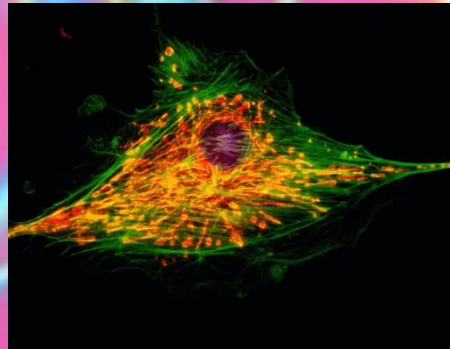


Standard 2

(Chapter 3)



A Tour of the Cell

Biology 1

Fall 2013

Standard 2-

Proficiency Goal:

Distinguishes the role of different organelles in a eukaryotic or prokaryotic cell and is able to relate them to the overall function of the cell.

Compare and contrast plant and animal cells.

Describes the steps of the protein export pathway.

Recognizes how different substances move across the membrane.

Standard 2

Advanced Goal:

Given a real-life scenario, the student can determine why the organism/cell is not functioning in the way it is supposed to, and establish how it will affect the cell/organism.

Use the organelle functions discussed in class to explain the formation of a protein in a eukaryotic cell, beginning with the instructions contained in DNA.

CELLS- "Little Rooms"

- ❖ Cells are small compartments that hold all of the biological equipment necessary to keep an organism alive and successful on Earth.
- ❖ A main purpose of a cell is to **organize**. Cells hold a variety of pieces and each cell has a different set of functions.

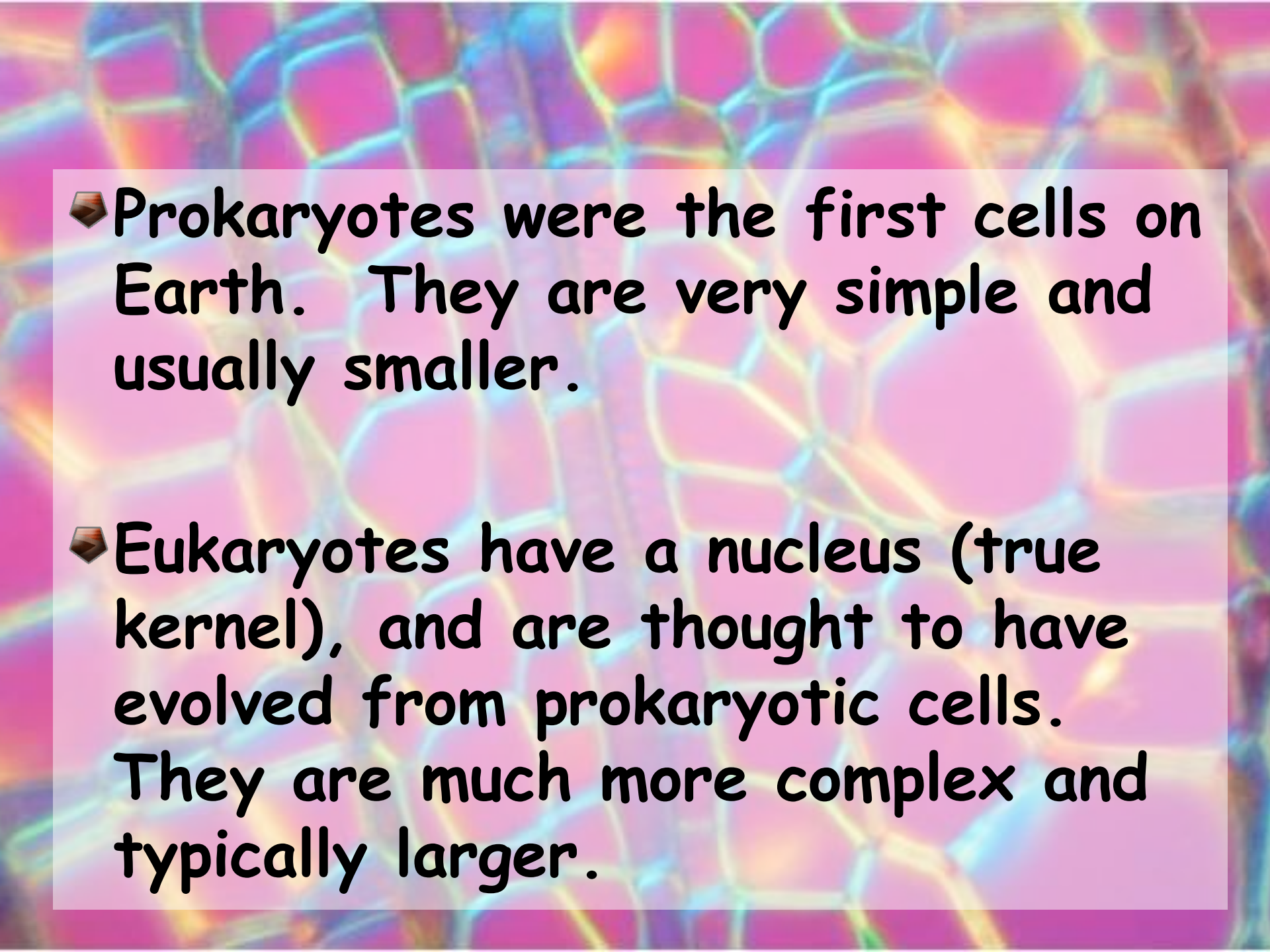
2 Main Cell Types: Prokaryotic and Eukaryotic

The two types of cells are:
prokaryotes and eukaryotes.

Kary- means kernel (think kernel of corn),
referring to the nucleus.

Pro- meaning first in space or time

Eu- true

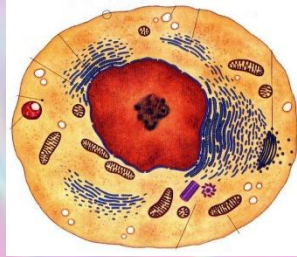


➤ Prokaryotes were the first cells on Earth. They are very simple and usually smaller.

➤ Eukaryotes have a nucleus (true kernel), and are thought to have evolved from prokaryotic cells. They are much more complex and typically larger.

Eukaryotic Cells are:

Animal cells



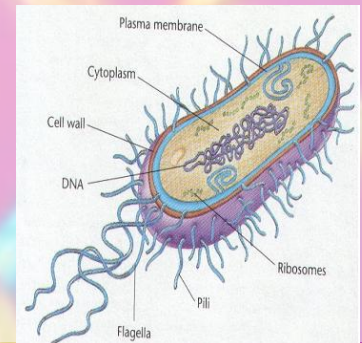
Plant Cells



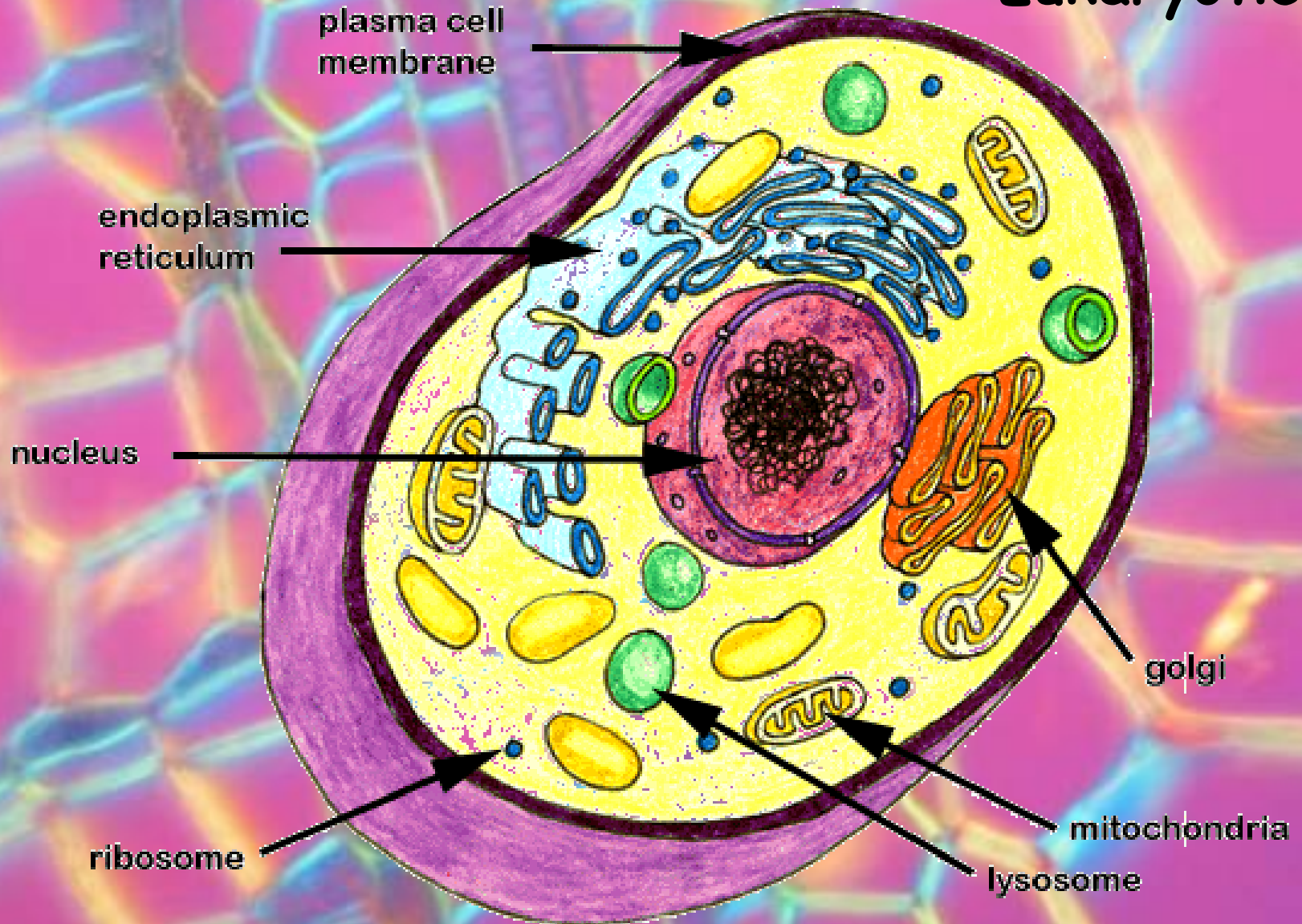
Fungi Cells and Protist Cells too, but we won't be looking at those.

Prokaryotic Cells are:

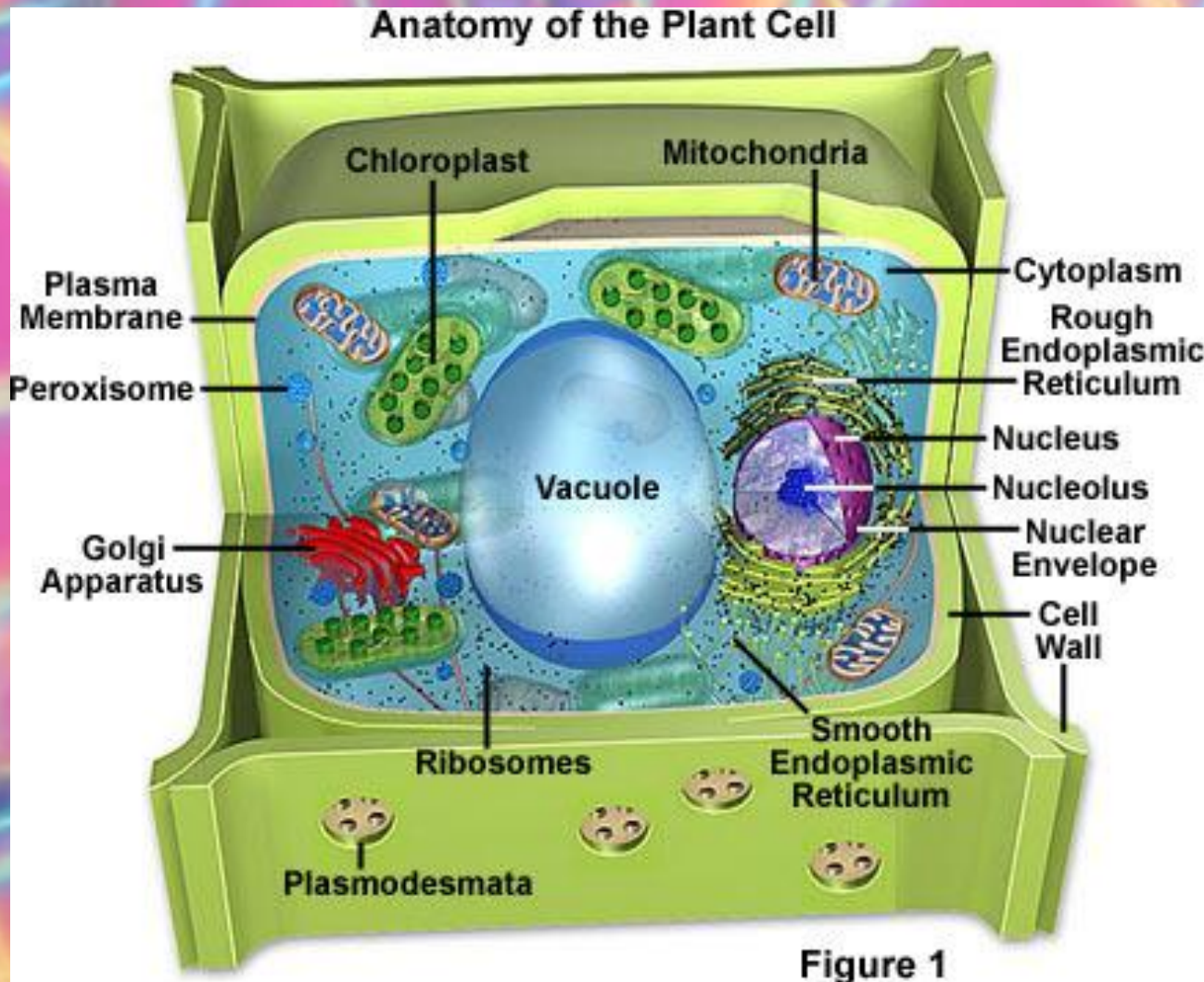
Bacterial Cells



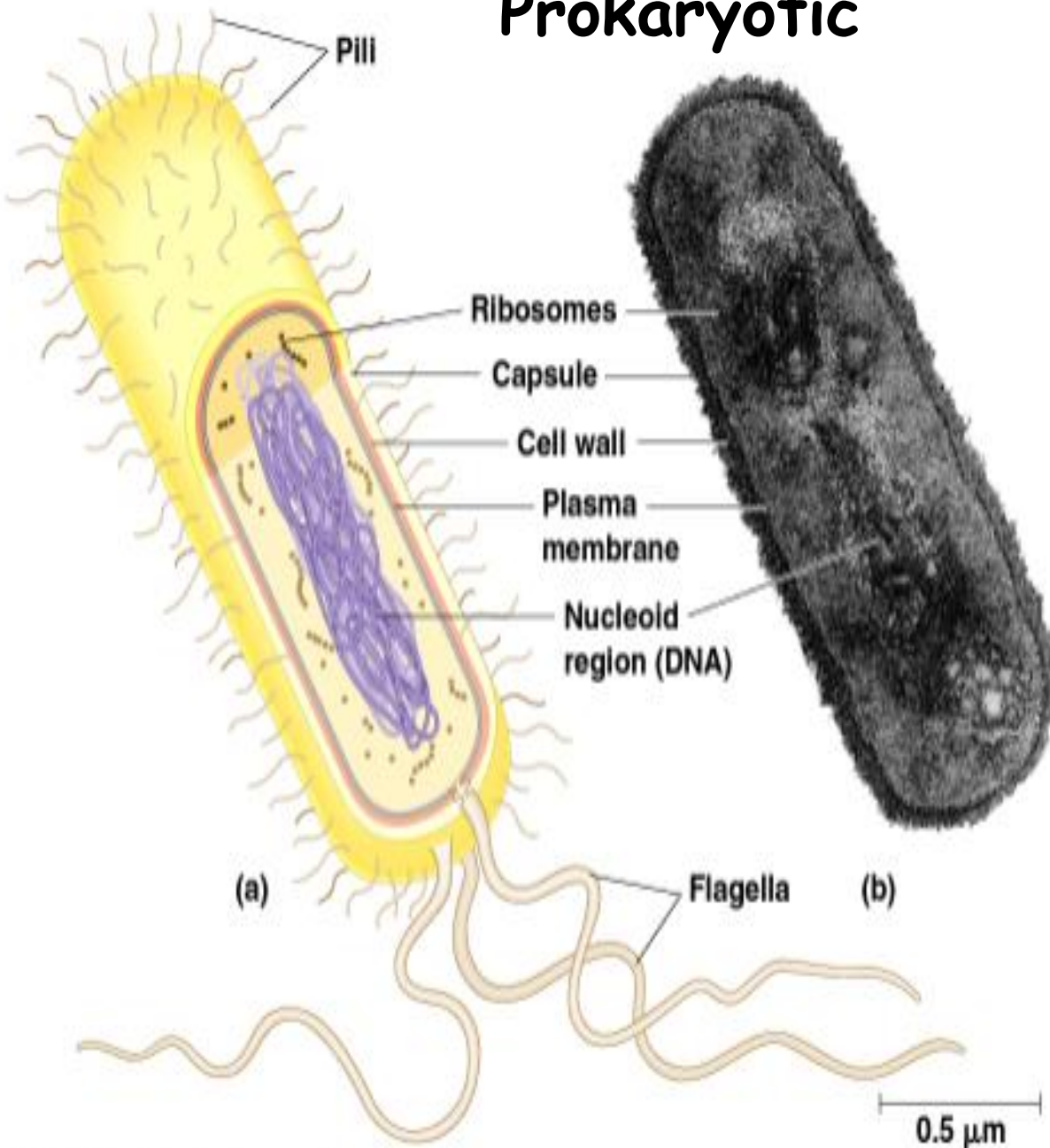
Eukaryotic



Eukaryotic



Prokaryotic



Common Cell Features

➤ All cells have these 5 characteristics in common:

1. cell membrane
2. cytoplasm
3. ribosomes
4. cytoskeleton
5. DNA

Lets take a closer look at each of these.

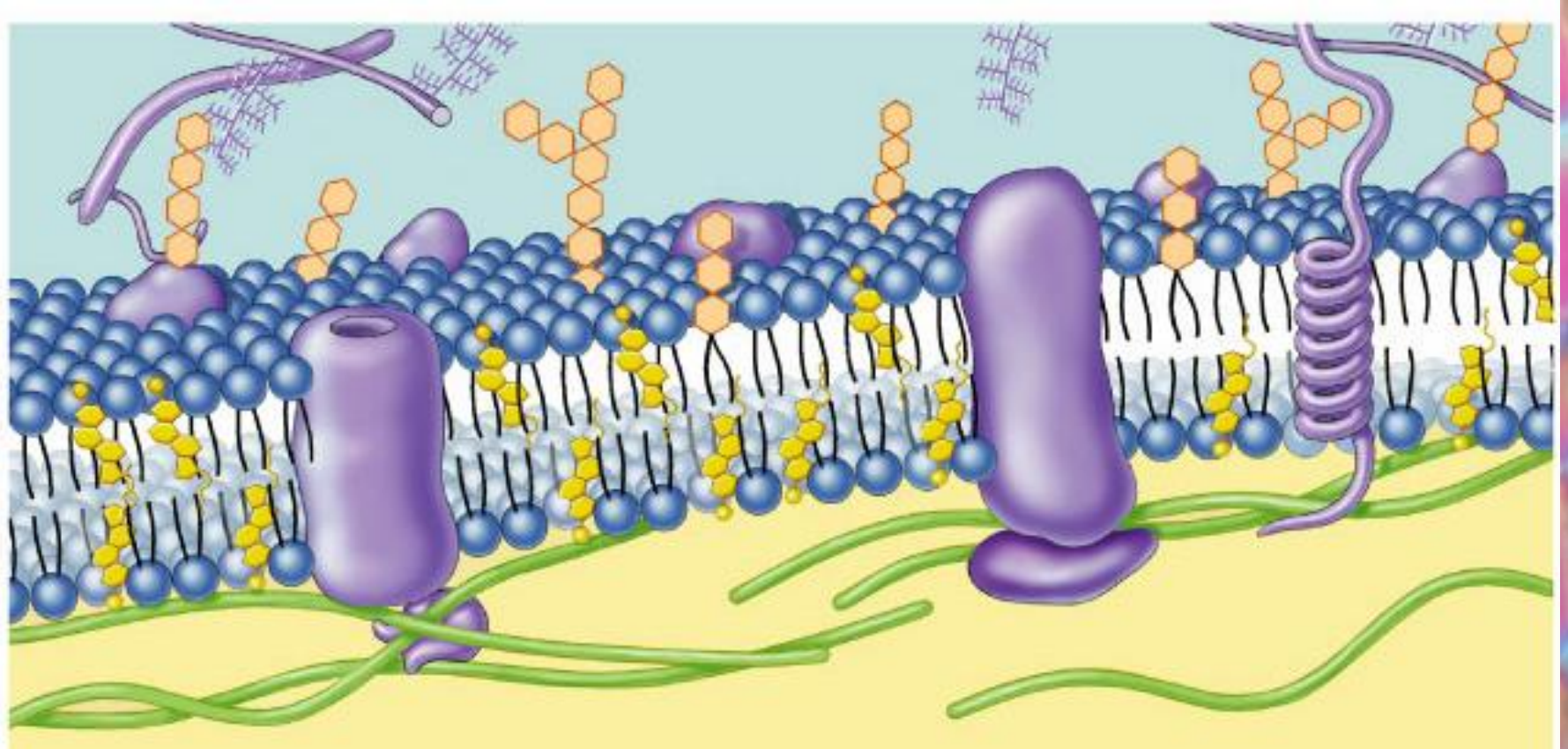
Common Cell Features

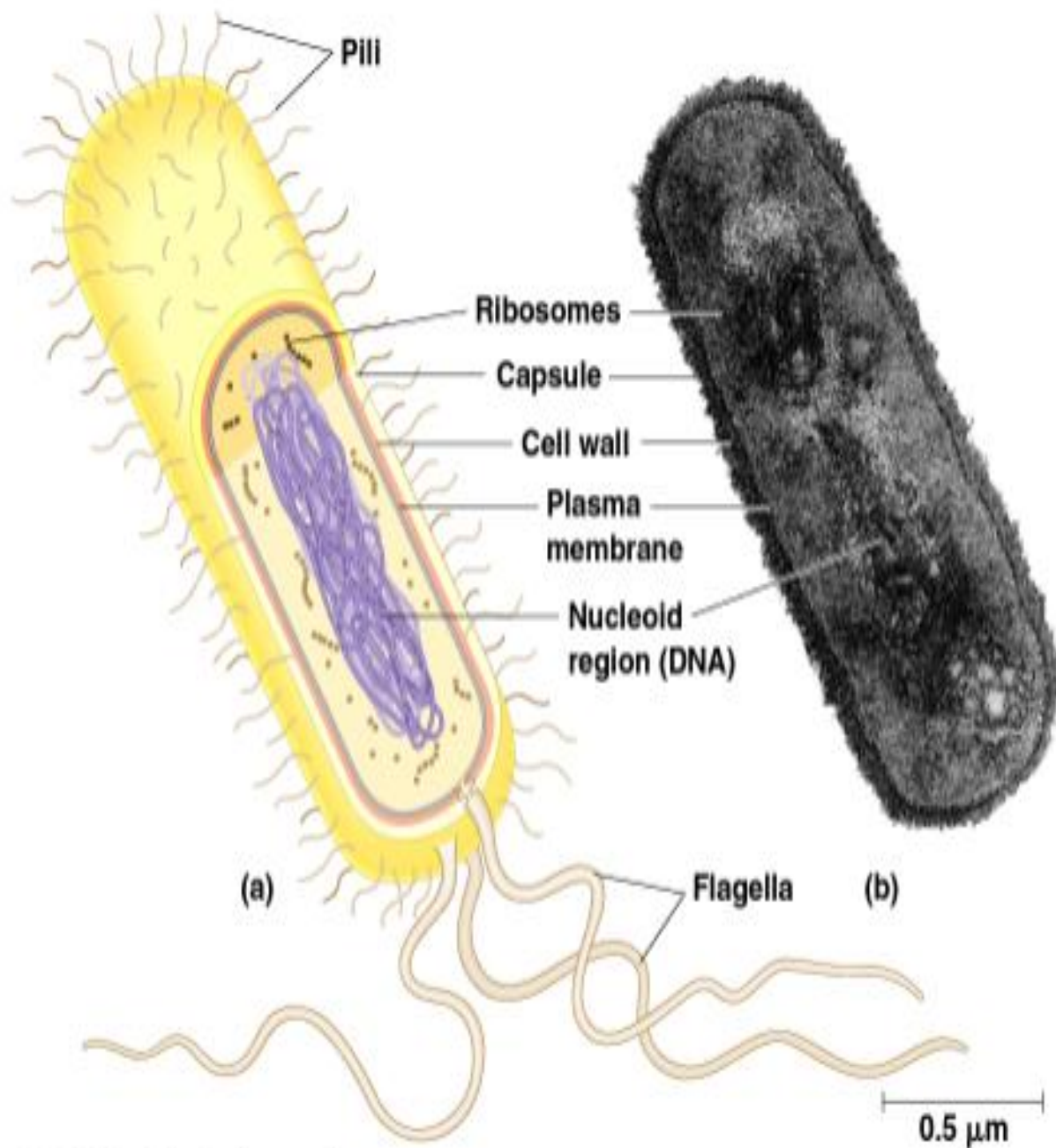
All cells share these 5 characteristics

1. cell membrane- outer membrane that *regulates* what leaves and enters cell

- ◆ There are two layers of lipids and proteins, called a lipid bi-layer.
- ◆ Lipids are non-polar, which means they have no charge and they repel water. Because of this, the lipids are on the inside part of the membrane.
- ◆ The lipid middle means a lot of molecules can't go through the membrane without help!

Cell Membrane





Common Cell Features

2. Cytoplasm- cell interior, jelly-like substance mostly made of water

- Its job is to hold all the organelles.

3. Ribosomes-

- Make proteins for all of the cell processes

Common Cell Features

4. Cytoskeleton-

- In the cytoplasm, it provides support for the cell

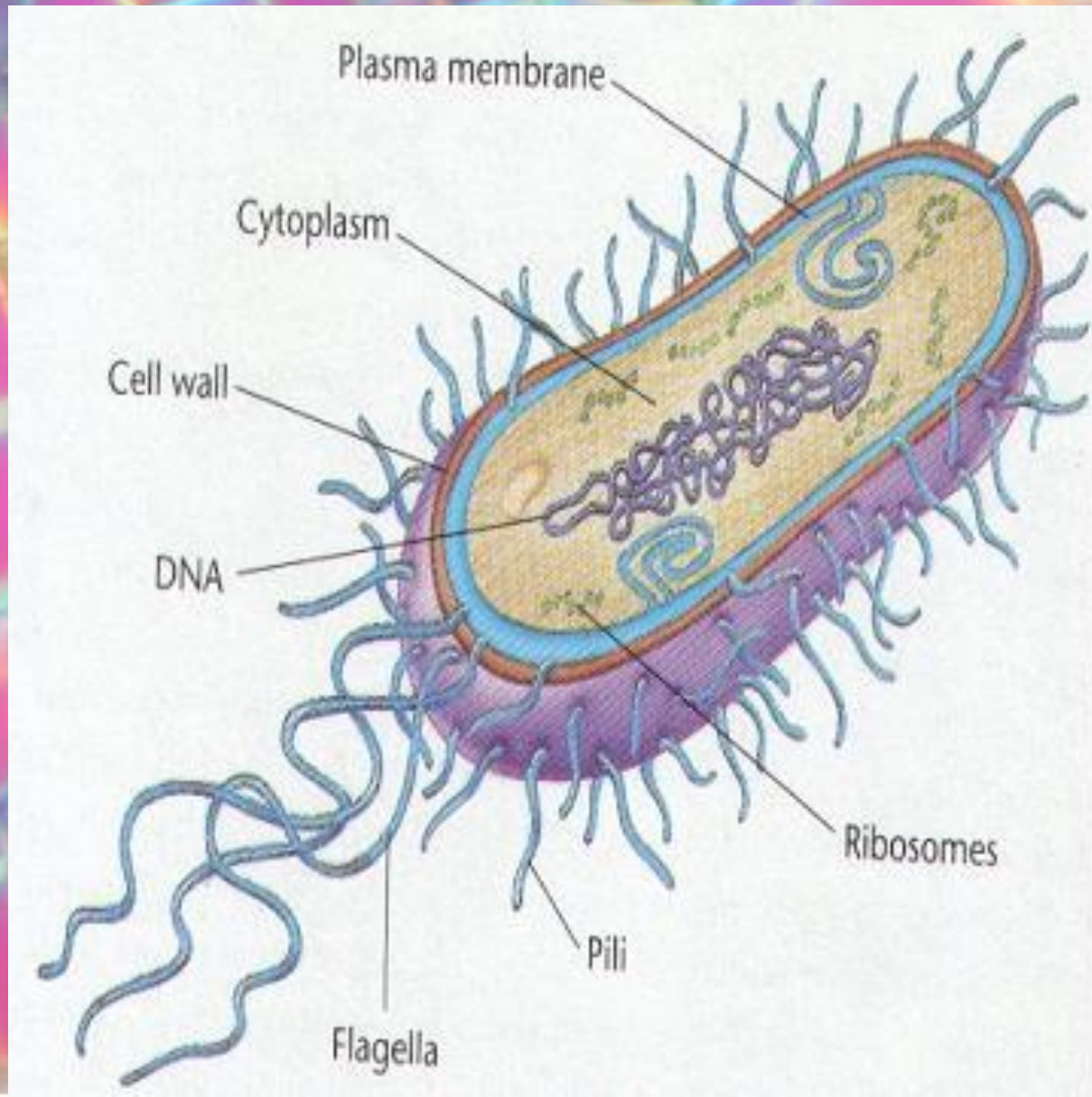
5. DNA

- Directs all cell processes- it tells the cell what to do and how to do it.
- In **prokaryotes**, DNA is found in the center of the cell. In **eukaryotes**, DNA is in the nucleus.

Review Time!

- 1. What are the two main types of cells?
- 2. List the other types of cells that fall into the two main categories from question 1.
- 3. What are the 5 cell features that all cells have?
- 4. What do ribosomes do?
- 5. What does cell membrane do?

Prokaryotic Cells!



Prokaryotic Cells

Prokaryotic cells are very simple- they have the basic 5 cell features
(cell membrane, cytoplasm, ribosomes, cytoskeleton, DNA)

AND

- Cell Wall
- Flagella (usually the form of transport)
- Pili (allows to stick to surfaces)

Examples of Prokaryotic cells are different kinds of bacteria.

Eukaryotic Cells

Eukaryotic cells are much more complex.

They have the 5 common features

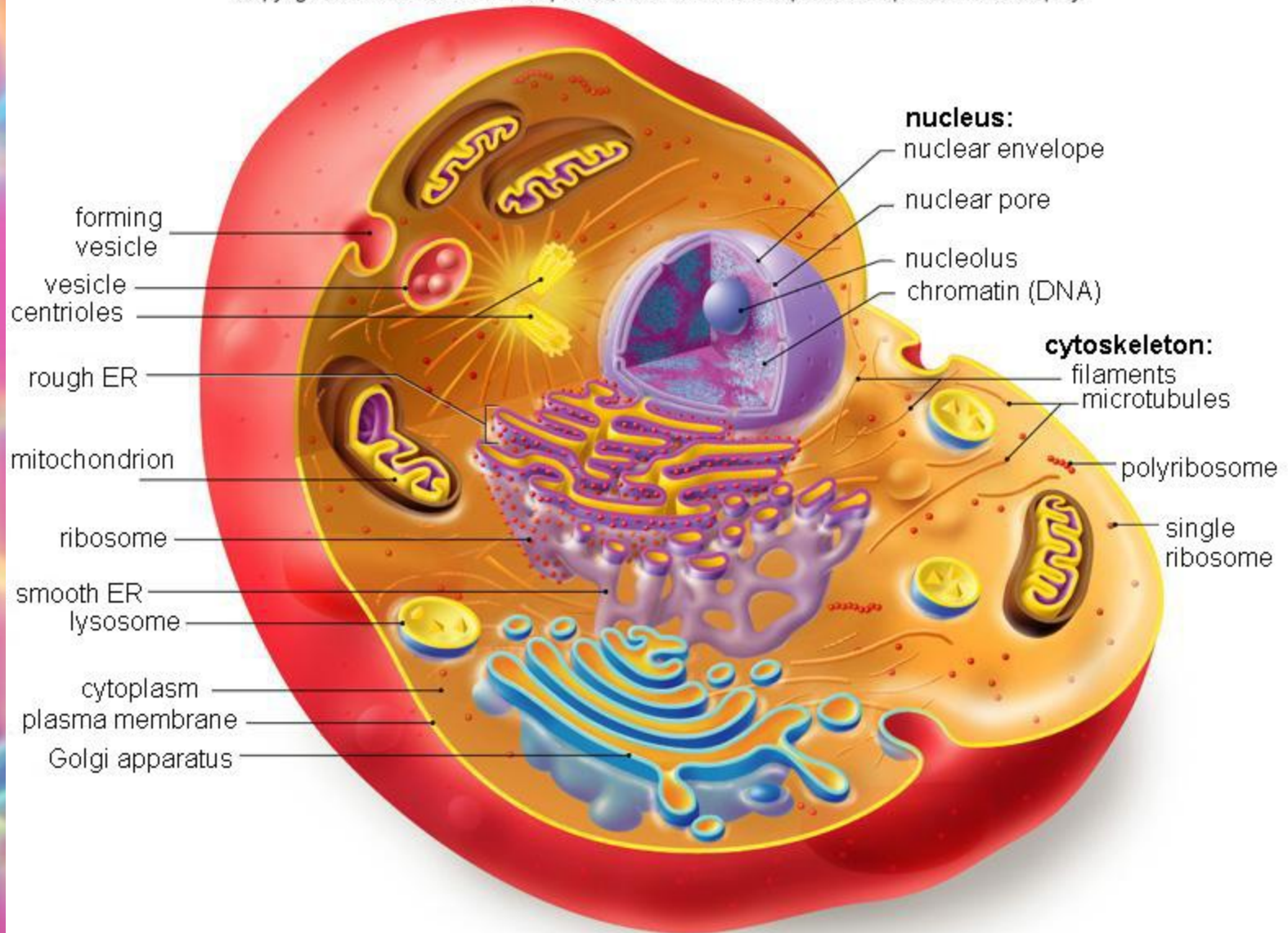
(cell membrane, cytoplasm, ribosomes, cytoskeleton, DNA)

PLUS:

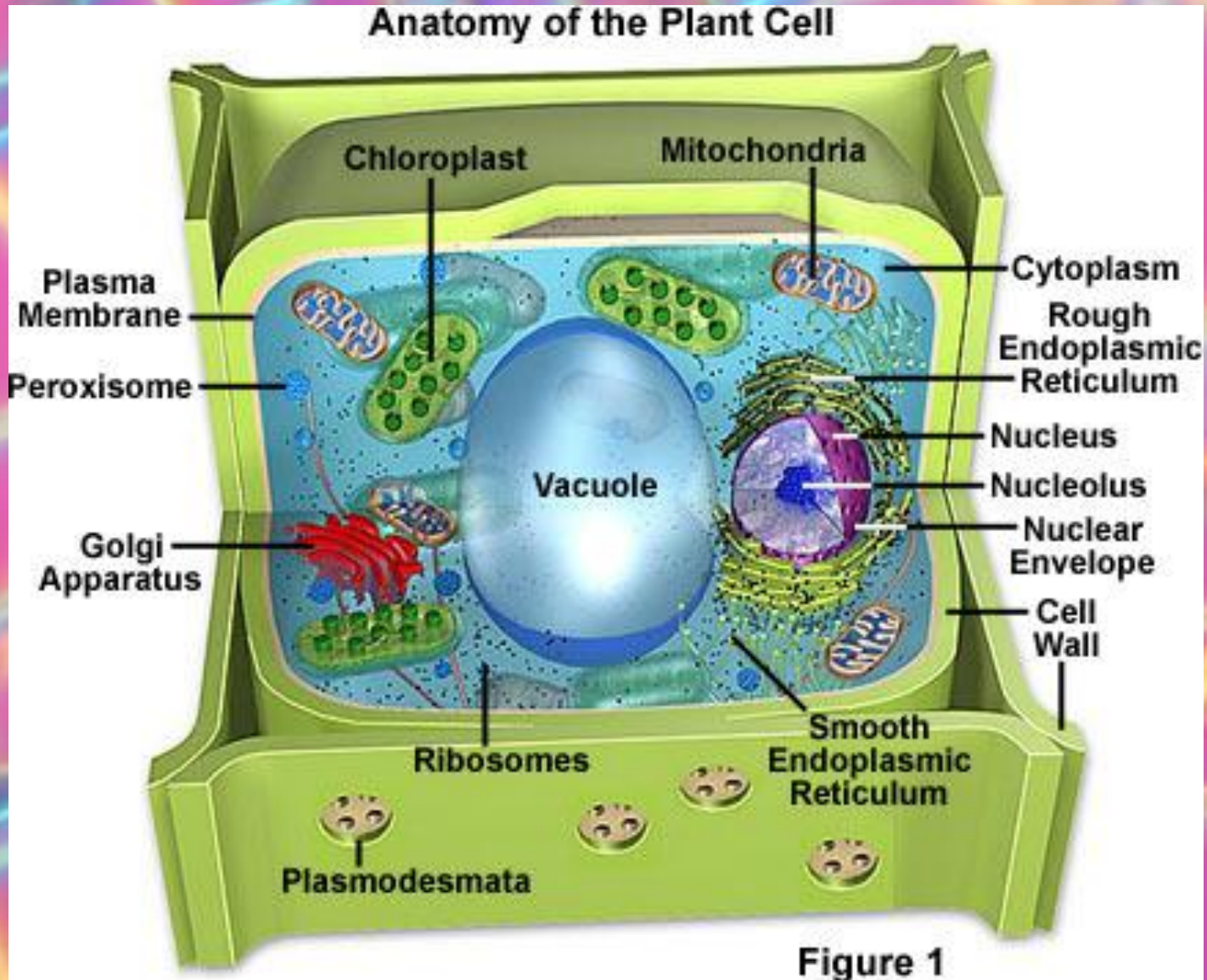
- Nucleus
- Mitochondria
- Endoplasmic Reticulum
- Golgi Apparatus
- Small Vacuoles (animals only)
- Lysosomes (animals only)
- Chloroplast (plants only)
- Cell Wall (plants only)
- Central Vacuole (plants only)

Eukaryotic Cells!

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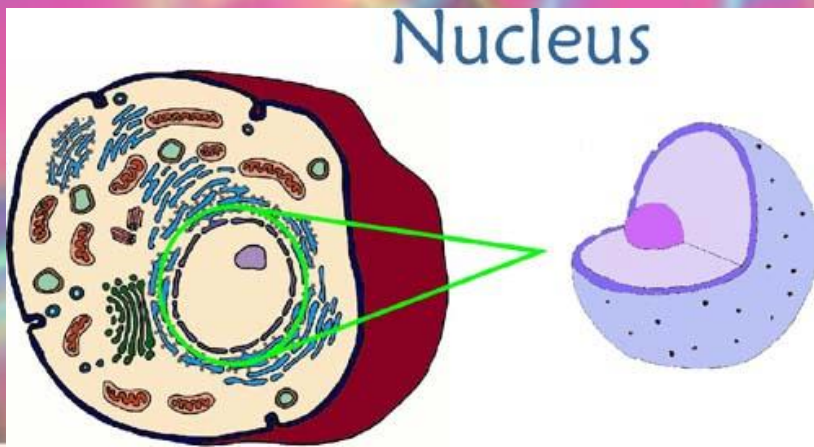


Eukaryotic Cells!



Nucleus - "Control Center"

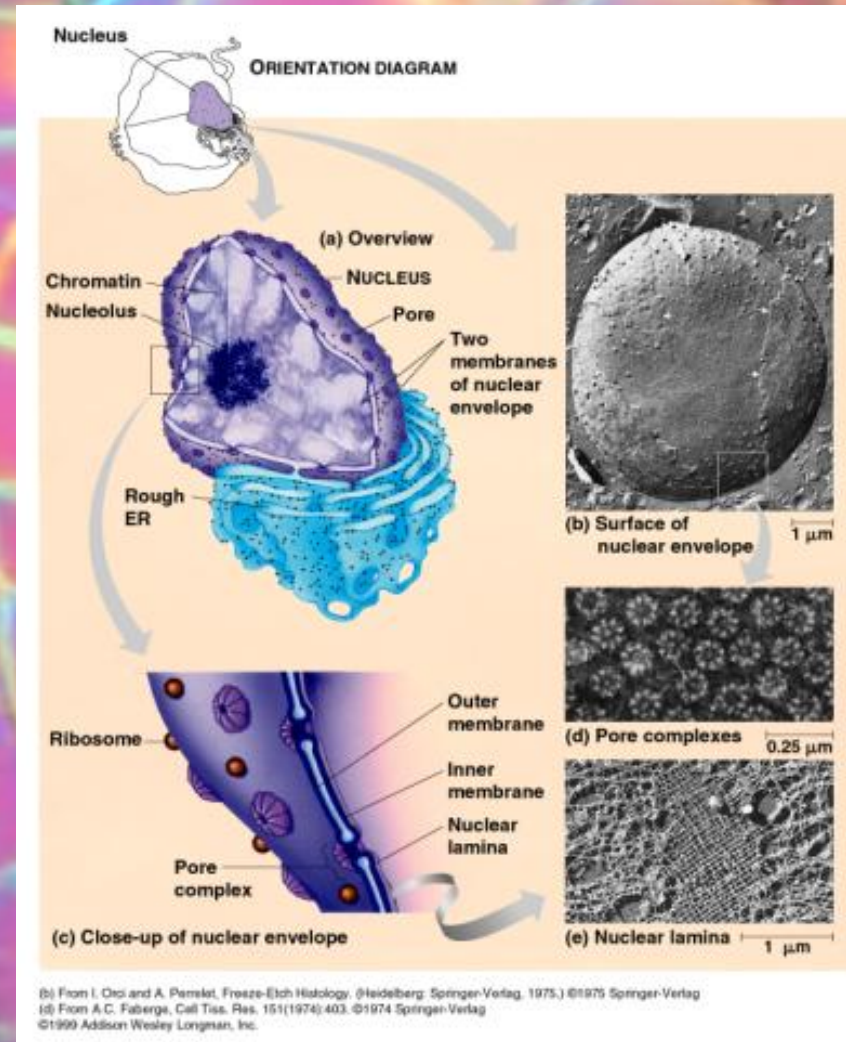
- Contains the genetic material- coded instruction for making proteins and molecules
- Double membrane envelope
- Like the boss' office, or "brain"; instructions move in and out of office (like messages) to the rest of the cell



Nucleus - "Control Center"

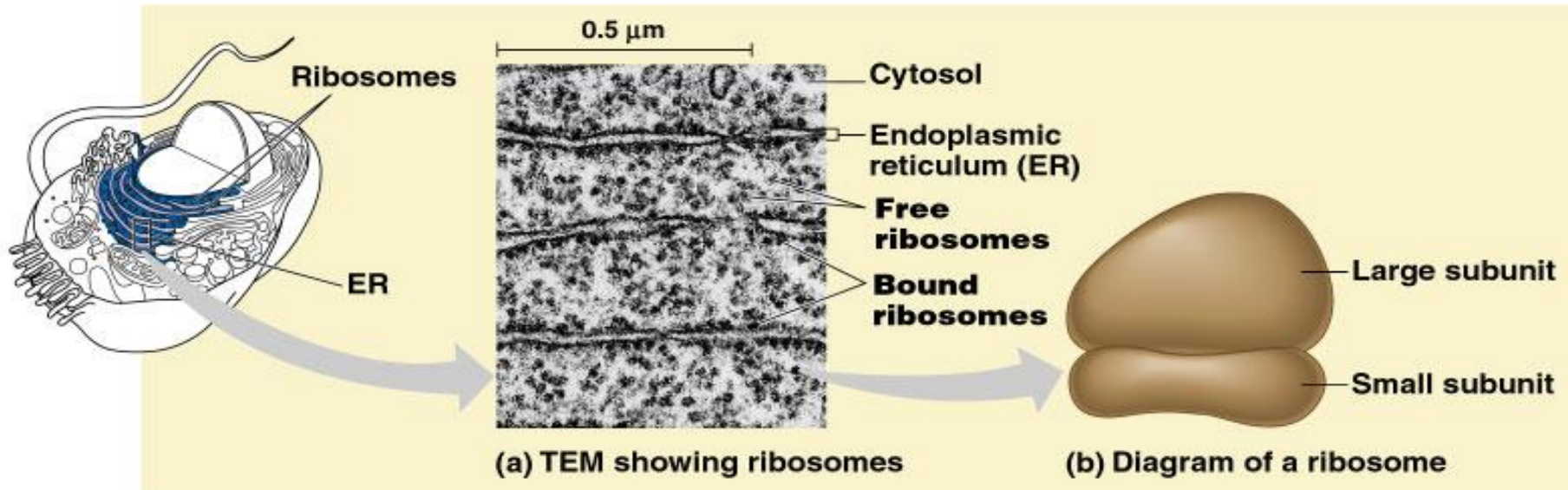
➤ DNA - hereditary information

➤ Found in the nucleus



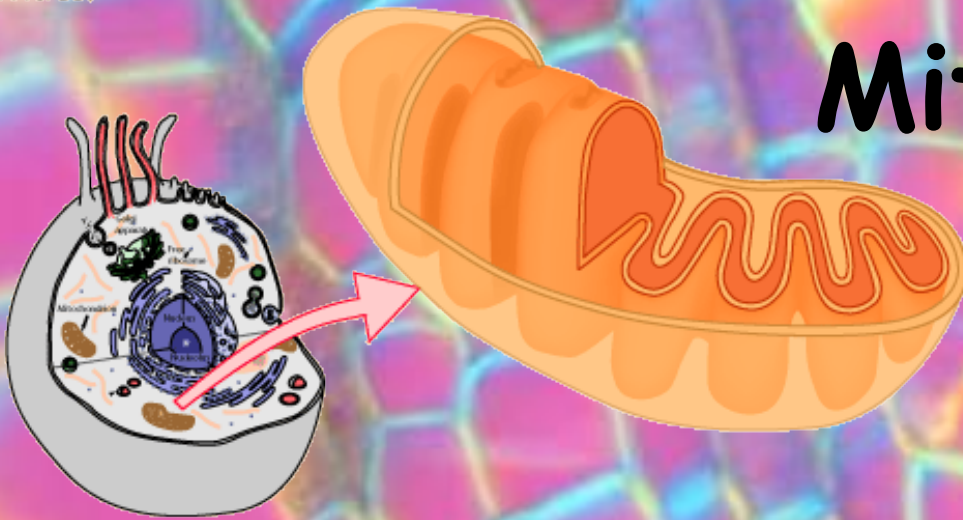
Ribosomes

- ❖ **Ribosomes**- Small particles of RNA where proteins are assembled, following instructions from nucleus

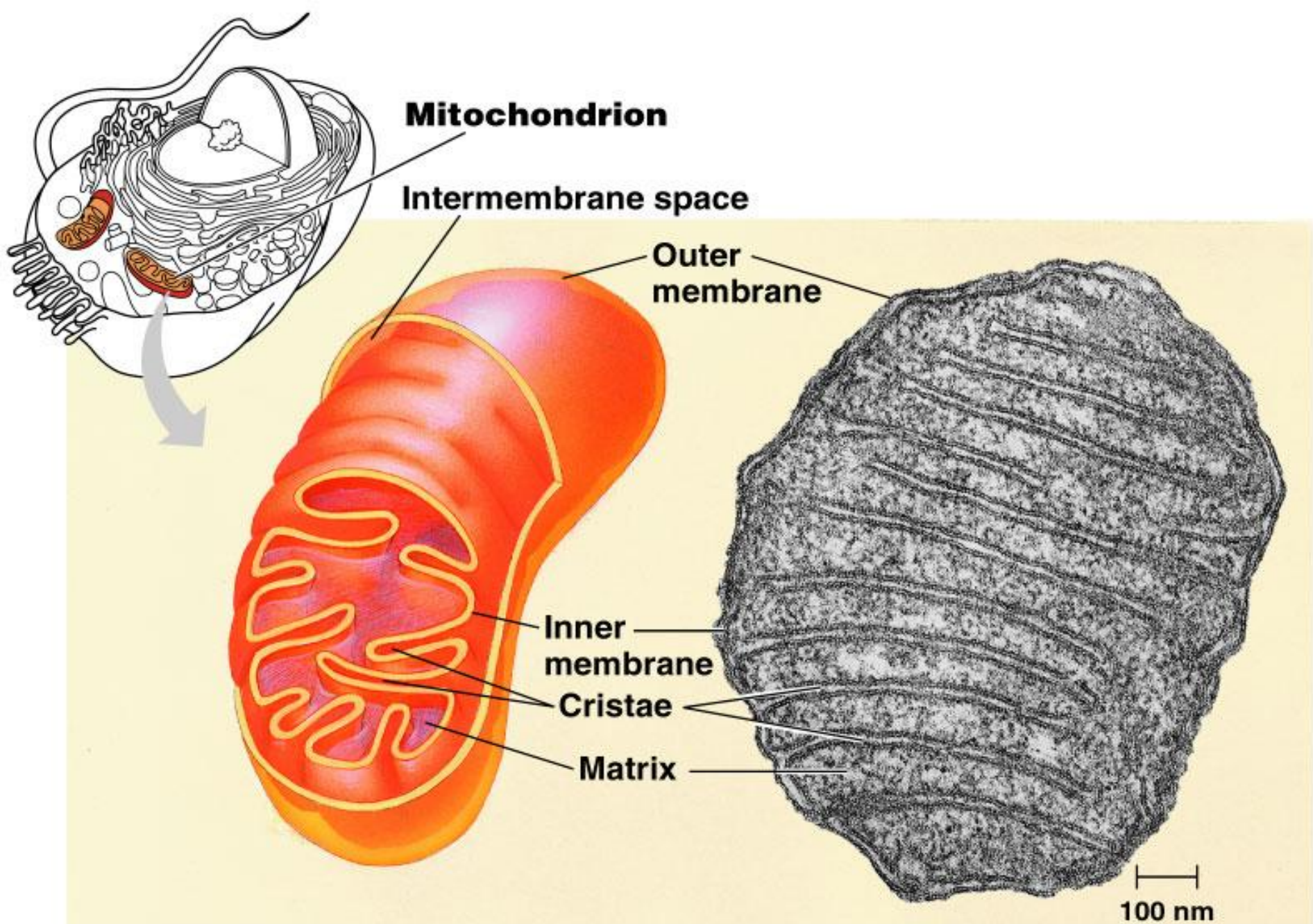


manufacture ATP to fuel all of life's activities.

Mitochondria

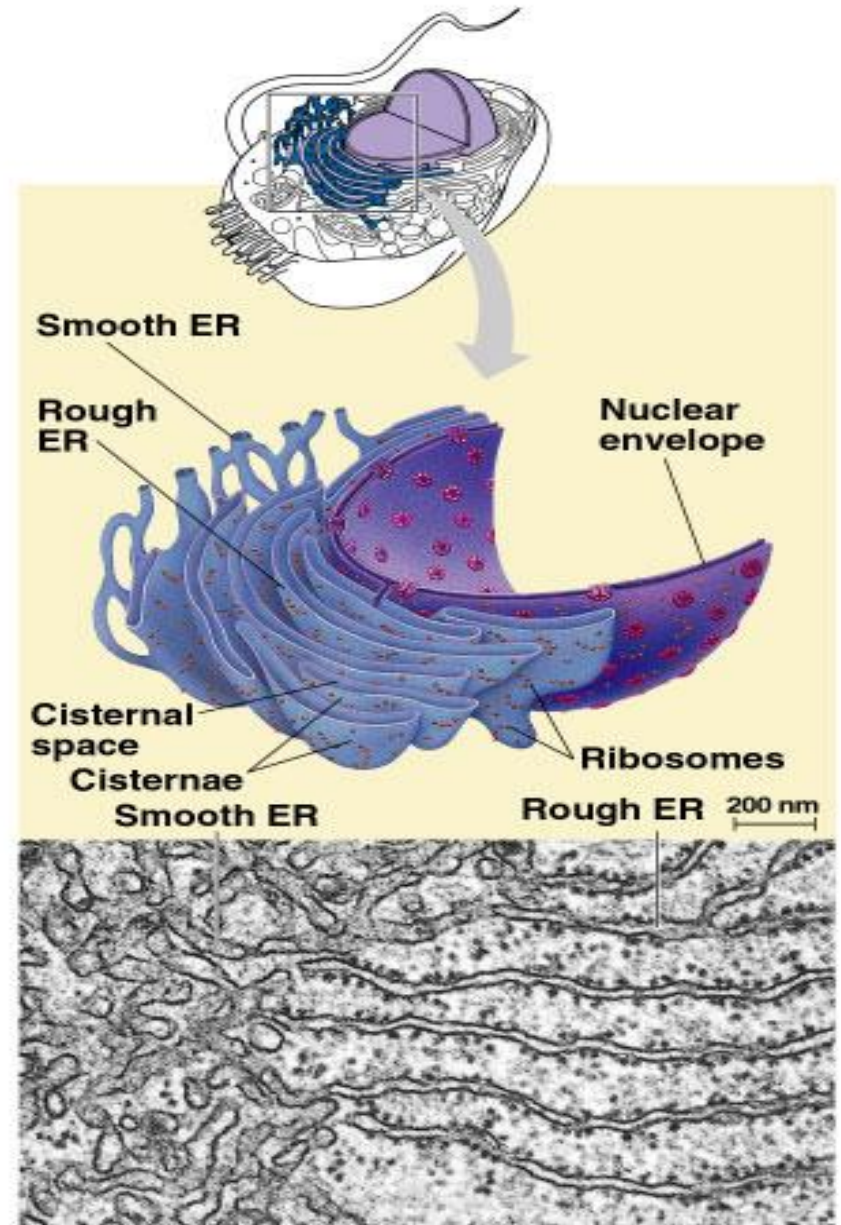


- ◆ Kidney shaped organelles that provide energy for the cell- "powerhouse"
- ◆ Convert chemical energy stored in food into compounds that the cell can use
- ◆ Cells with high energy like muscle cells may contain thousands of mitochondria



Endoplasmic Reticulum

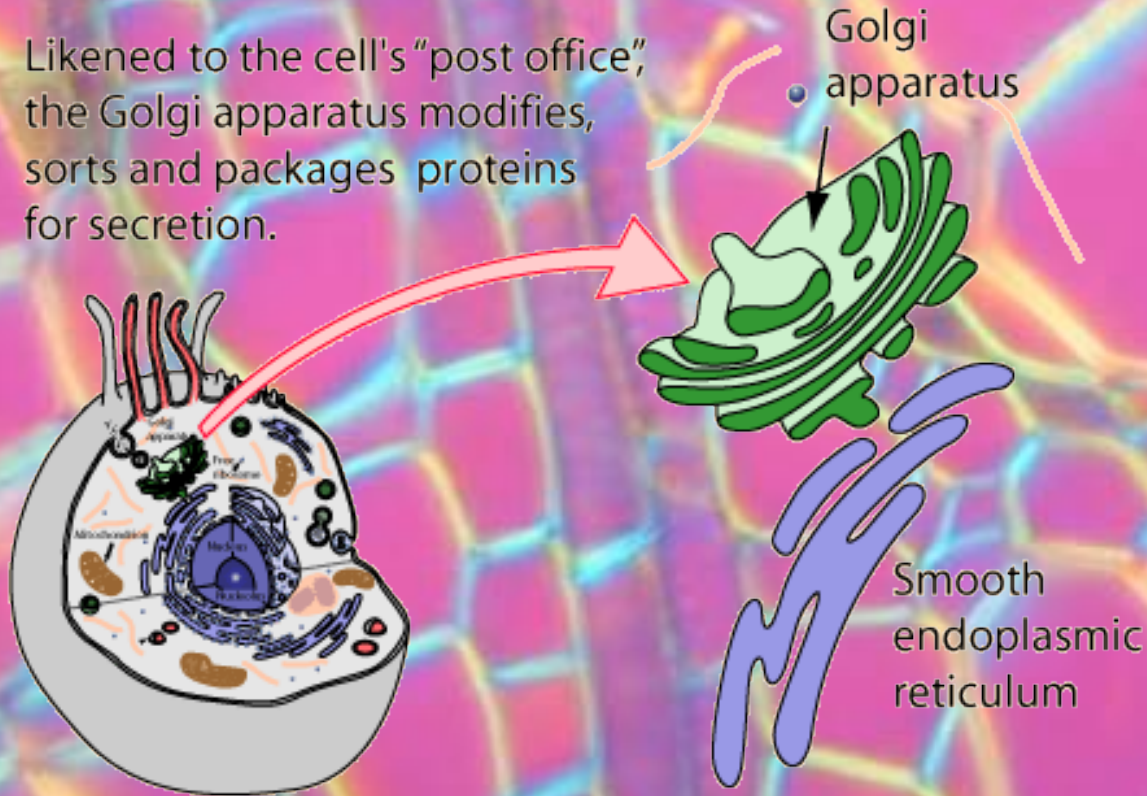
- ◆ Endoplasmic Reticulum (ER)-
- ◆ system of internal membranes that move proteins and other substances through the cell
 - ◆ -Rough ER
 - ◆ -Smooth ER



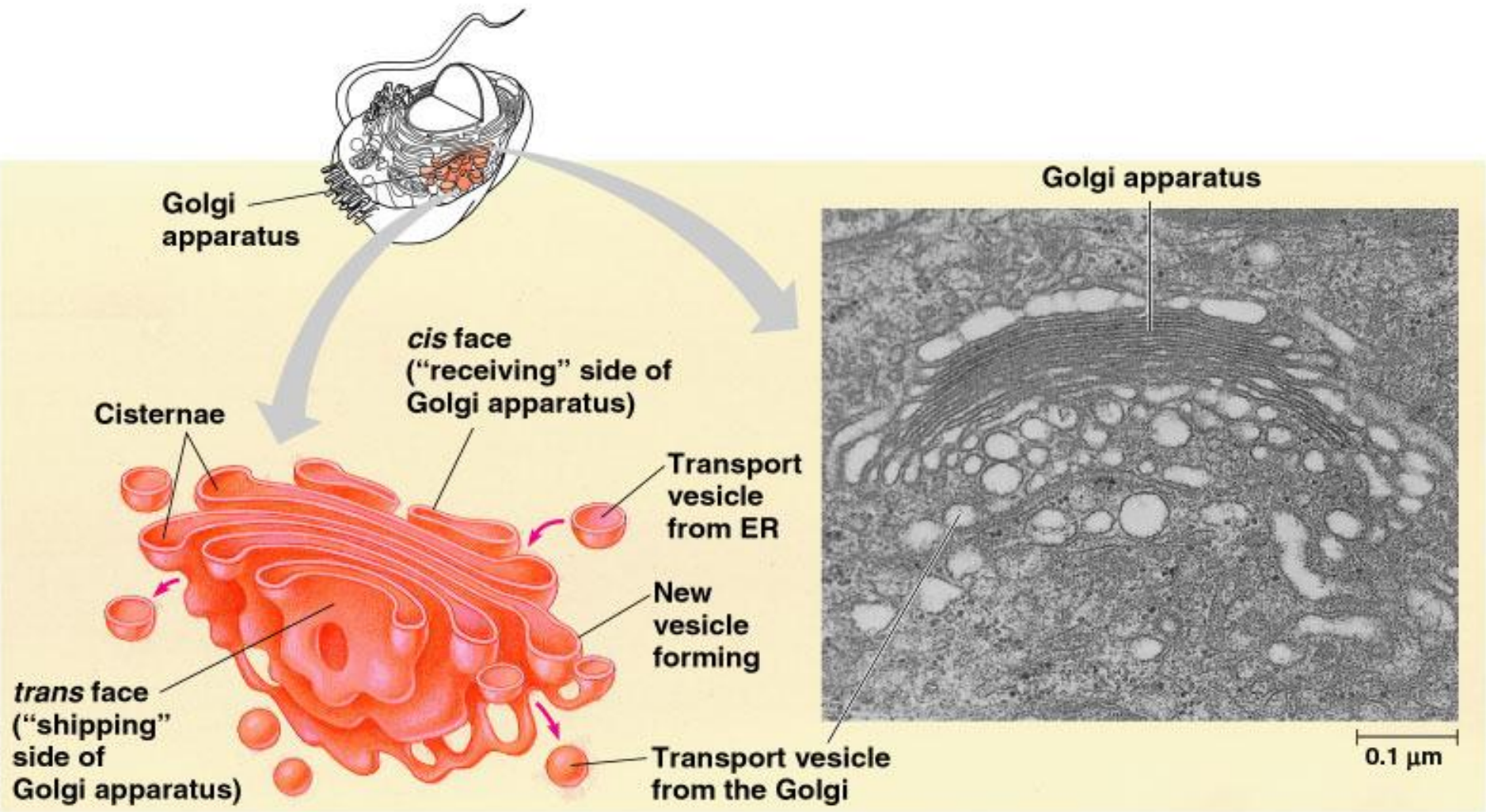
Golgi Apparatus

- ◆ Golgi receives proteins that were transferred from ER

Likened to the cell's "post office", the Golgi apparatus modifies, sorts and packages proteins for secretion.



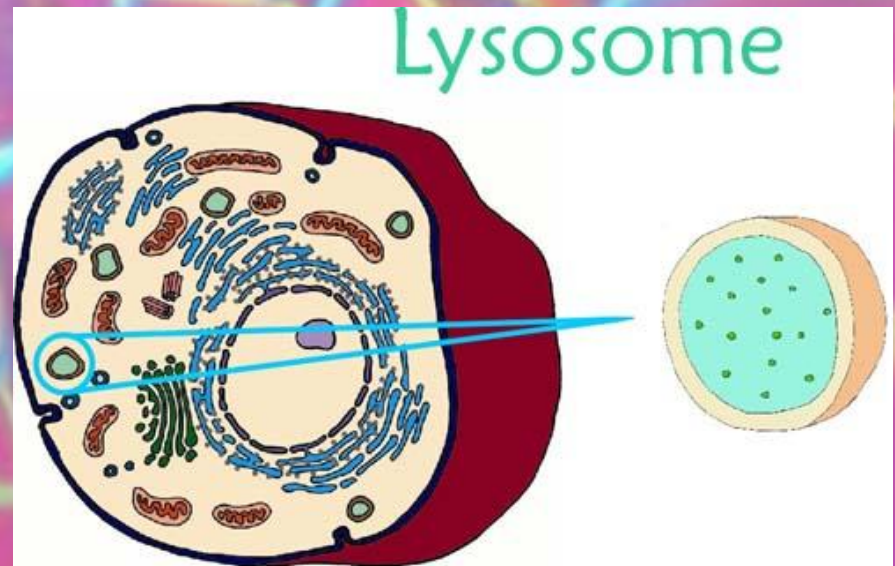
- ◆ "packaging department"



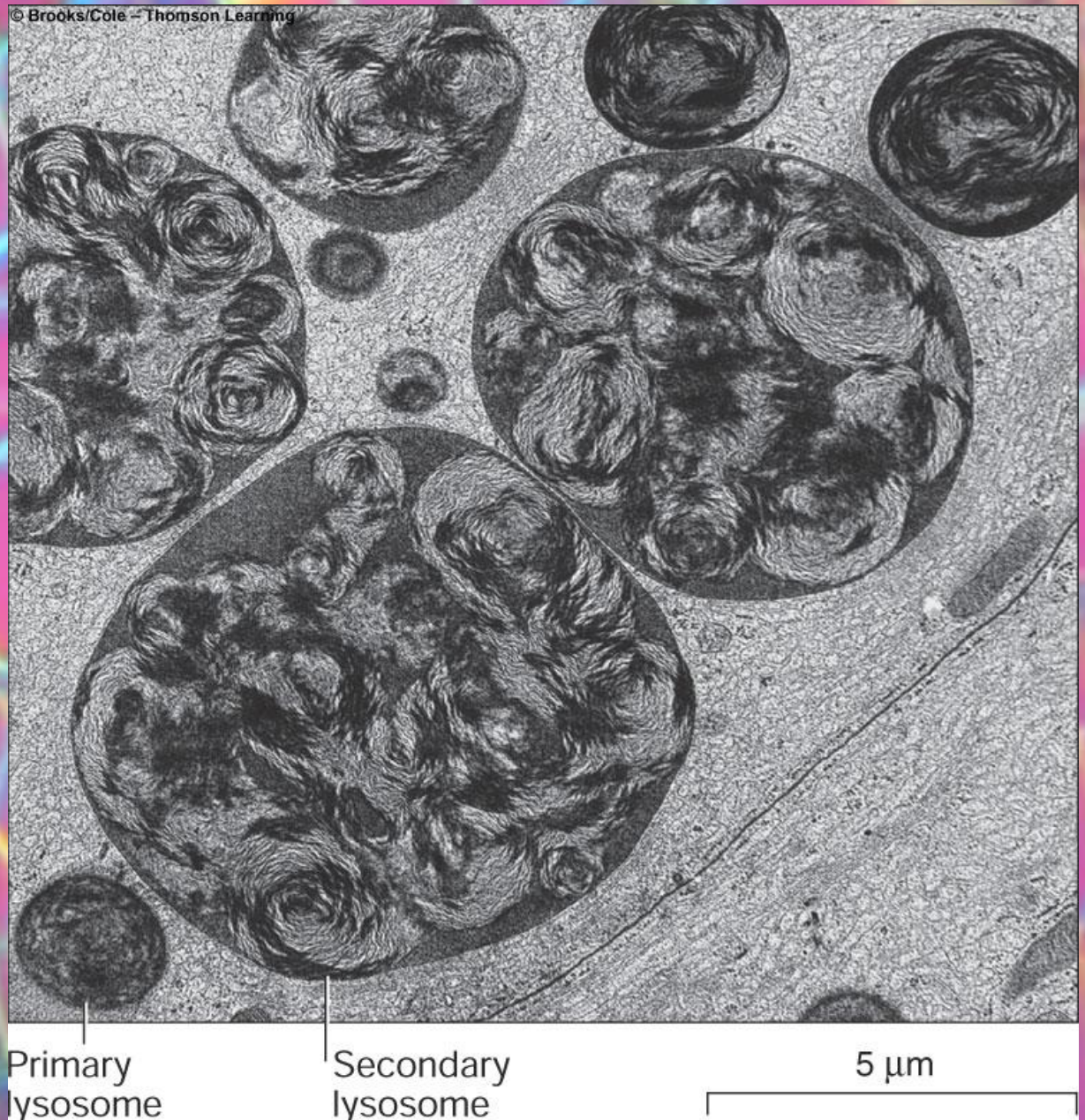
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Lysosomes (Animal Cells Only)

- Small organelles filled with enzymes, found in animal cells
- Break down lipids, carbohydrates and proteins
- "Janitors"

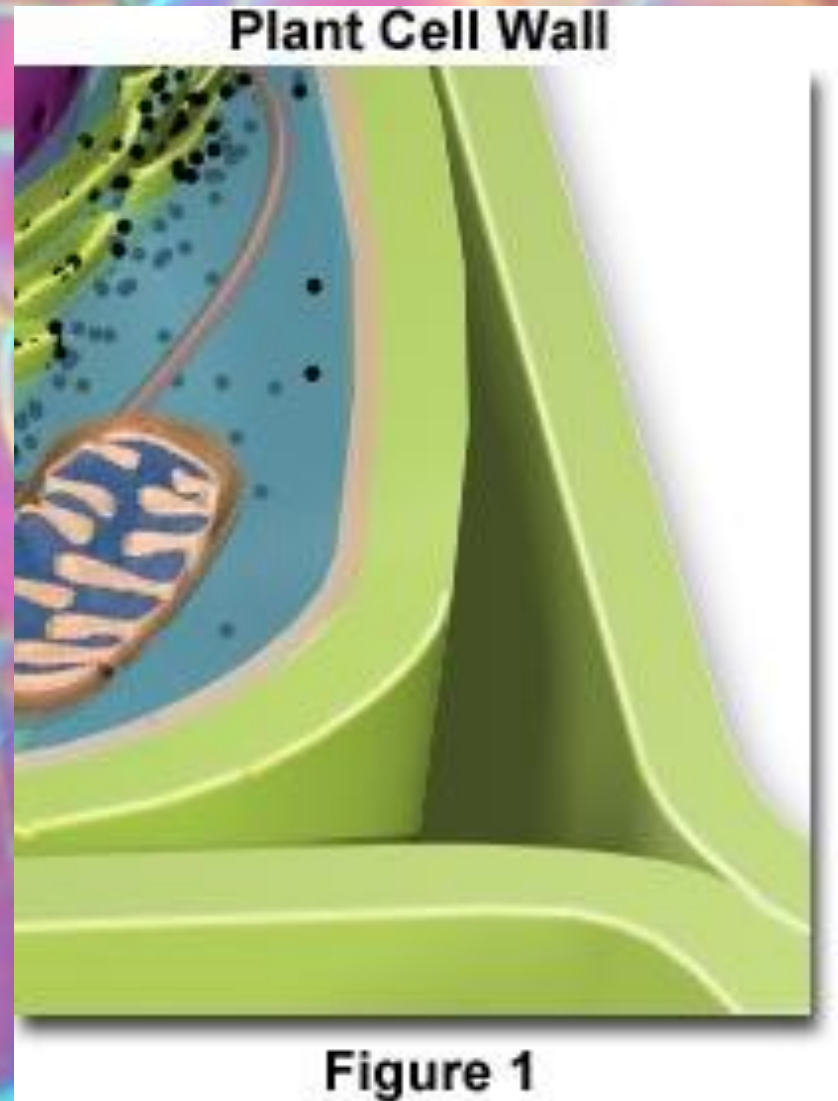


Lysosomes



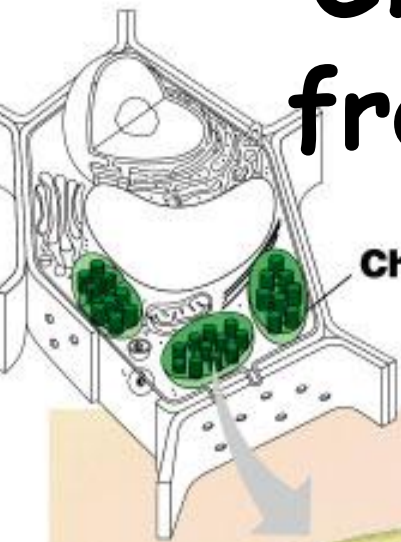
Features of Plant Cells

- ❖ Cell wall- made up of proteins and cellulose
- ❖ Helps support and maintain the shape of the cell
- ❖ Protects cell from damage

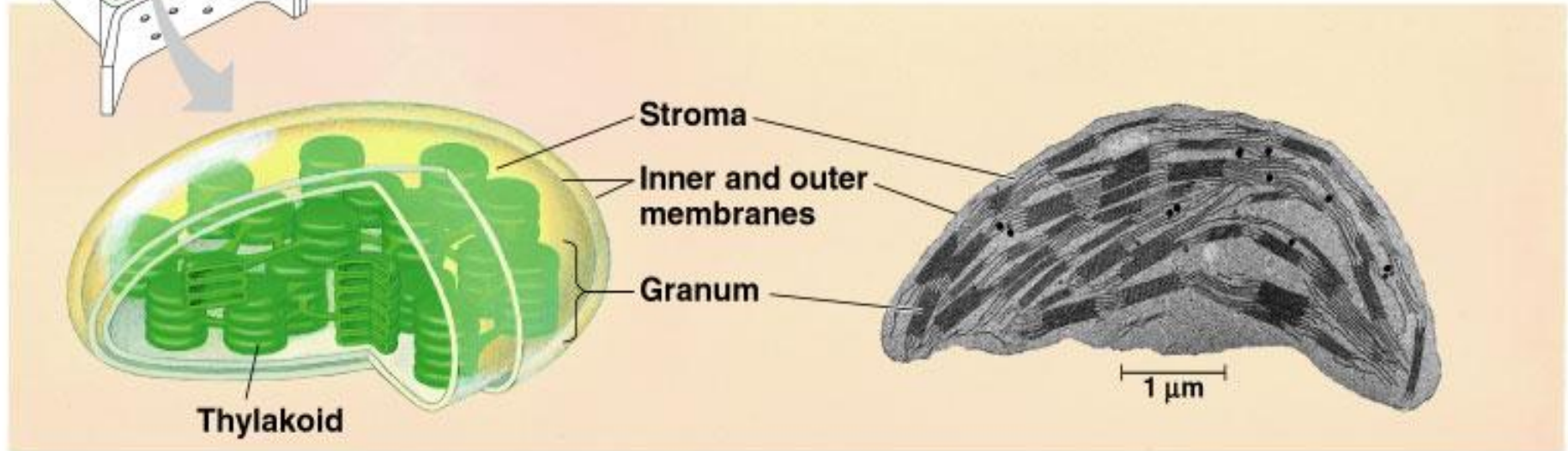


Features of Plant Cells

Chloroplast - capture energy from sunlight and convert into chemical energy

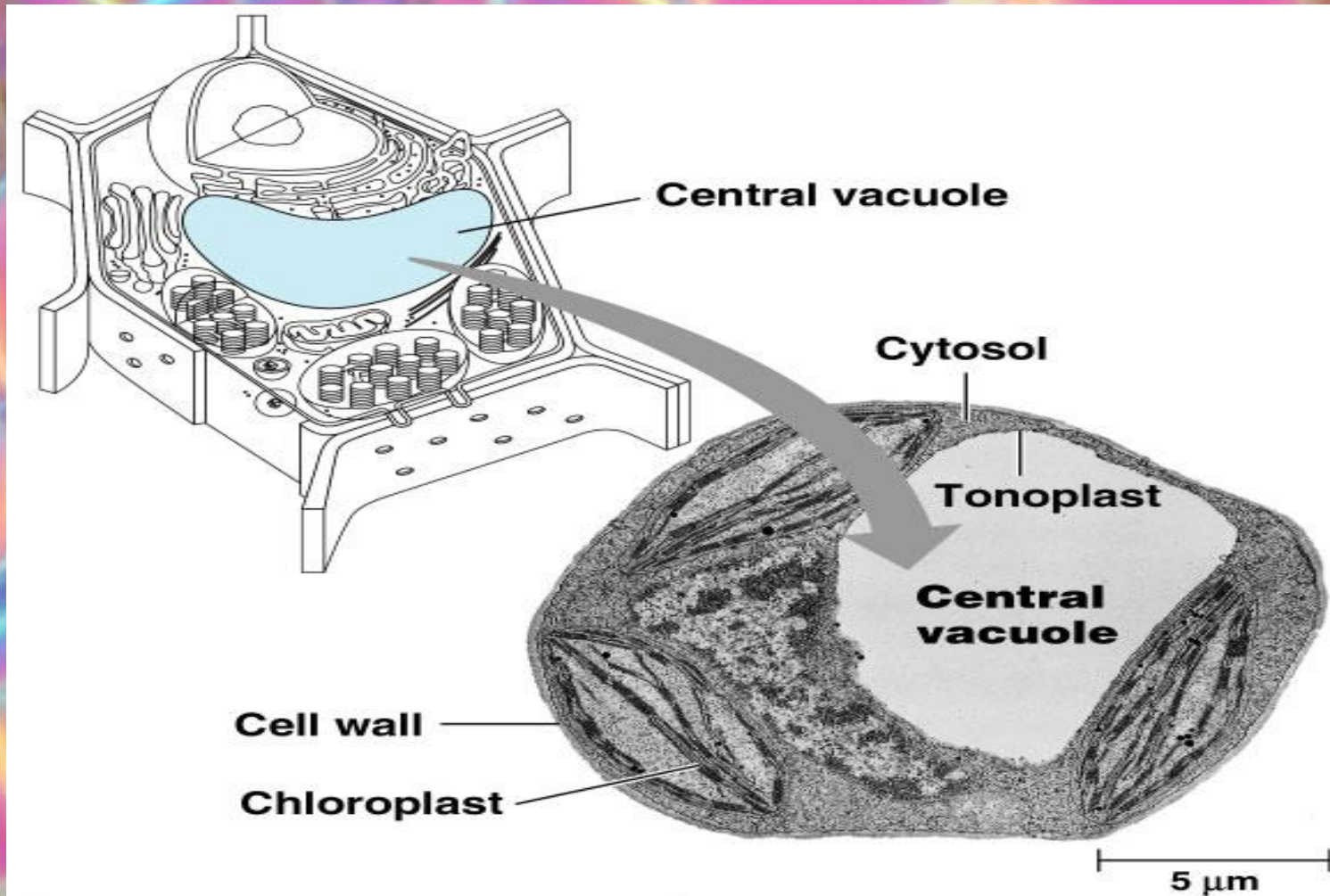


Chloroplast



Features of Plant Cells

- Central Vacuole- stores water and may contain many substances, including ions, nutrients and waste



Review Time!

- 1. List all the parts of a Prokaryotic cell (therefore a bacterial cell).
- 2. List all of the organelles of an animal cell.
- 3. List all of the organelles of a plant cell.