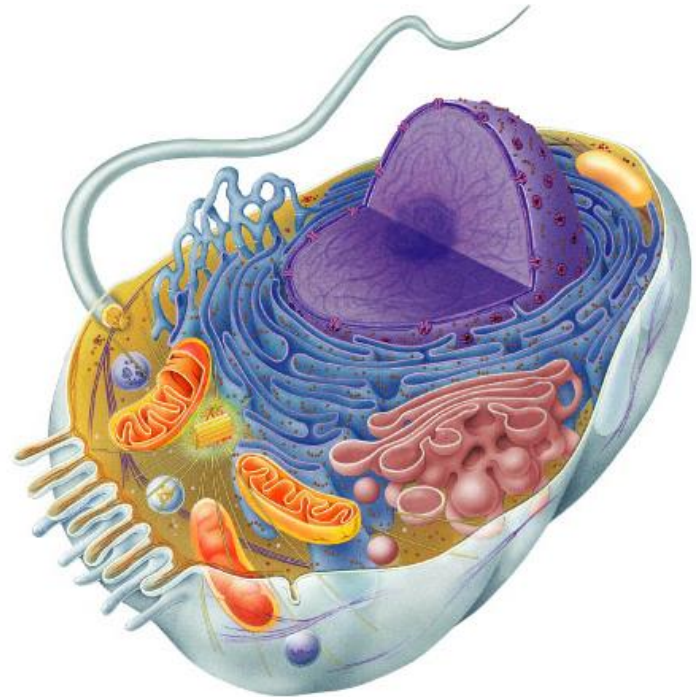


2 famous Eukaryotes

Plant cell



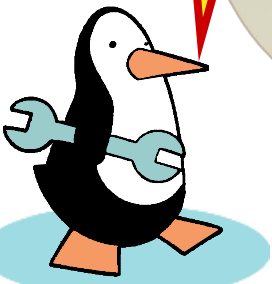
Animal cell



Organelles

- Organelles do the work of cells
 - ▣ each structure has a job to do
 - keeps the cell alive; keeps you alive

They're like
mini-organs!



Model Animal Cell

1. Cells make energy

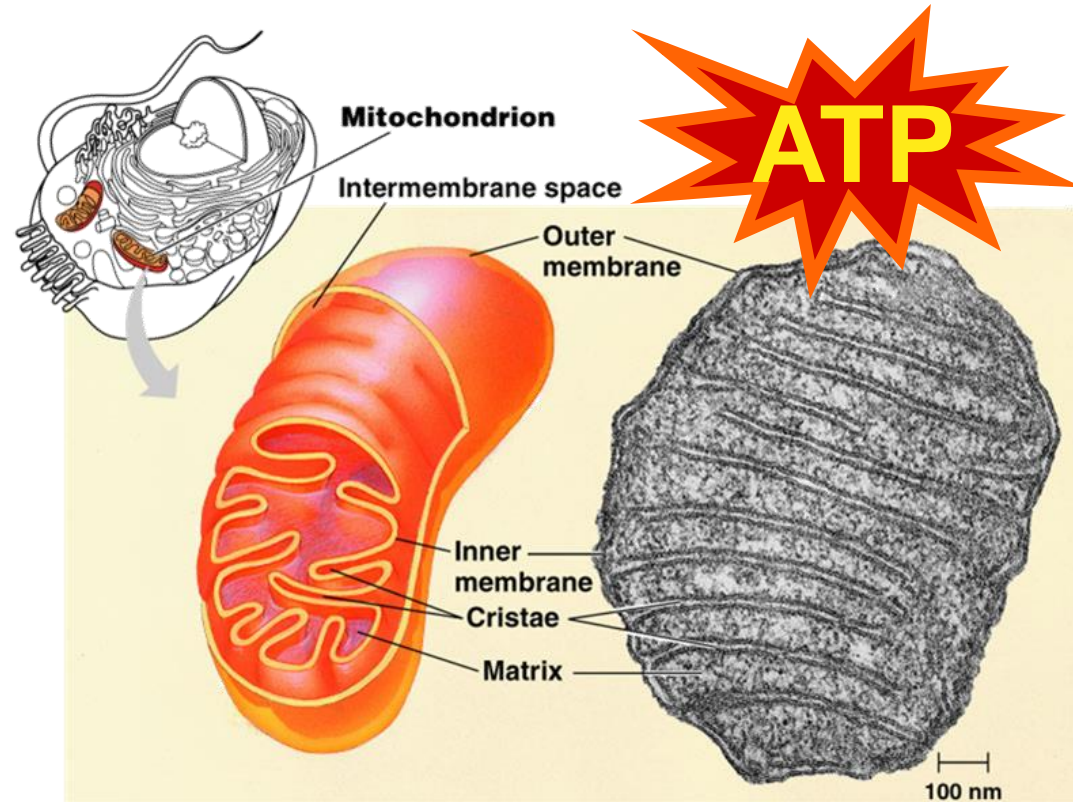
□ Mitochondria Function

▣ make ATP energy from cellular respiration

- $\text{sugar} + \text{O}_2 \rightarrow \text{ATP}$
- fuels the work of life

□ Structure

▣ double membrane



in both animal & plant cells

2. Cells need workers = proteins!

□ Making proteins

▣ to run daily life & growth, the cell must...

- read genes (DNA)

- build proteins

 - structural proteins (muscle fibers, hair, skin, claws)

 - enzymes (speed up chemical reactions)

 - signals (hormones) & receptors

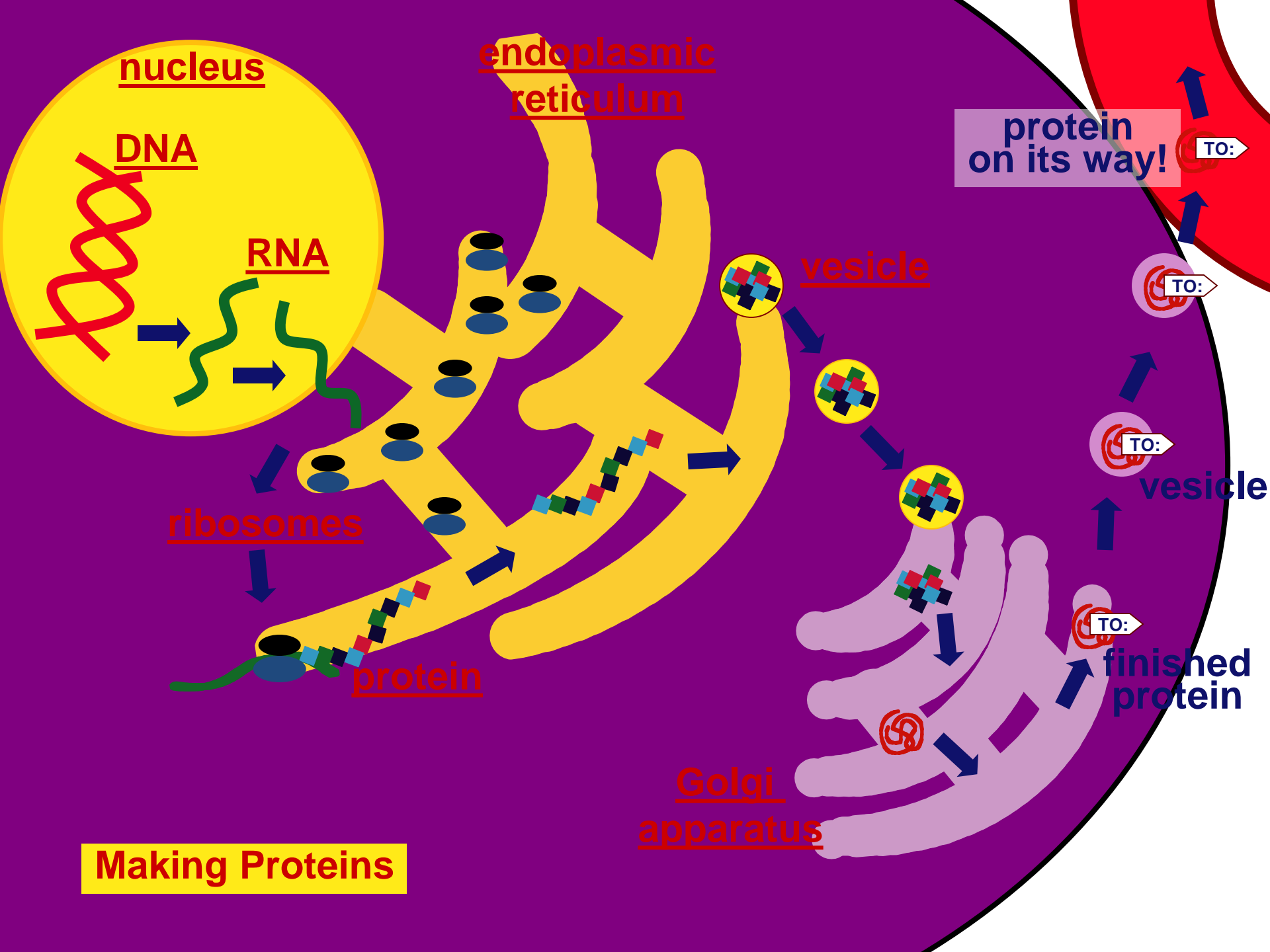
▣ organelles that do this work...

- nucleus

- ribosomes

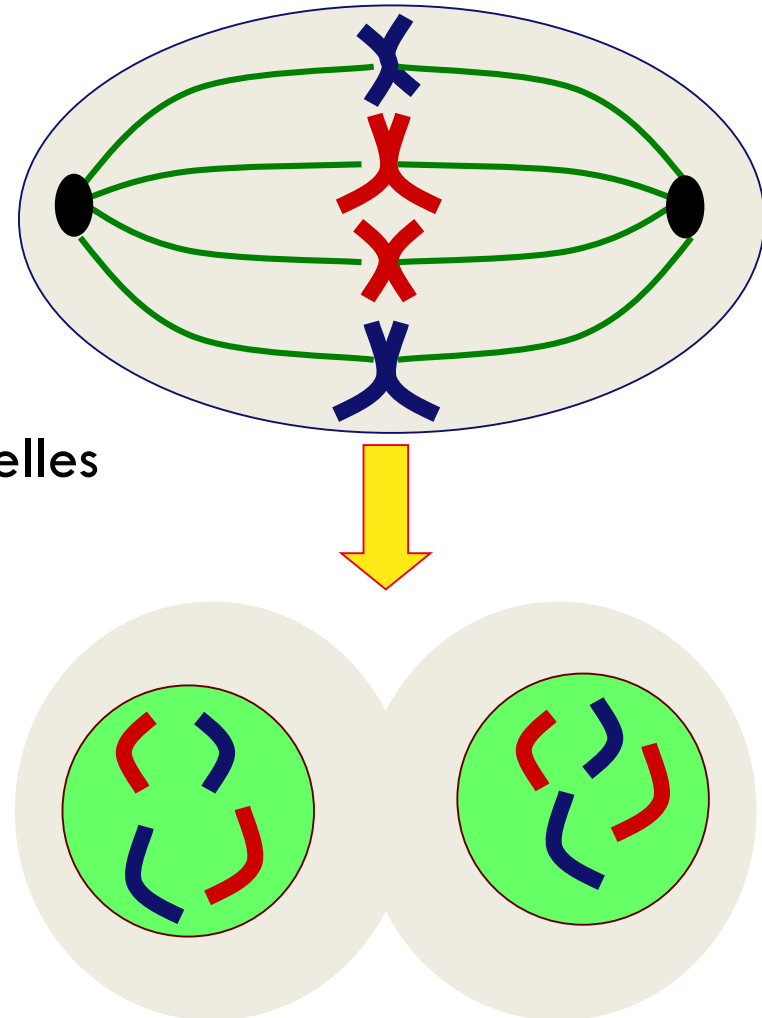
- endoplasmic reticulum (ER)

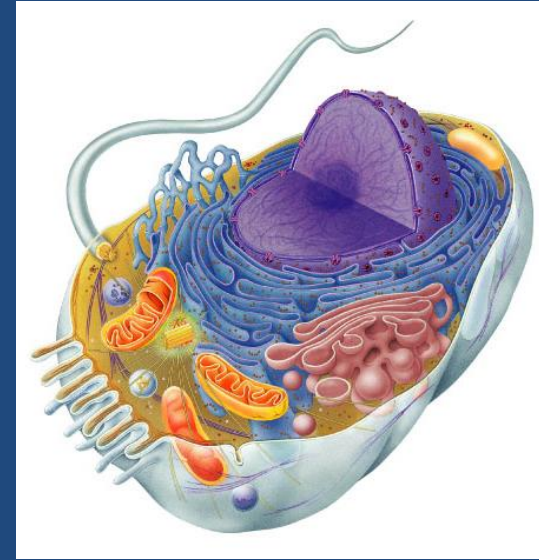
- Golgi apparatus



3. Cells need to make more cells!

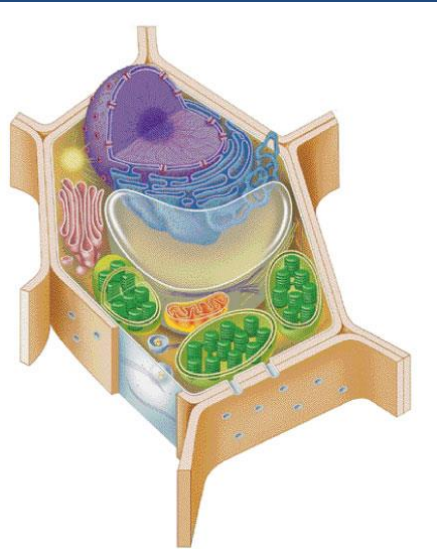
- Making more cells
 - ▣ to replace, repair & grow, the cell must...
 - copy their DNA
 - make extra organelles
 - divide the new DNA & new organelles between 2 new “daughter” cells
 - ▣ organelles that do this work...
 - nucleus
 - centrioles





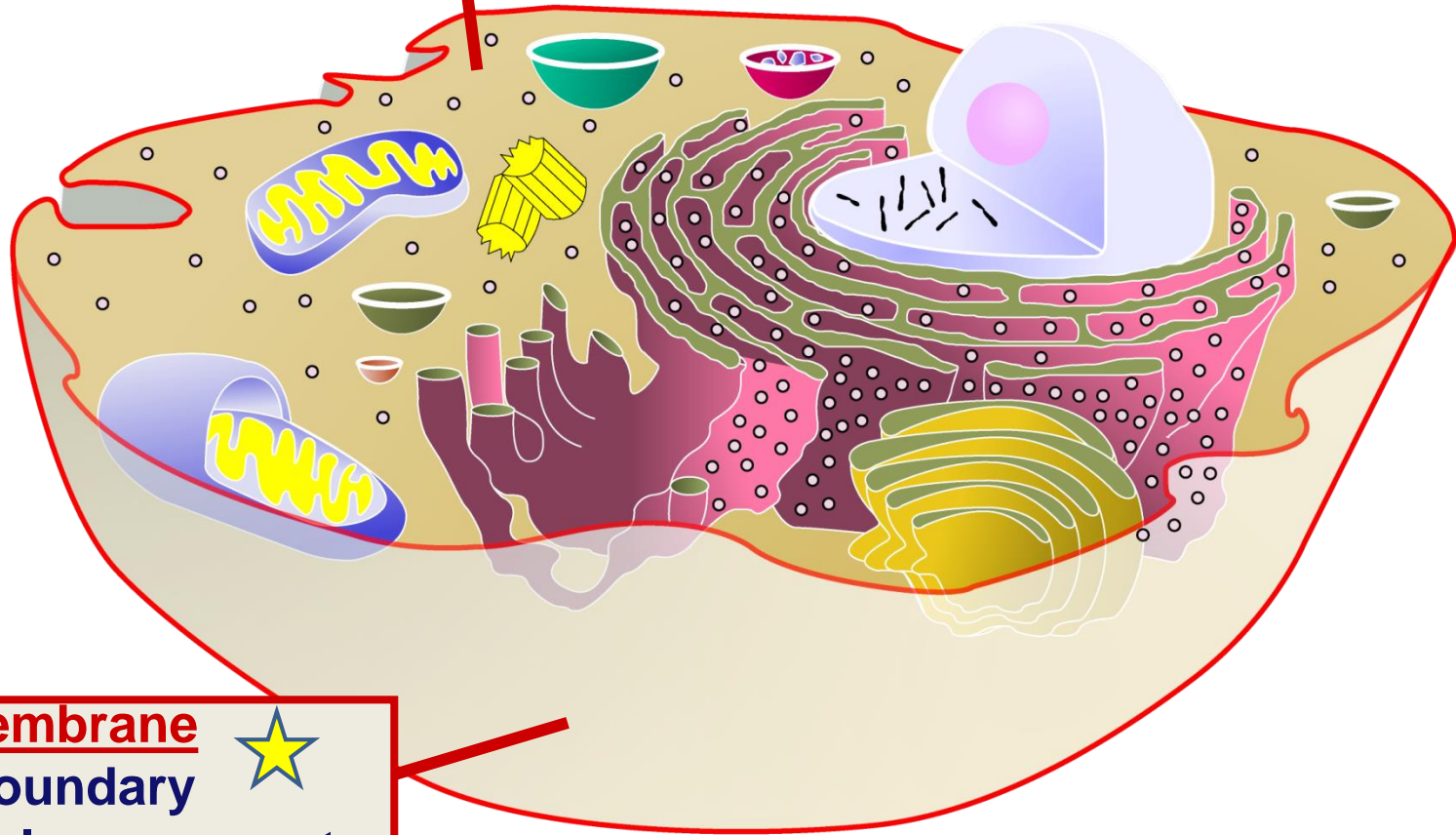
Cells & Cell Organelles

Doing Life's Work



cytoplasm

- jelly-like material holding organelles in place



cell membrane

- cell boundary
- controls movement of materials in & out
- recognizes signals



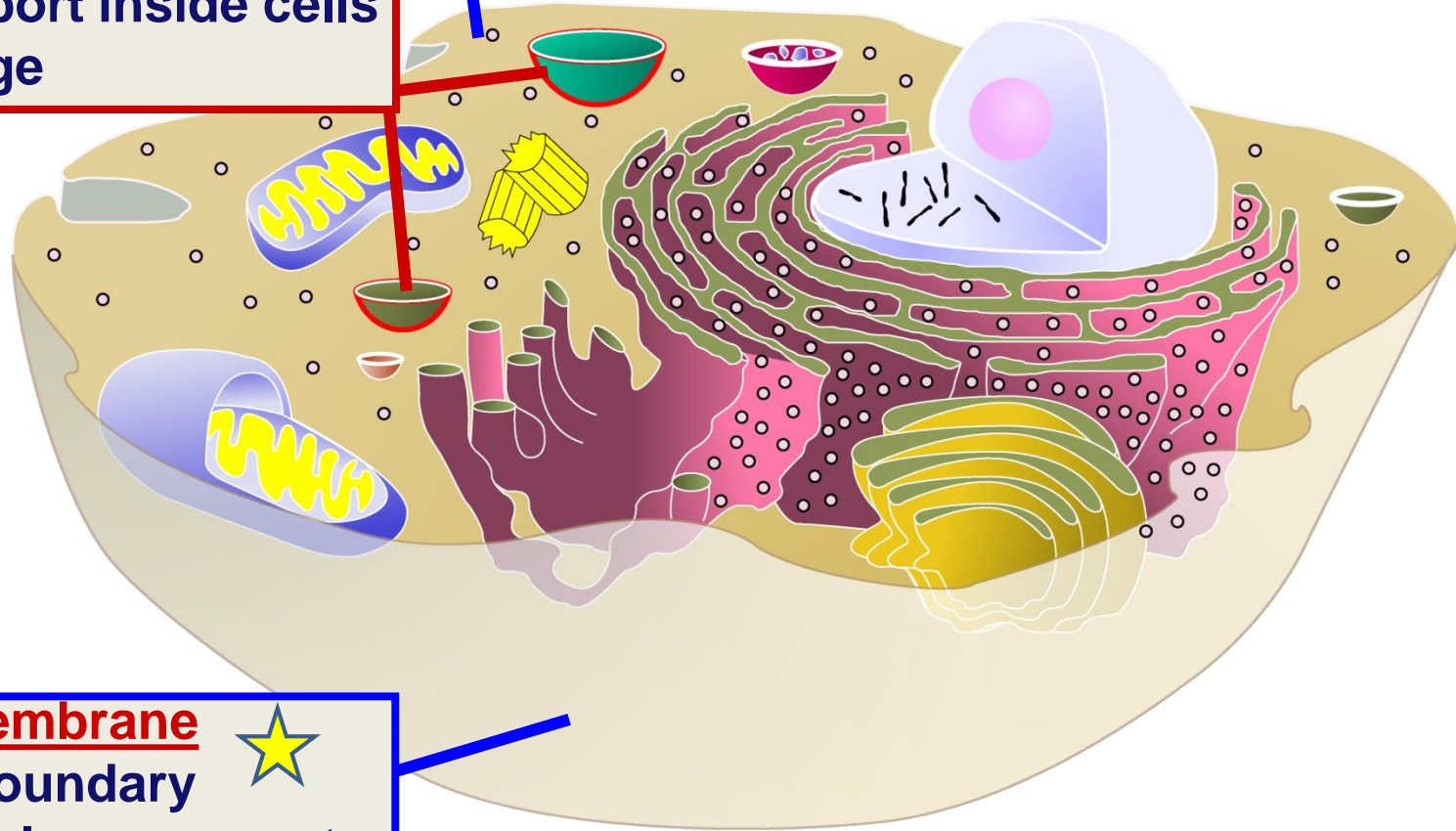
cytoplasm

- jelly-like material holding organelles in place



vacuole & vesicles

- transport inside cells
- storage



cell membrane

- cell boundary
- controls movement of materials in & out
- recognizes signals



cytoplasm

- jelly-like material holding organelles in place



vacuole & vesicles

- transport inside cells
- storage

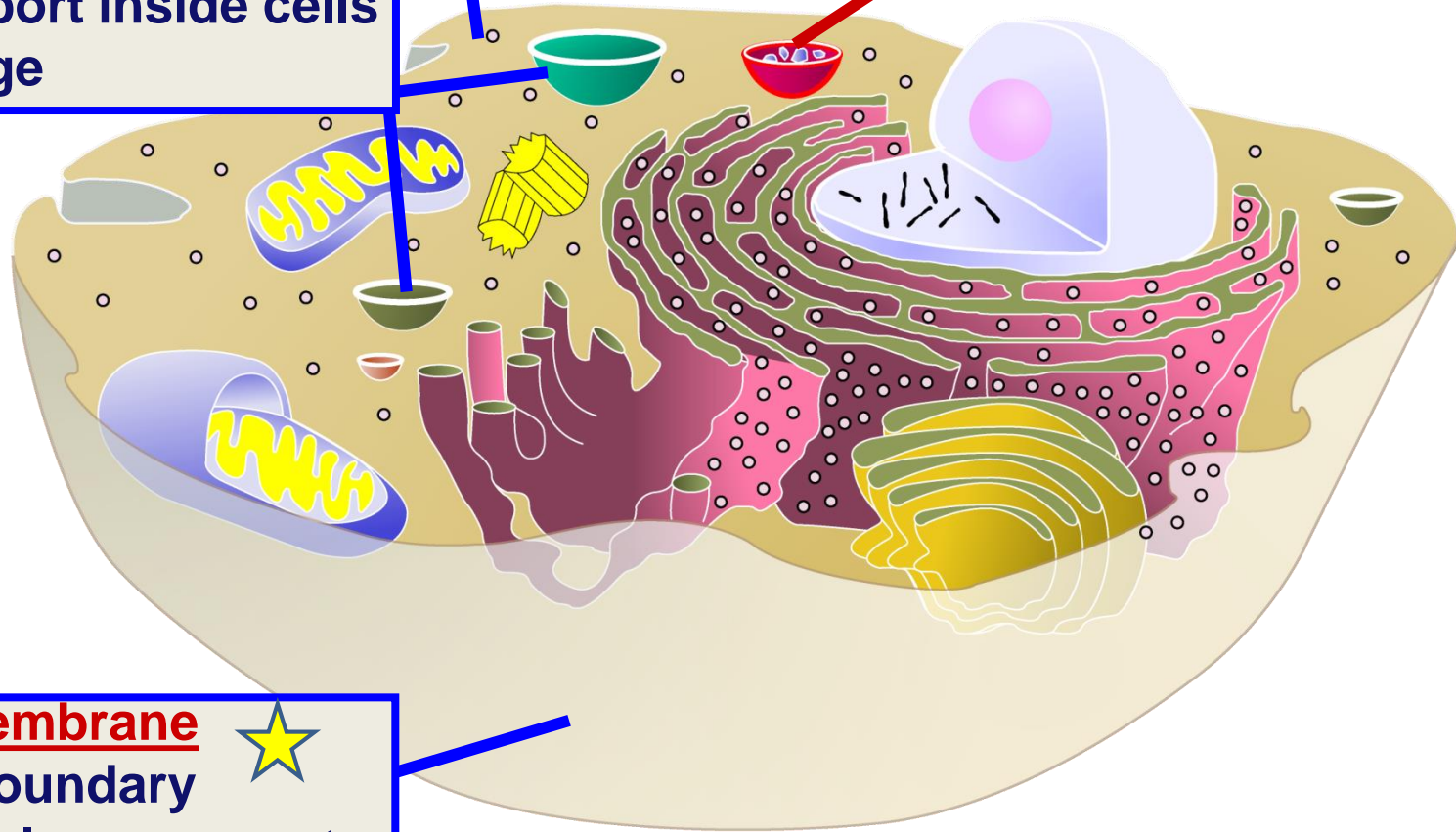
lysosome

- food digestion
- garbage disposal & recycling



cell membrane

- cell boundary
- controls movement of materials in & out
- recognizes signals



Mitochondria ★

□ Function

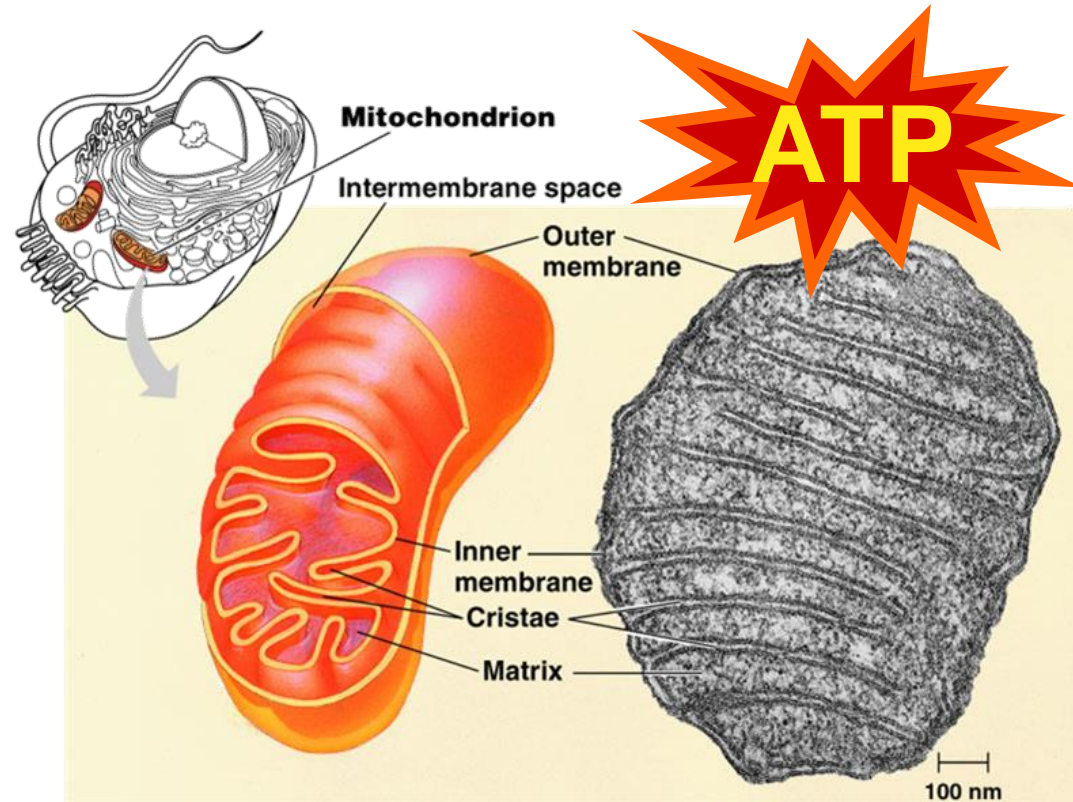
▣ make ATP energy from cellular respiration

- $\text{sugar} + \text{O}_2 \rightarrow \text{ATP}$
- fuels the work of life

□ Structure

- ▣ double membrane
- ▣ DNA

in both animal & plant cells



cytoplasm

- jelly-like material holding organelles in place



vacuole & vesicles

- transport inside cells
- storage

lysosome

- food digestion
- garbage disposal & recycling



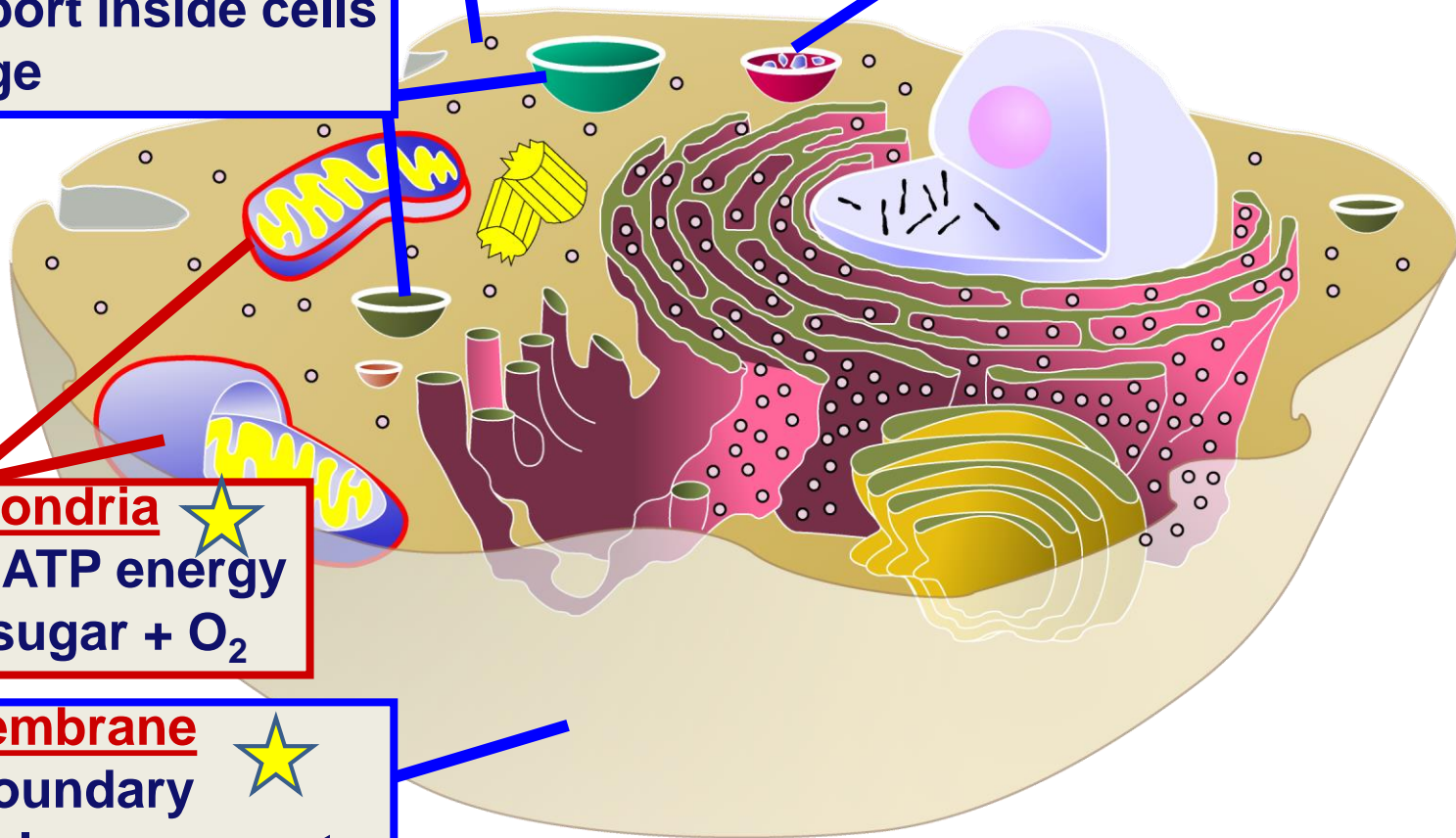
Mitochondria

- make ATP energy from sugar + O₂



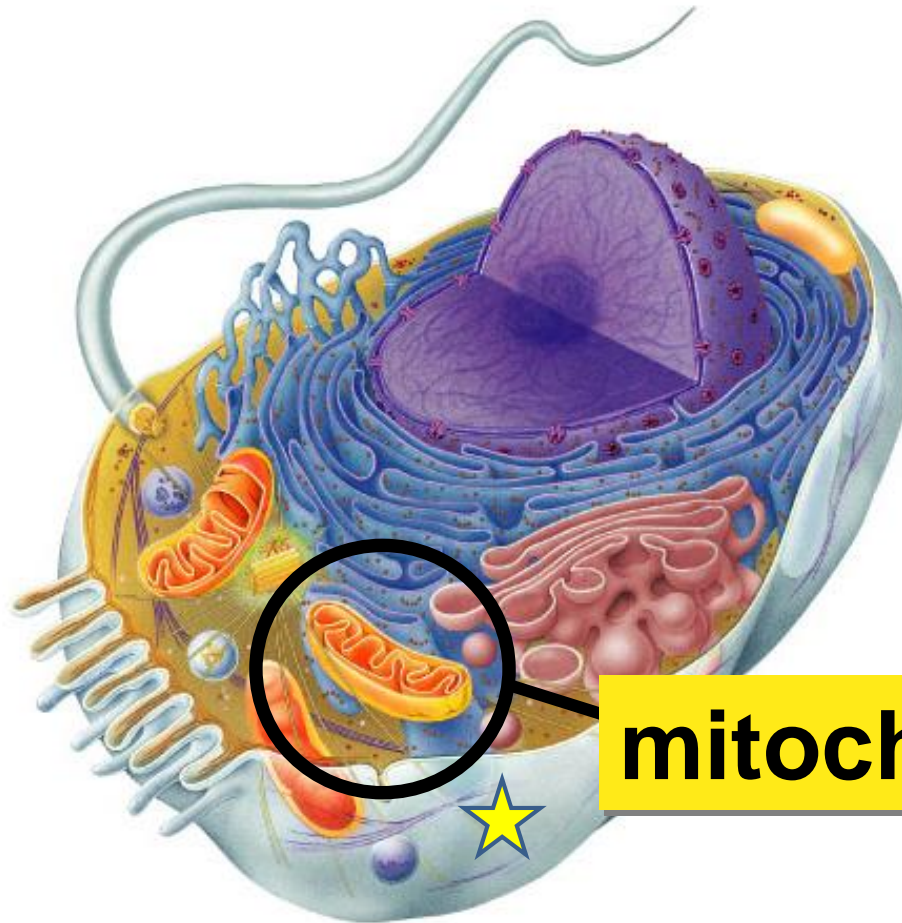
cell membrane

- cell boundary
- controls movement of materials in & out
- recognizes signals



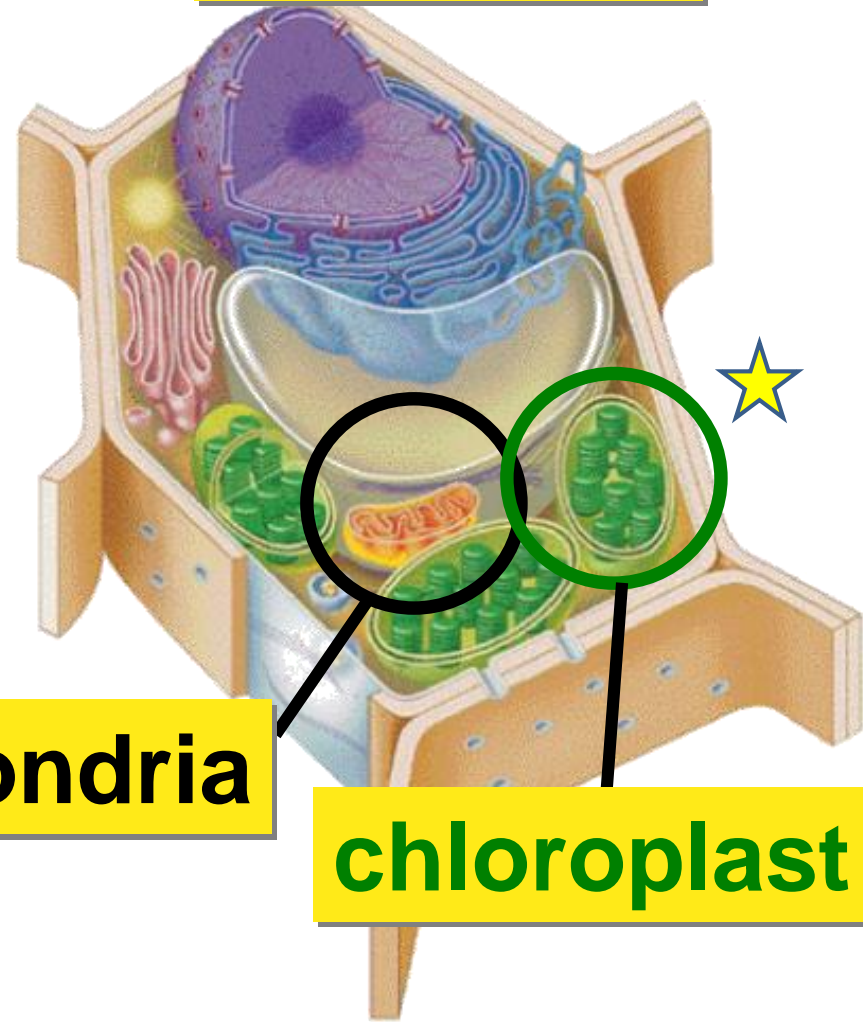
Mitochondria are in both cells!!

animal cells



mitochondria

plant cells



chloroplast

cytoplasm

- jelly-like material holding organelles in place ★

vacuole & vesicles

- transport inside cells
- storage

lysosome

- food digestion ★
- garbage disposal & recycling

nucleolus

- produces ribosomes

Nucleus

- protects DNA ★
- controls cell

chromosomes

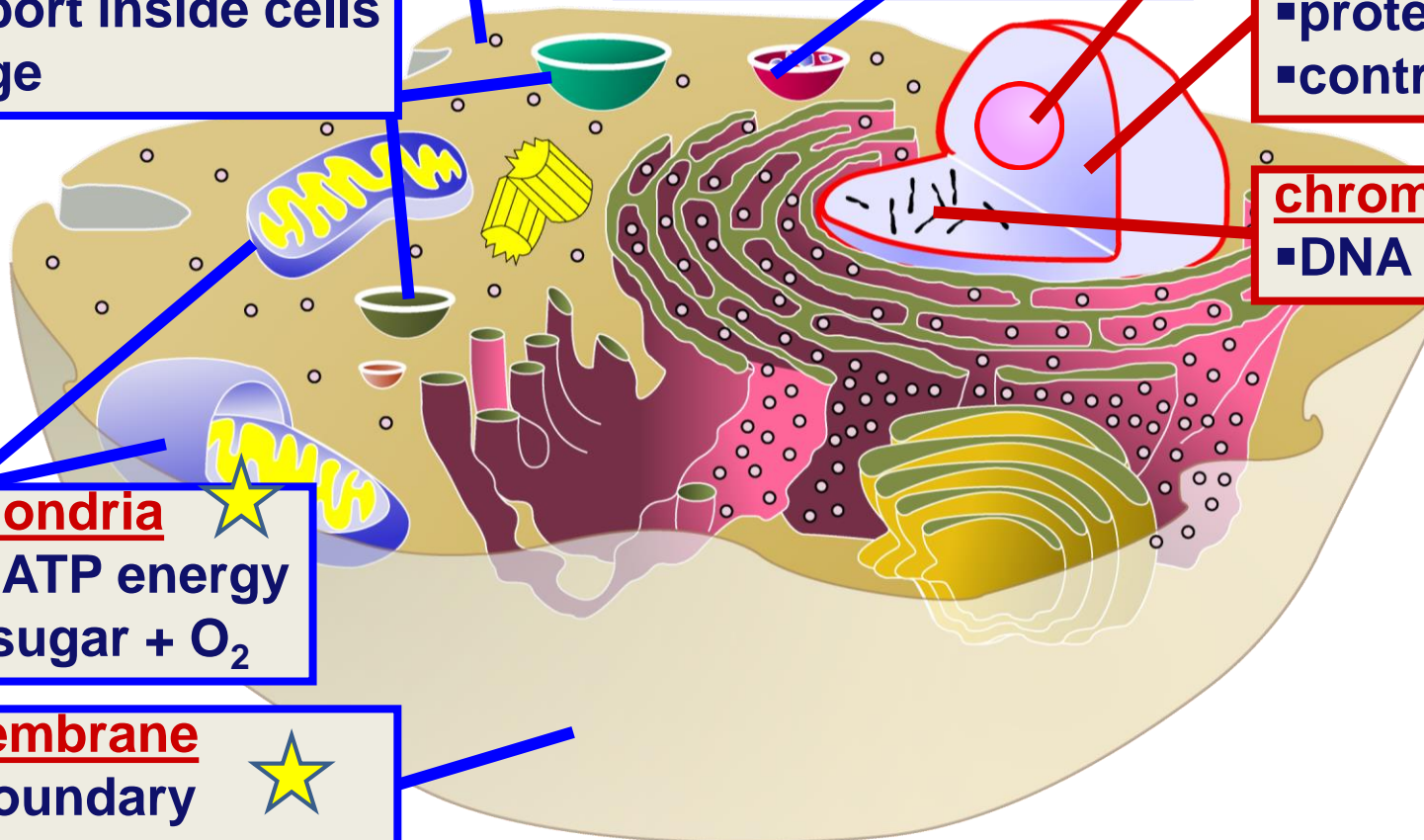
- DNA

mitochondria

- make ATP energy from sugar + O₂ ★

cell membrane

- cell boundary ★
- controls movement of materials in & out
- recognizes signals



Ribosomes ★

□ Function

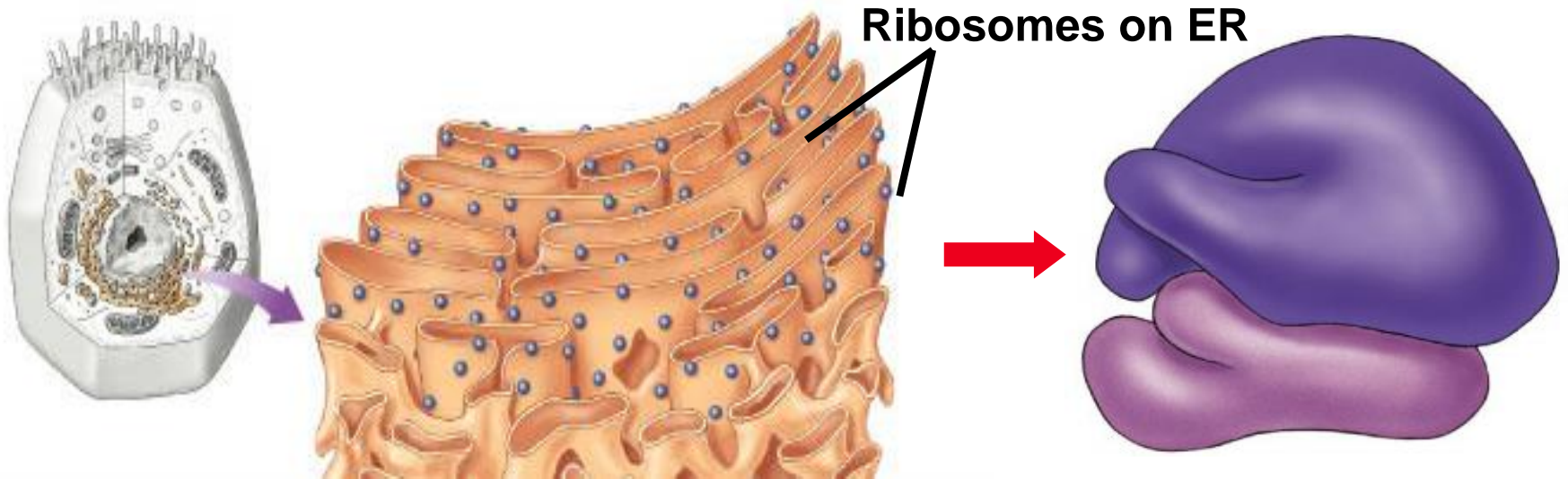
- ▣ protein factories

- ▣ read instructions to build proteins from DNA

□ Structure

- ▣ some free in cytoplasm

- ▣ some attached to ER



cytoplasm

- jelly-like material holding organelles in place

vacuole & vesicles

- transport inside cells
- storage

Lysosome

- food digestion
- garbage disposal & recycling

nucleolus

- produces ribosomes

nucleus

- protects DNA
- controls cell

mitochondria

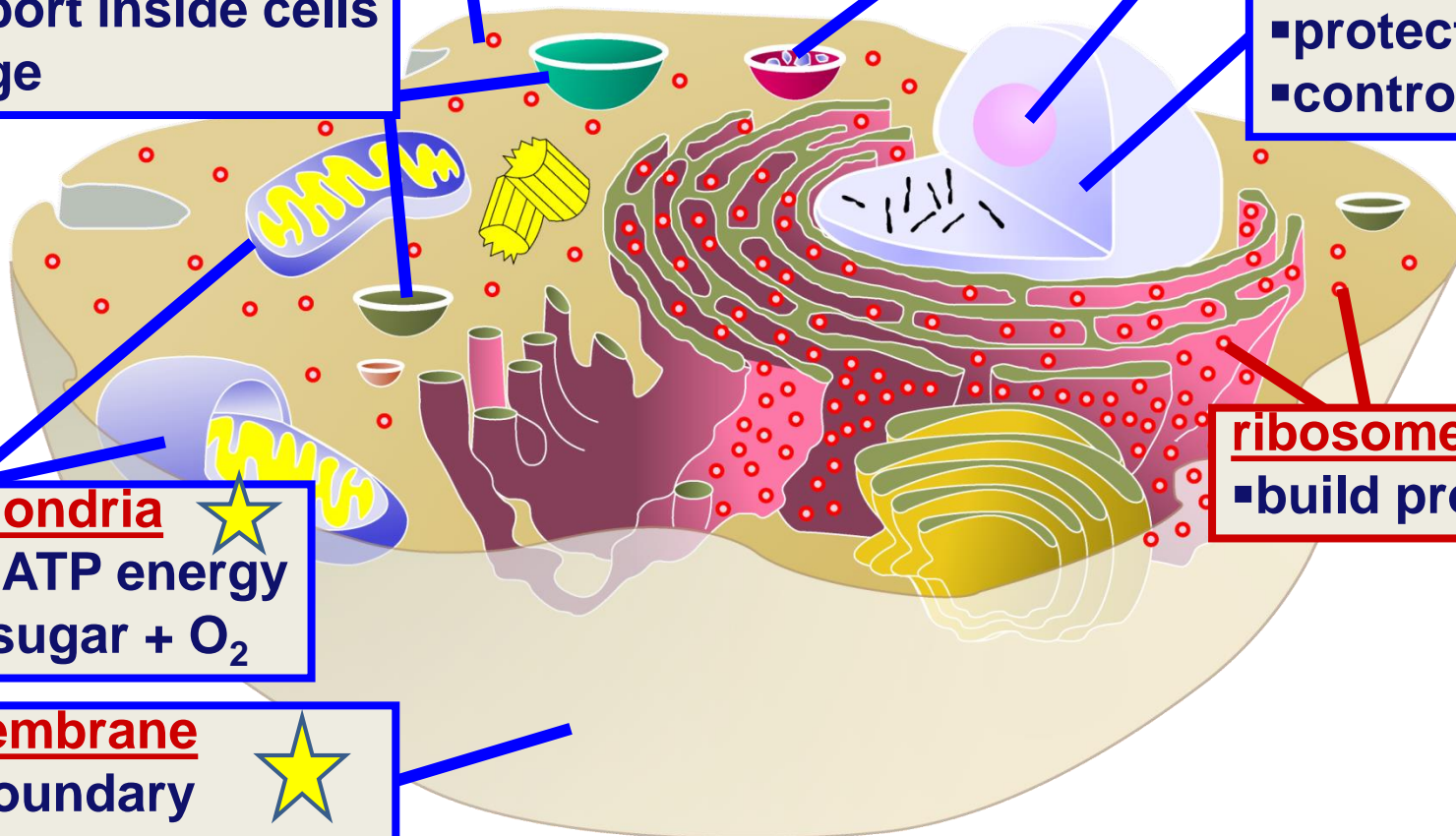
- make ATP energy from sugar + O₂

cell membrane

- cell boundary
- controls movement of materials in & out
- recognizes signals

ribosomes

- build proteins



cytoplasm

- jelly-like material holding organelles in place ★

vacuole & vesicles

- transport inside cells
- storage

Lysosome

- food digestion ★
- garbage disposal & recycling

nucleus

- protects DNA ★
- controls cell

mitochondria

- make ATP energy from sugar + O₂ ★

cell membrane

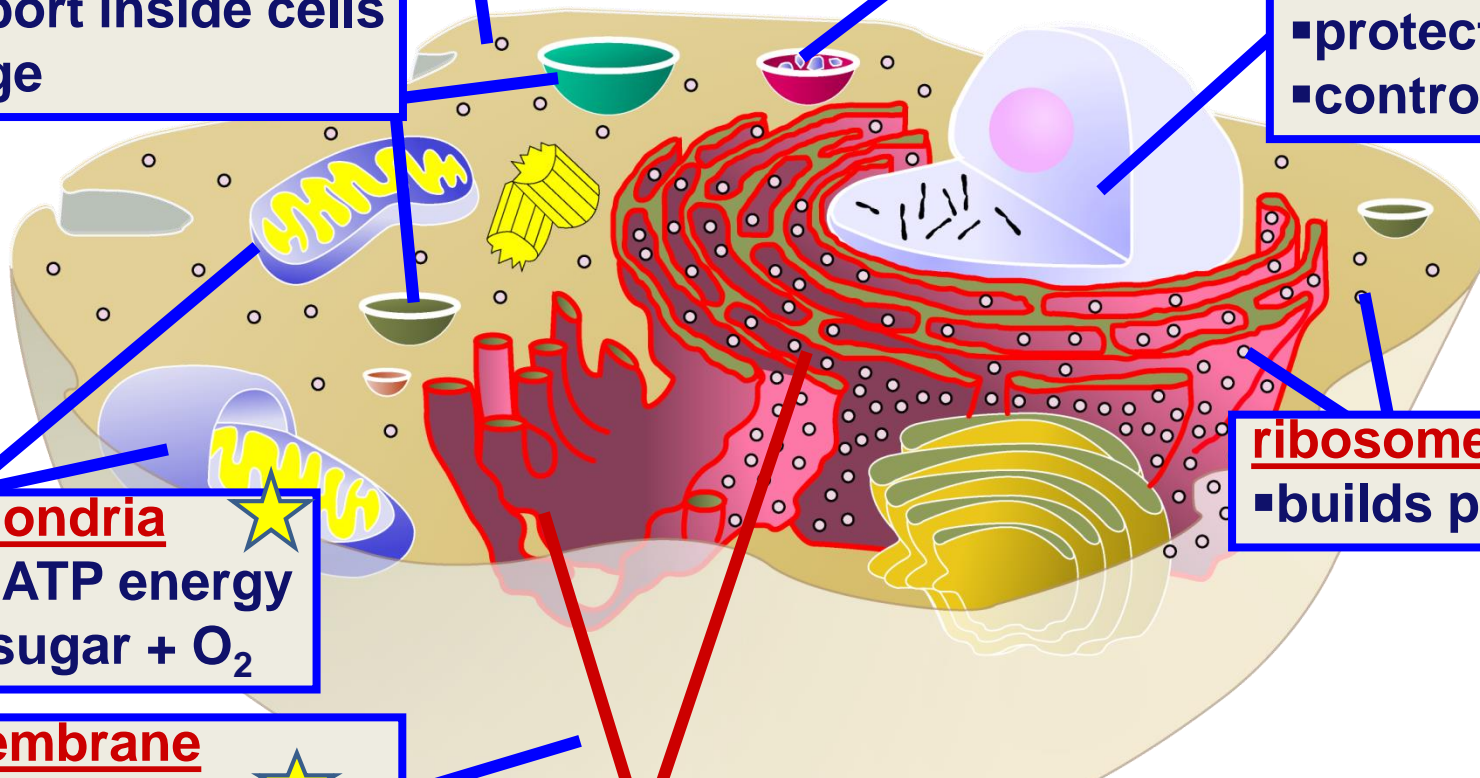
- cell boundary ★
- controls movement of materials in & out
- recognizes signals

ER

- transport proteins

ribosomes

- builds proteins ★



cytoplasm

- jelly-like material holding organelles in place

vacuole & vesicles

- transport inside cells
- storage

Lysosome

- food digestion
- garbage disposal & recycling

nucleus

- protects DNA
- controls cell

mitochondria

- make ATP energy from sugar + O₂

cell membrane

- cell boundary
- controls movement of materials in & out
- recognizes signals

ER

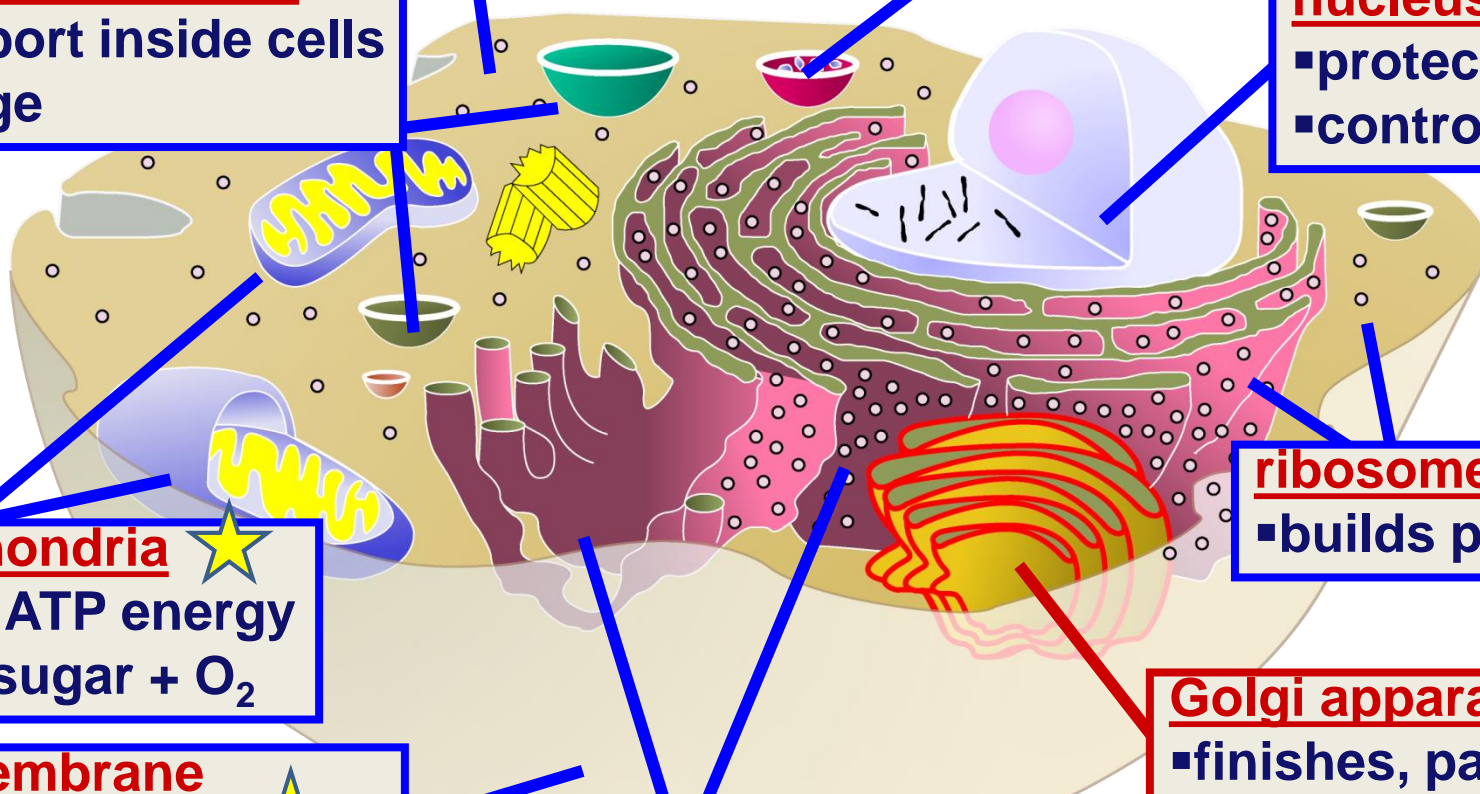
- helps finish proteins
- makes membranes

ribosomes

- builds proteins

Golgi apparatus

- finishes, packages & ships proteins



cytoplasm

- jelly-like material holding organelles in place ★

vacuole & vesicles

- transport inside cells
- storage

Lysosome

- food digestion ★
- garbage disposal & recycling

nucleus

- protects DNA ★
- controls cell

centrioles

- cell division

mitochondria

- make ATP energy from sugar + O₂ ★

cell membrane

- cell boundary ★
- controls movement of materials in & out
- recognizes signals

ribosomes

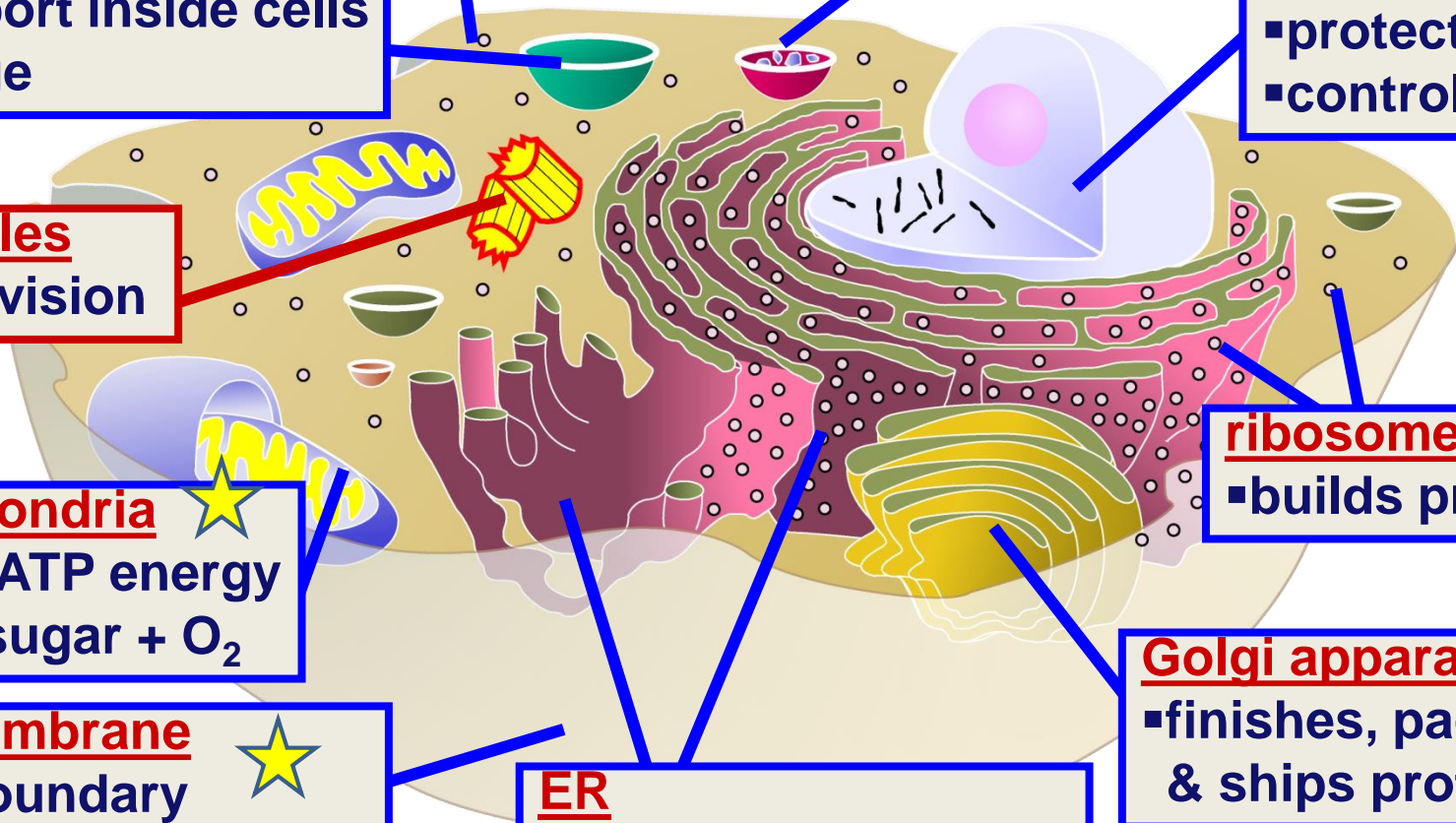
- builds proteins ★

Golgi apparatus

- finishes, packages & ships proteins

ER

- helps finish proteins
- makes membranes



nucleus

- control cell
- protects DNA



nucleolus

- make ribosomes

endoplasmic reticulum

- processes proteins
- makes membranes

ribosomes

- make proteins



cytoplasm

- jelly-like material around organelles



Golgi apparatus

- finish & ship proteins

mitochondria

- make ATP in cellular respiration



central vacuole

- storage: food, water or waste

cell wall

- support and structure



cell membrane

- cell boundary
- controls movement of materials in & out
- recognizes signals



chloroplast

- make ATP & sugars in photosynthesis



lysosome

- digestion & clean up

