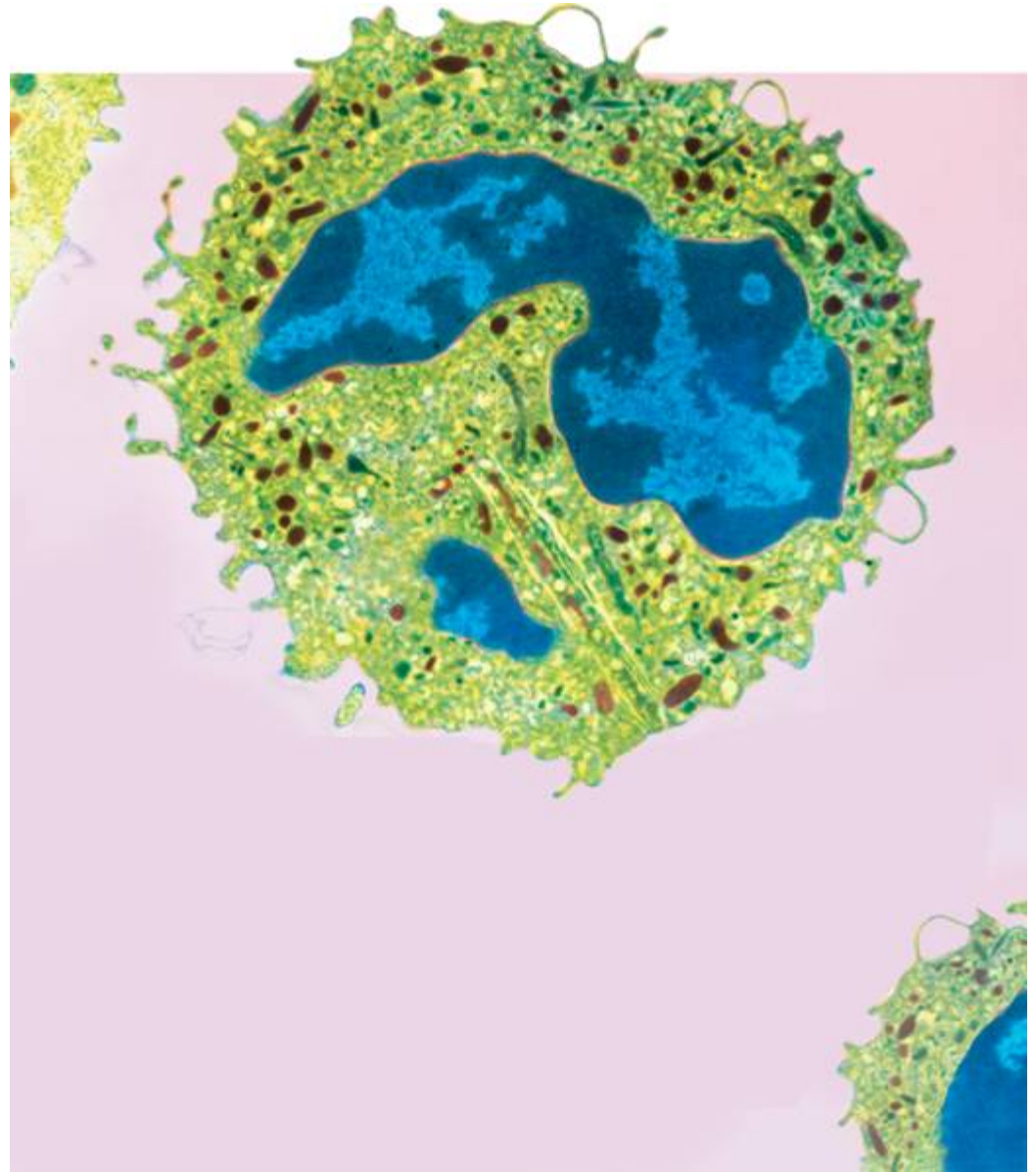


7-1 Life Is Cellular

CELL STRUCTURE & FUNCTION



The Discovery of the Cell

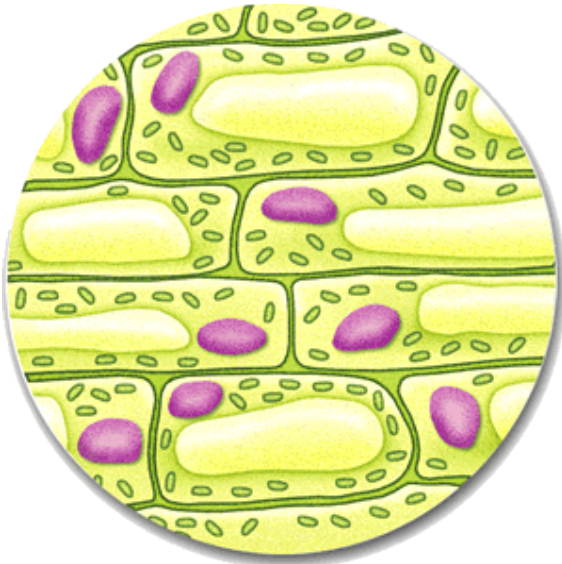
- 1665: Robert Hooke used an early compound microscope to look at a thin slice of cork.
- Cork looked like thousands of tiny, empty chambers.
- Hooke called these chambers "cells."



Development of the Cell Theory

The cell theory states the following:

1. All living things are made of cells.
2. Cells are the basic units of structure and function in living things.
3. All cells are made from other cells.



Plant Cells



Animal Cells

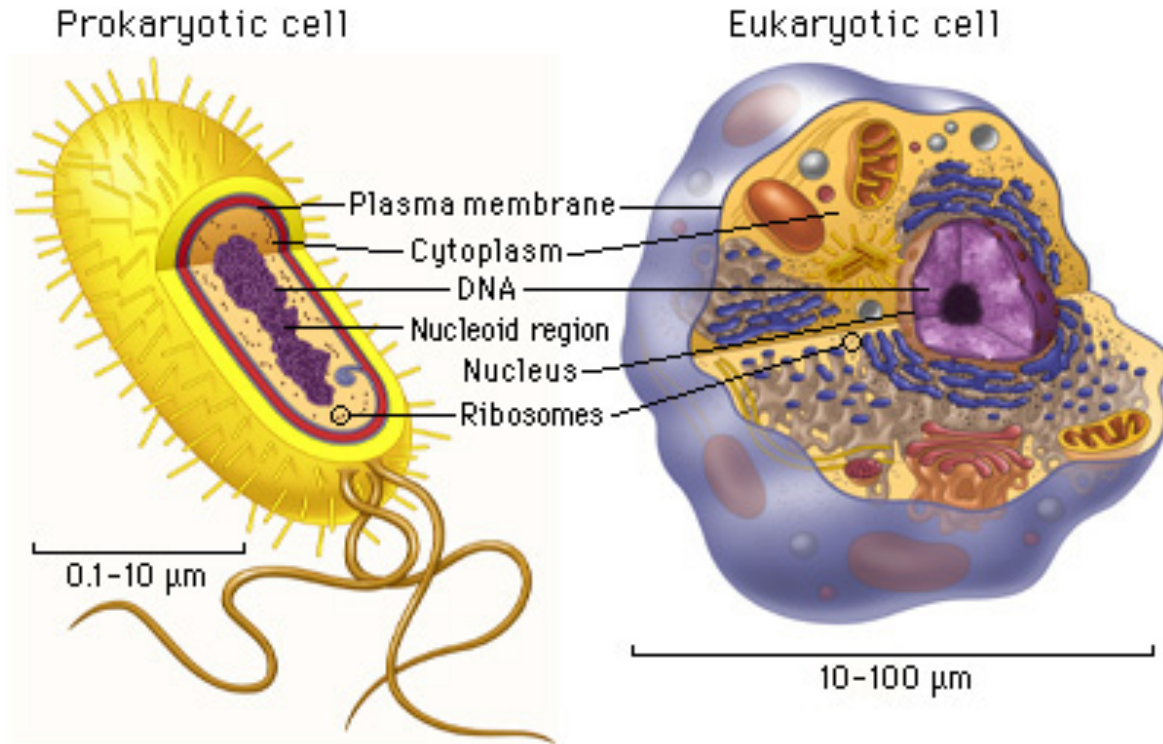
2 MAIN TYPES OF CELLS

- Cells are put into 2 main groups, depending on whether they have a **nucleus**.
 - The **nucleus** is a large membrane-enclosed structure that holds the cell's genetic material in the form of DNA.
 - The nucleus controls many of the cell's activities.
 - **ALL CELLS HAVE: cell membrane & DNA.**

Prokaryotes and Eukaryotes

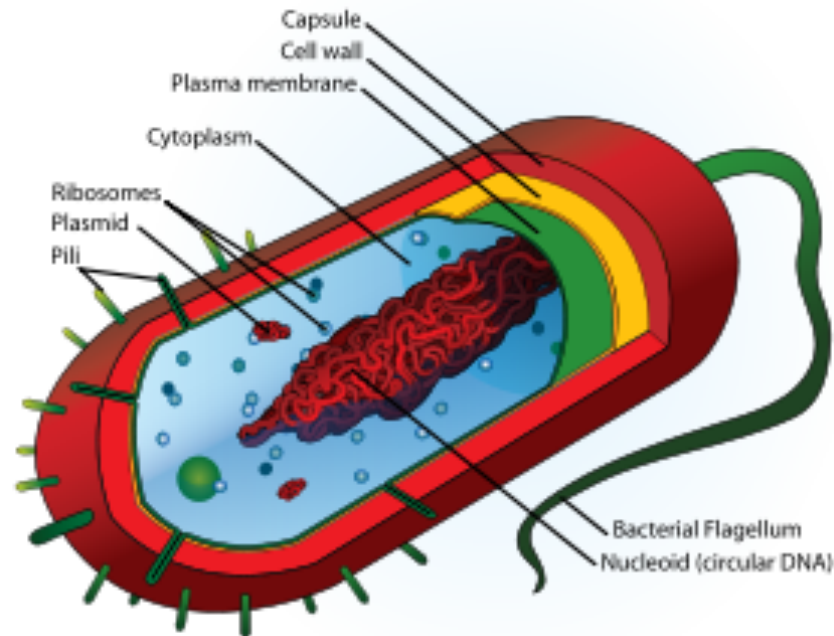
Prokaryotes: cells with NO nucleus.

Eukaryotes: cells with a nucleus.

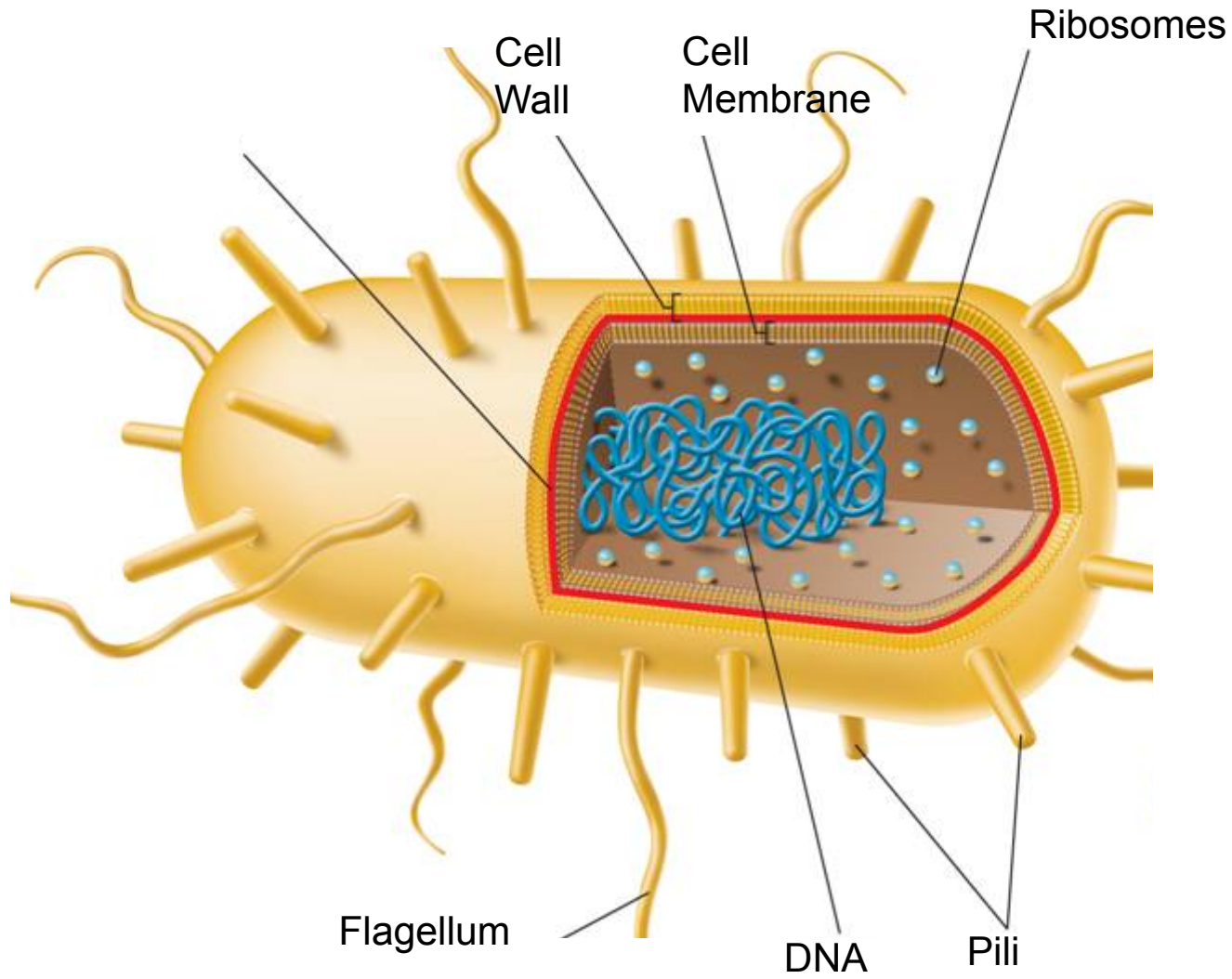


Prokaryotes

- Smaller and simpler than eukaryotes.
- Contain **cell membranes** and **cytoplasm**.
- DNA floats in cytoplasm
- All bacteria are prokaryotes.
- Examples:
 - *E. Coli*: bacteria which lives in your intestines
 - *Staphylococcus aureus*: bacteria which causes skin infections.

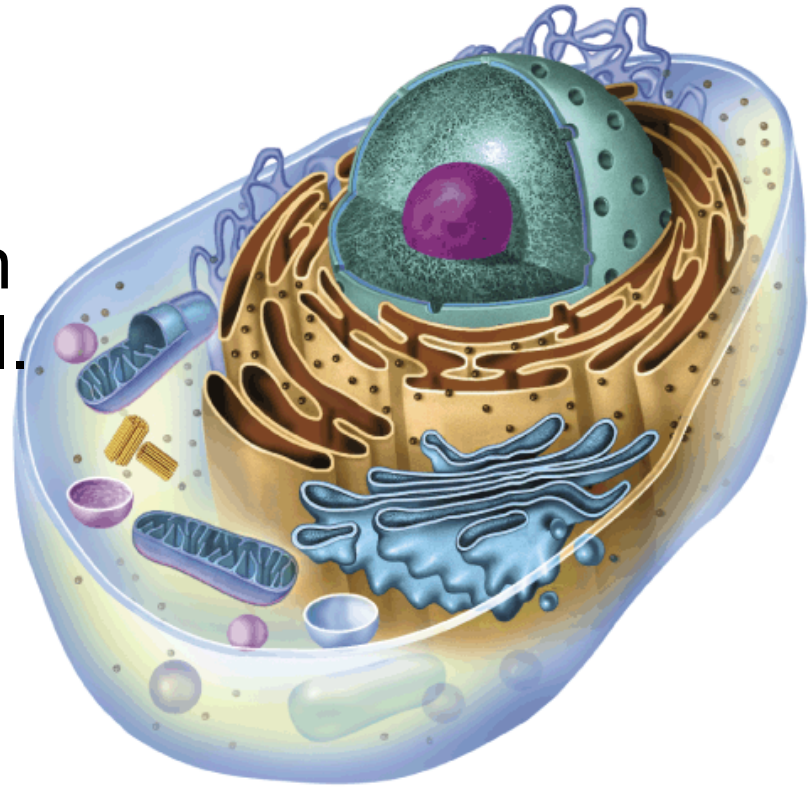


E. coli, a typical Eubacterium



Eukaryotes

- Have a **nucleus**, **cell membranes**, and **cytoplasm**.
- They have complex **organelles**, structures which have functions within the cell.
- Examples: All plants, animals, fungi, and some microorganisms are Eukaryotes.



Prokaryotic vs. Eukaryotic Cells

Prokaryotic Cells

NO nucleus

NO membrane-bound organelles

Smaller, simpler cells

Bacteria are prokaryotic

Eukaryotic Cells

Nucleus

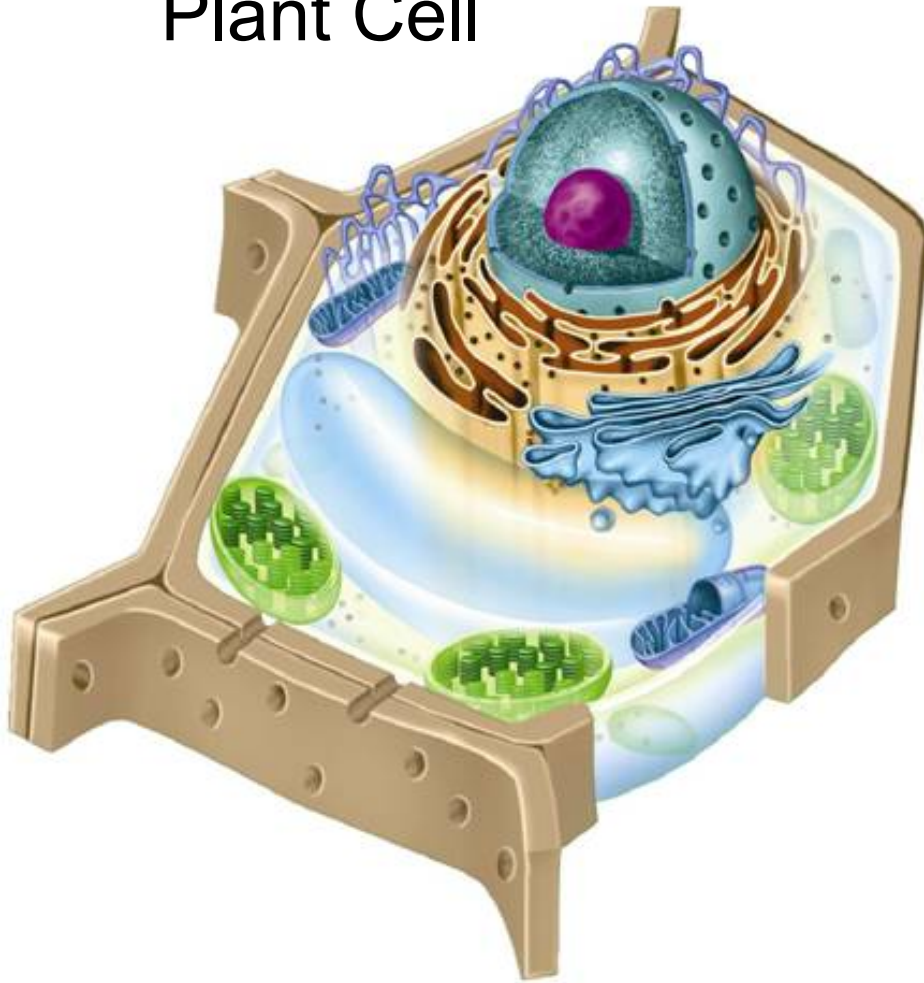
Membrane-bound organelles

more complex cells

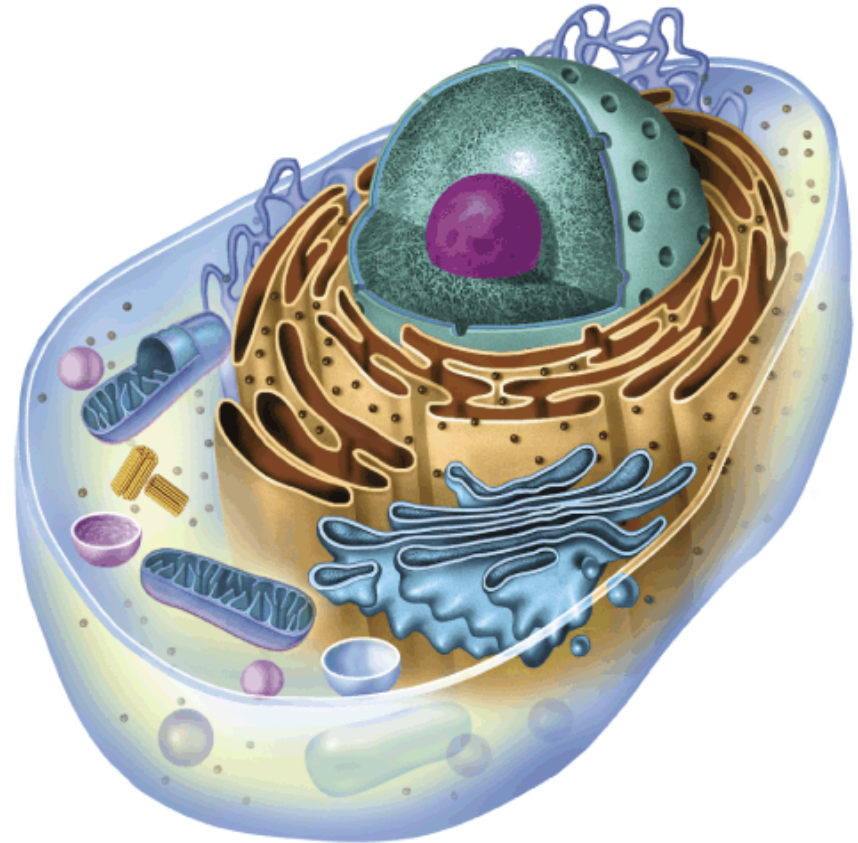
Plants, animals, fungi, protista are eukaryotic.

Eukaryotic Cell Structure

Plant Cell



Animal Cell

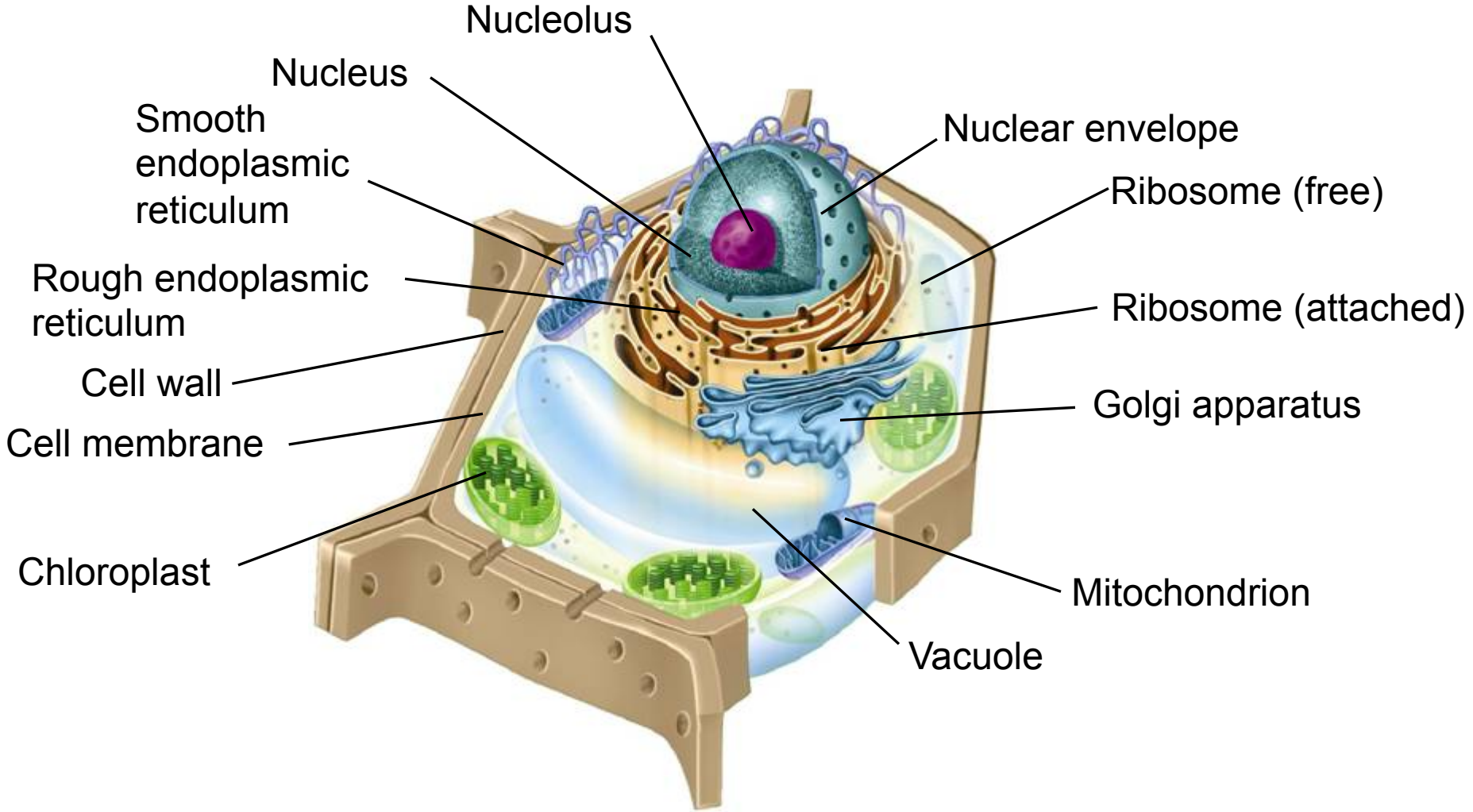


Eukaryotic Cell Structures

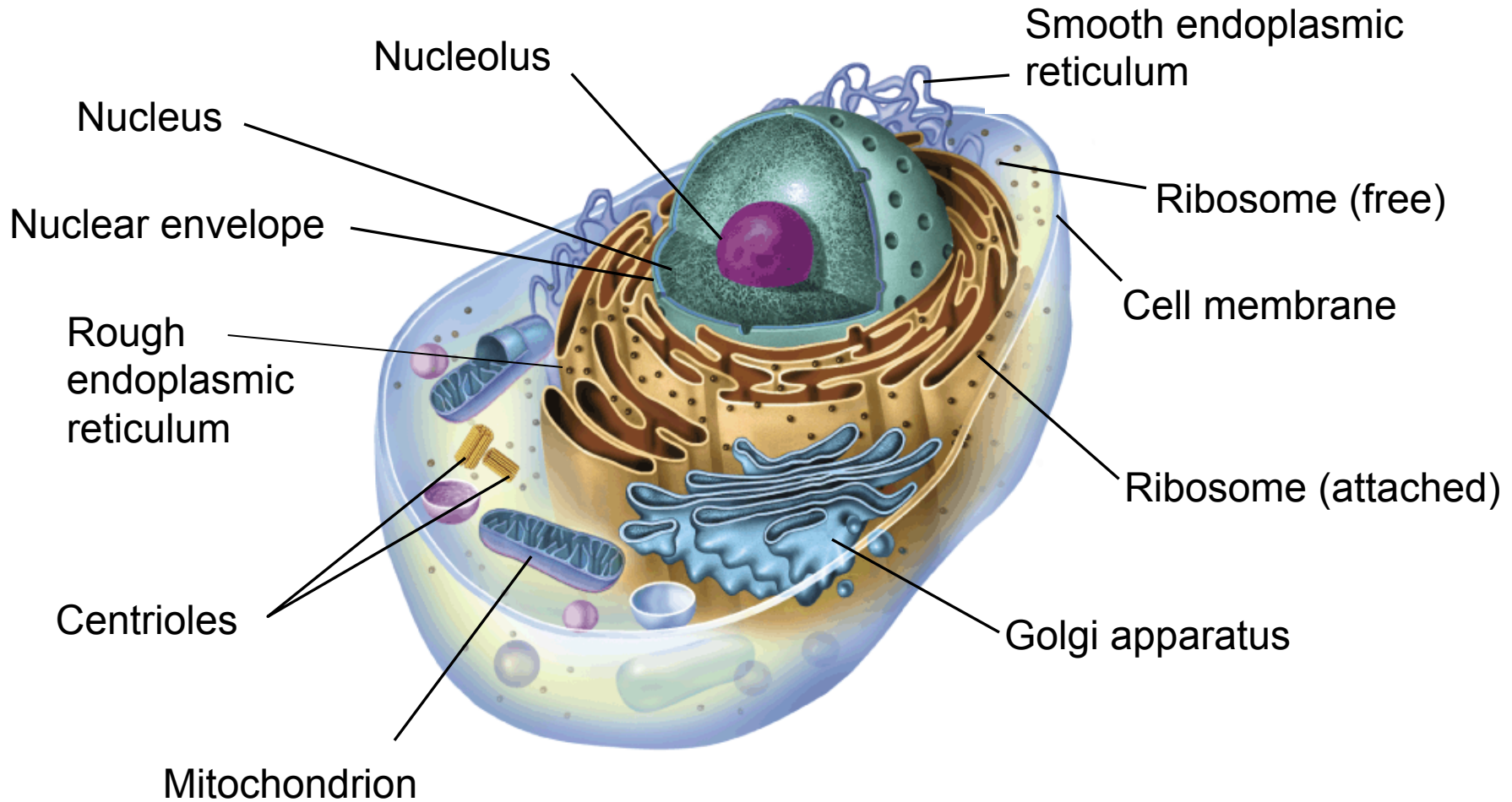
Organelles: structures within a eukaryotic cell that perform important cellular functions (jobs).

- mini organs of the cell.

Plant Cell



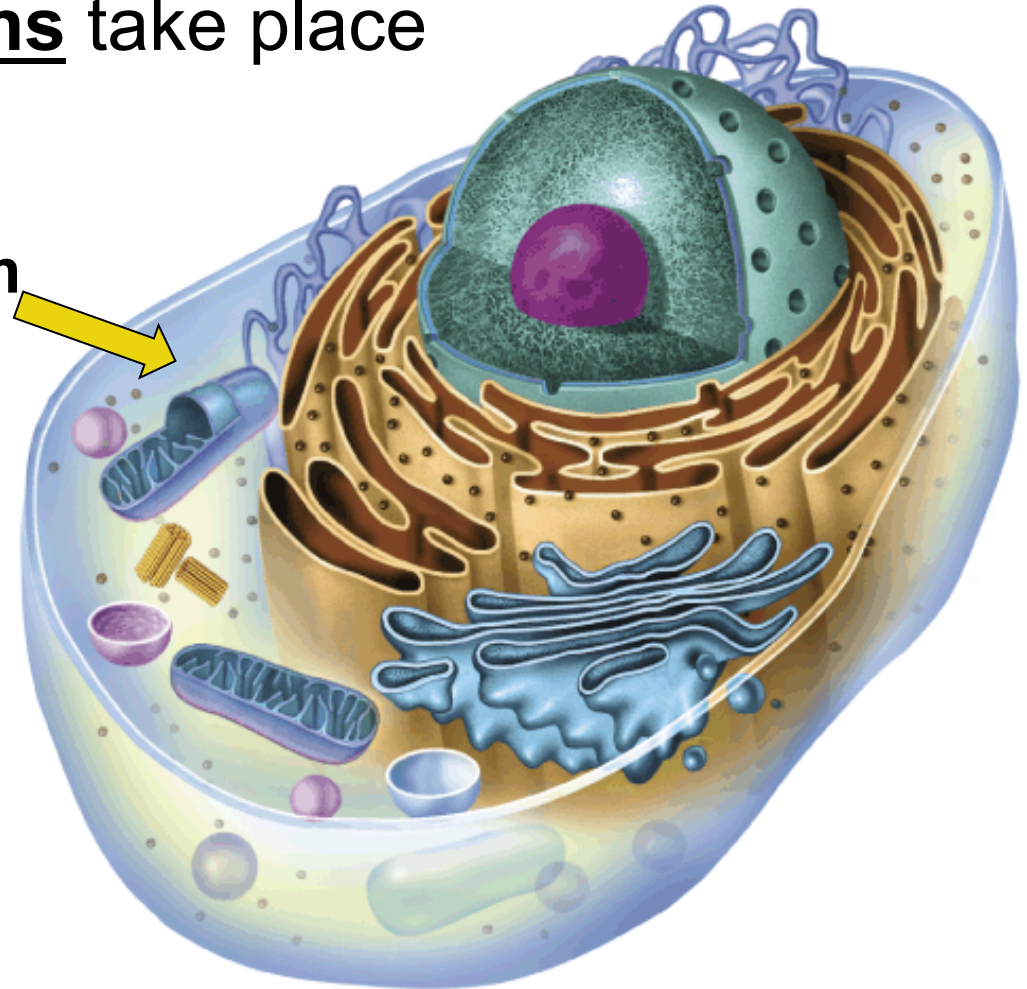
Animal Cell



Cytoplasm

- The portion of the cell that contains the organelles.
- Many chemical reactions take place in the cytoplasm.

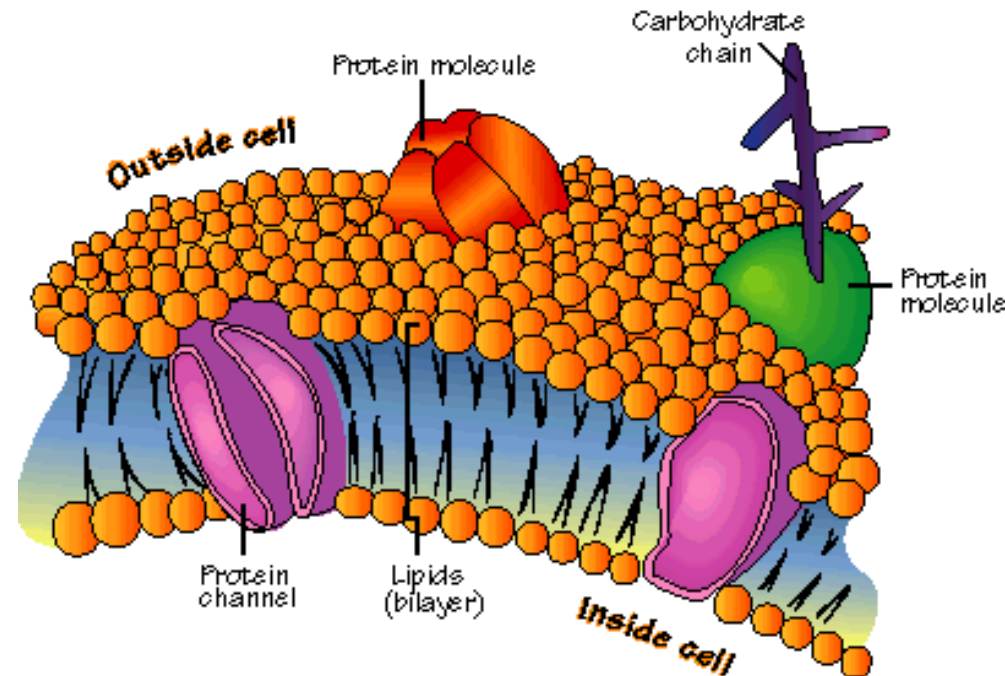
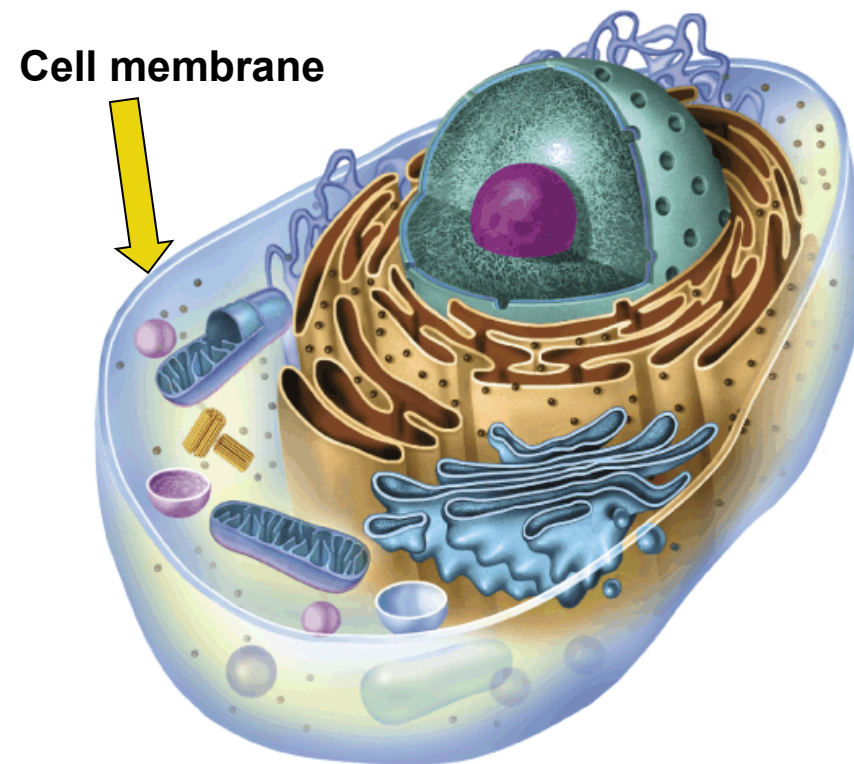
Cytoplasm



Cell Membrane

(the protective barrier)

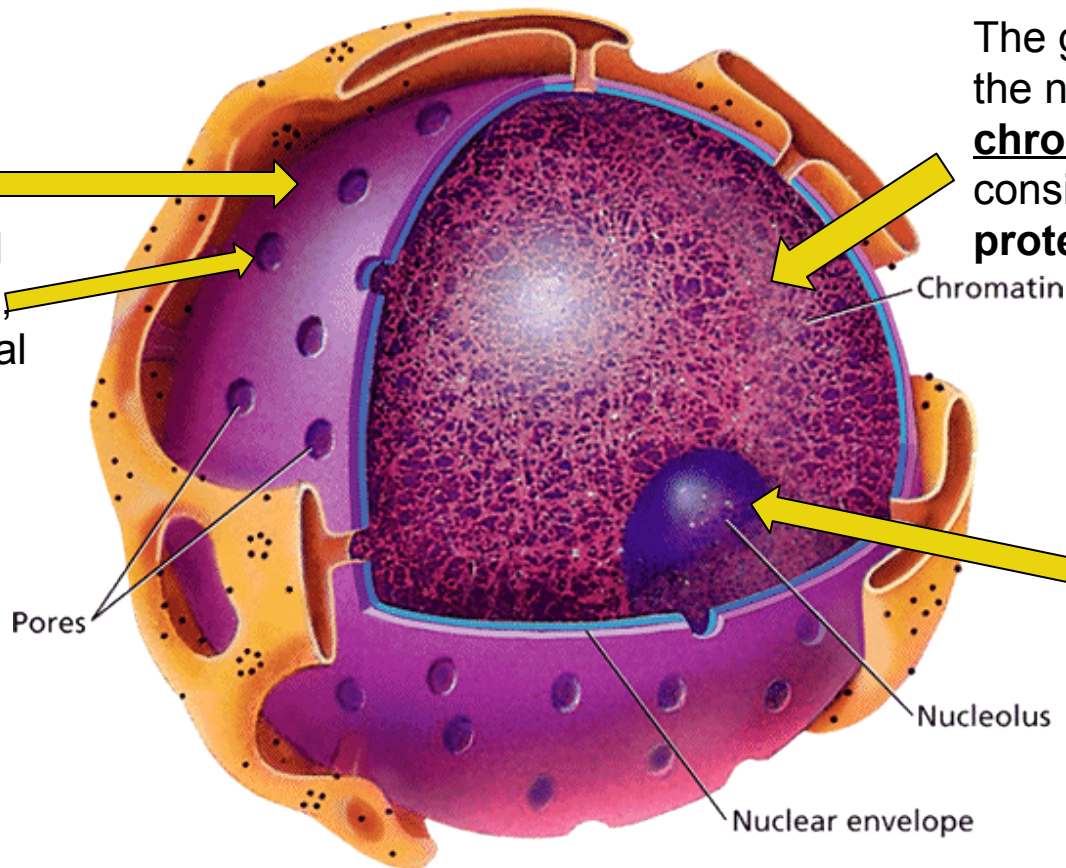
- Cell membrane separates a cell from its surroundings.
- Regulates what enters and leaves the cell.
- Helps protect and support the cell.



Nucleus (the control center)

- The cell's **control center**.
- Directs all of the cell's activities.
- Contains the cell's **genetic information (DNA).**

The **nuclear envelope** is dotted with **nuclear pores**, which allow material to move in and out of the nucleus.



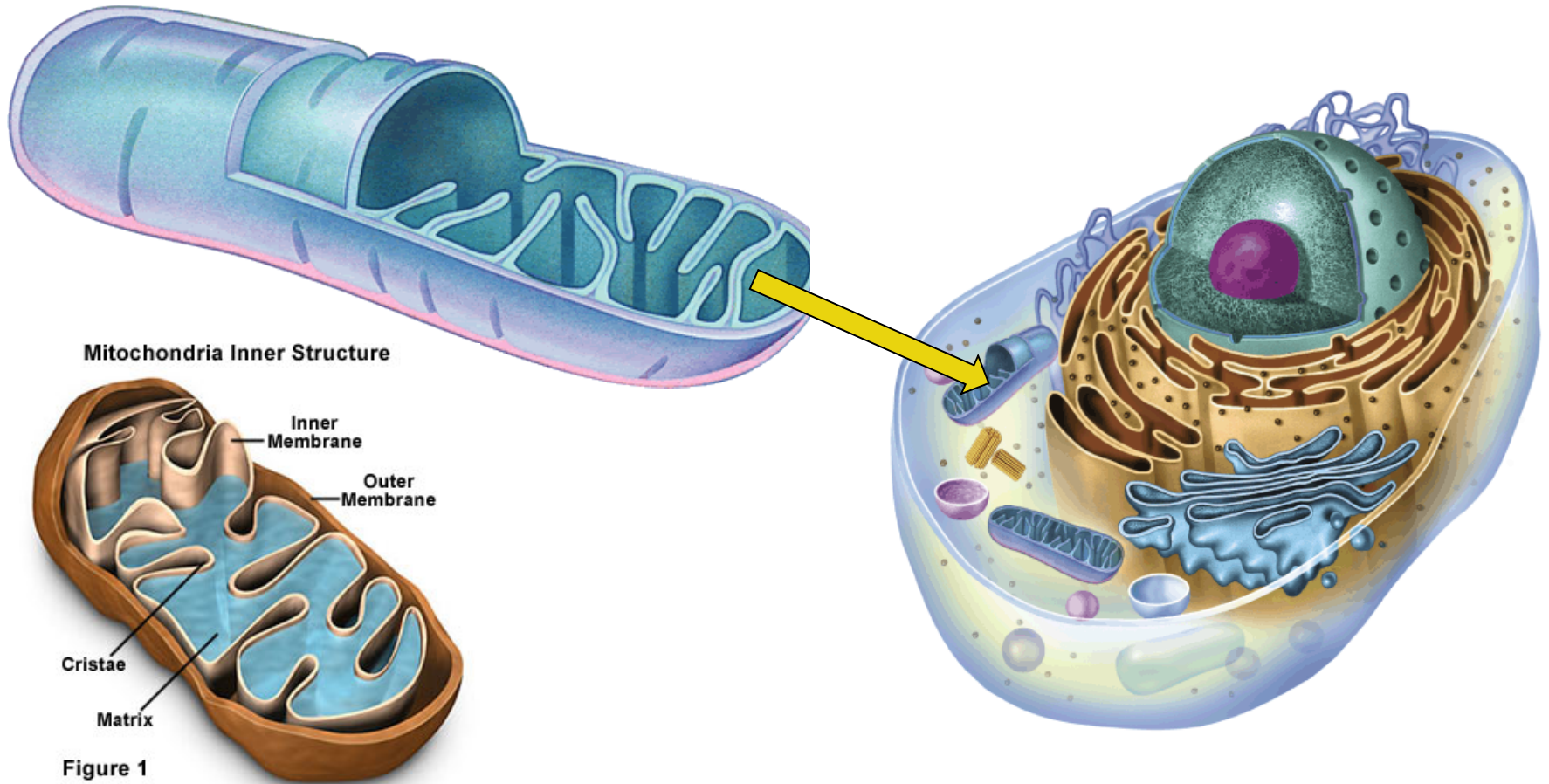
The granular material in the nucleus is called **chromatin**. Chromatin consists of **DNA bound to protein**.

The **nucleolus** is where the **assembly of ribosomes begins**.

Mitochondria

(the powerhouse of the cell)

- Known as the “powerhouses” of the cell.
- They convert energy in food molecules to energy the cell can use to carry out its functions (ATP).

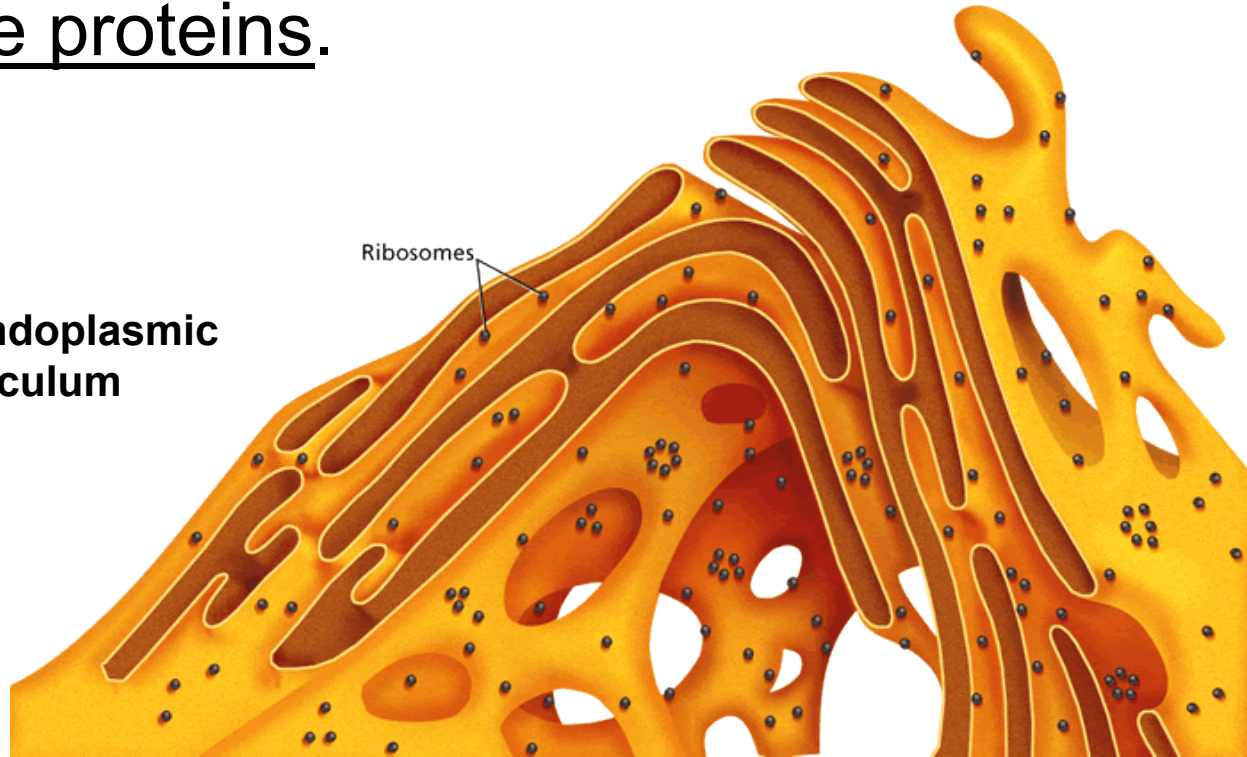


Endoplasmic Reticulum (E.R.)

(the highway of the cell)

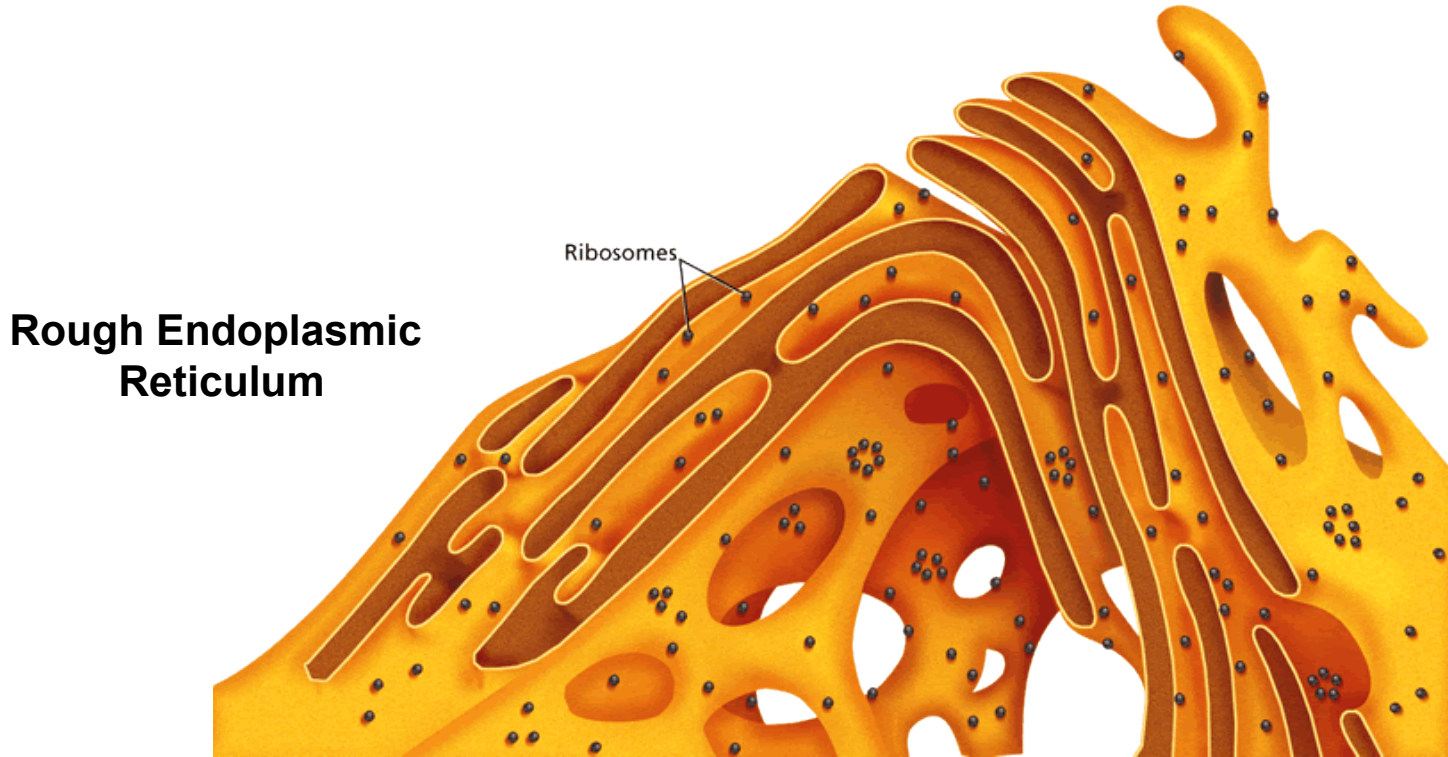
- The E.R. is **similar to the system of hallways** in a building.
- Proteins and **other materials** move throughout the cell by way of the E.R.
- The spots on this organelle are **ribosomes**, **which produce proteins.**

Rough Endoplasmic Reticulum



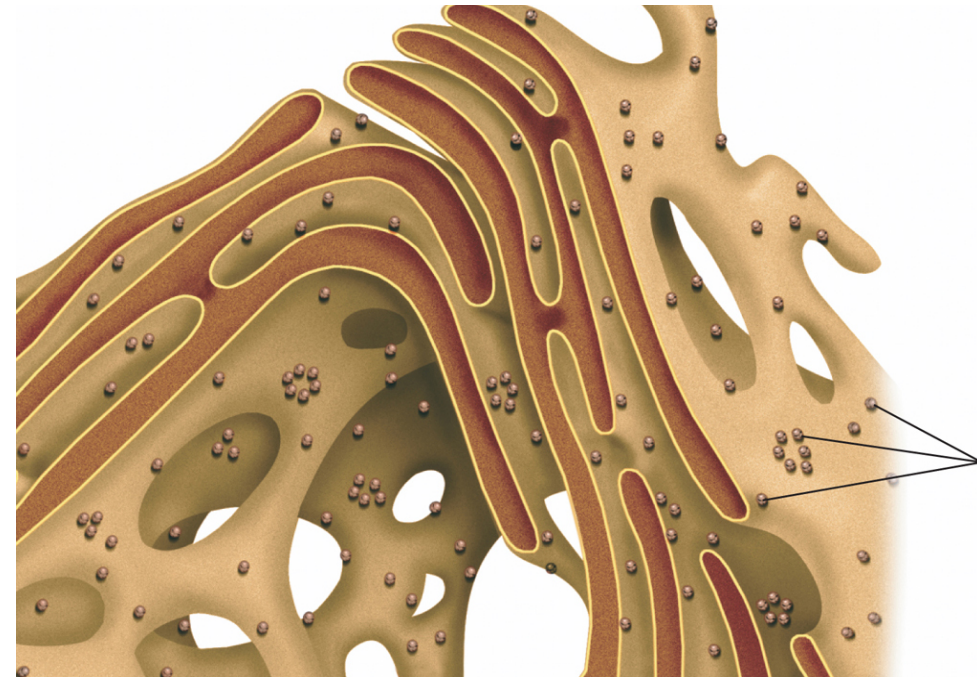
Endoplasmic Reticulum (E.R.) (the highway of the cell)

- **Rough ER**: has ribosomes on outside.
 - Transports proteins and other stuff.
- **Smooth ER**: NO ribosomes on outside.
 - Contains enzymes that make lipids and detoxify drugs.



Ribosomes

(little protein makers)

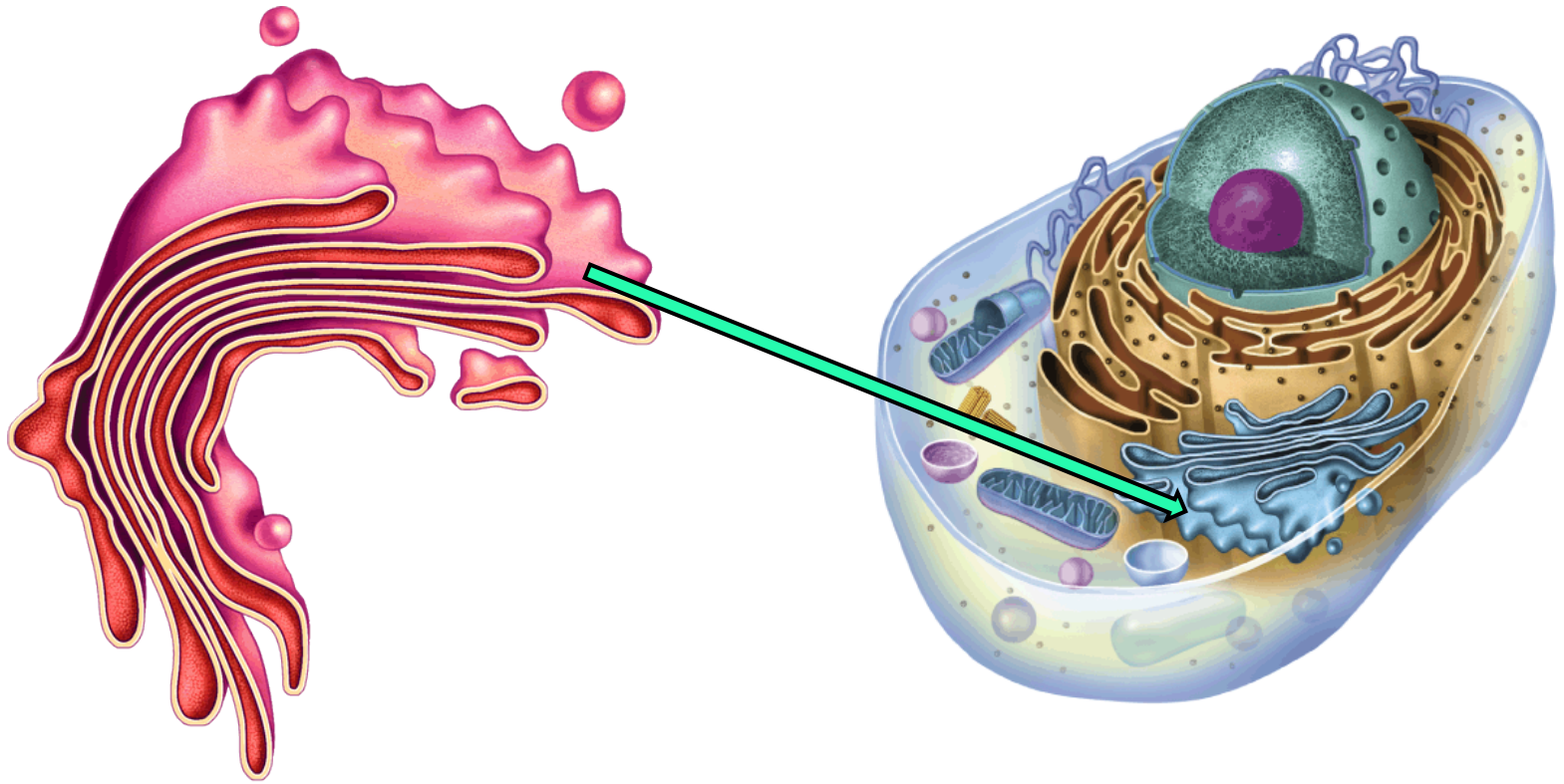


Rough Endoplasmic Reticulum with
Ribosomes attached

- One of the most important jobs carried out in the cell is making proteins.
- **Proteins** are made by ribosomes.
- Ribosomes are small particles of RNA and protein found throughout the cytoplasm and on the **rough ER**.

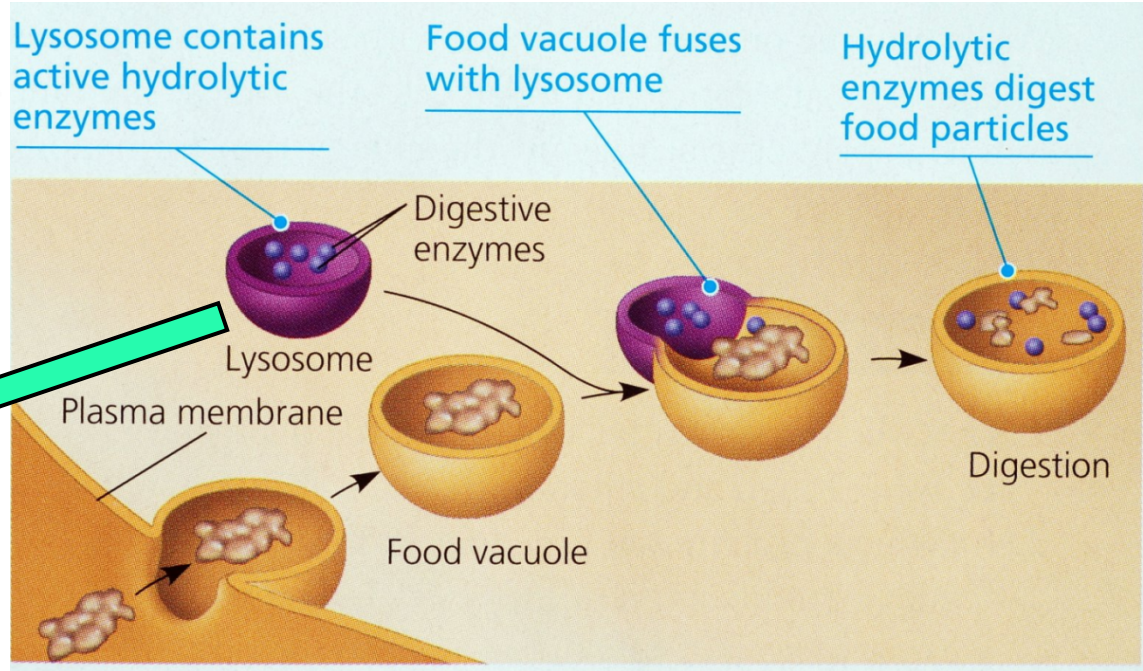
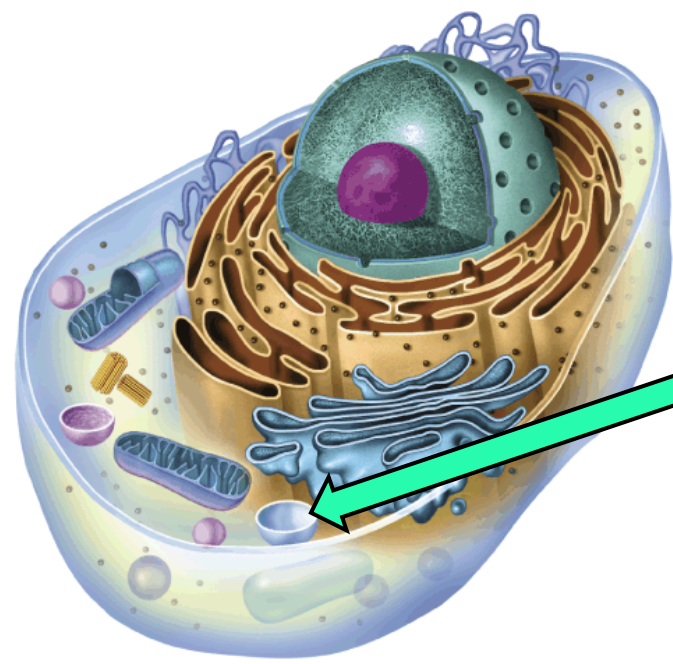
Golgi Body (the shipping warehouse)

- **Receive** proteins and other newly formed materials from the endoplasmic reticulum.
- **Package** and **distribute** proteins and other materials to other parts of the cell.



Lysosomes (the little garbage disposals)

- **Lysosomes** are small organelles filled with enzymes that **break things down** into small molecules that can be used by the rest of the cell.

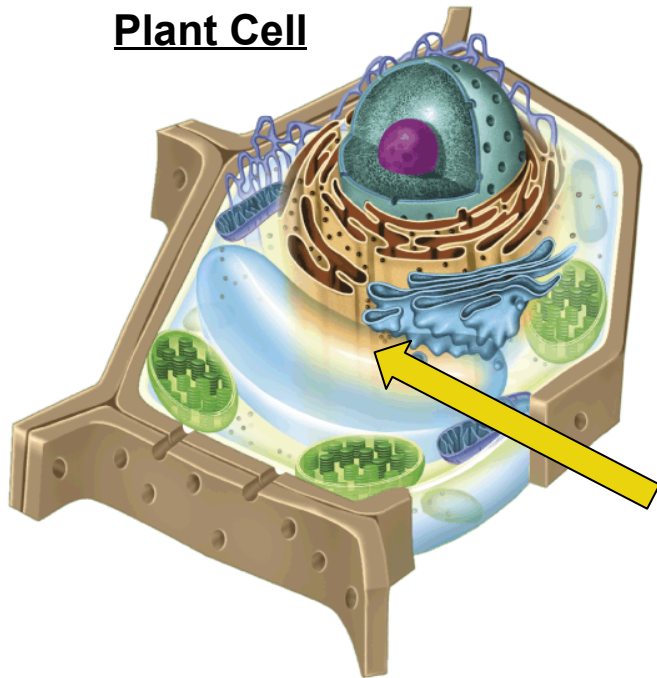


Vacuoles

(the plant storage warehouse and support system)

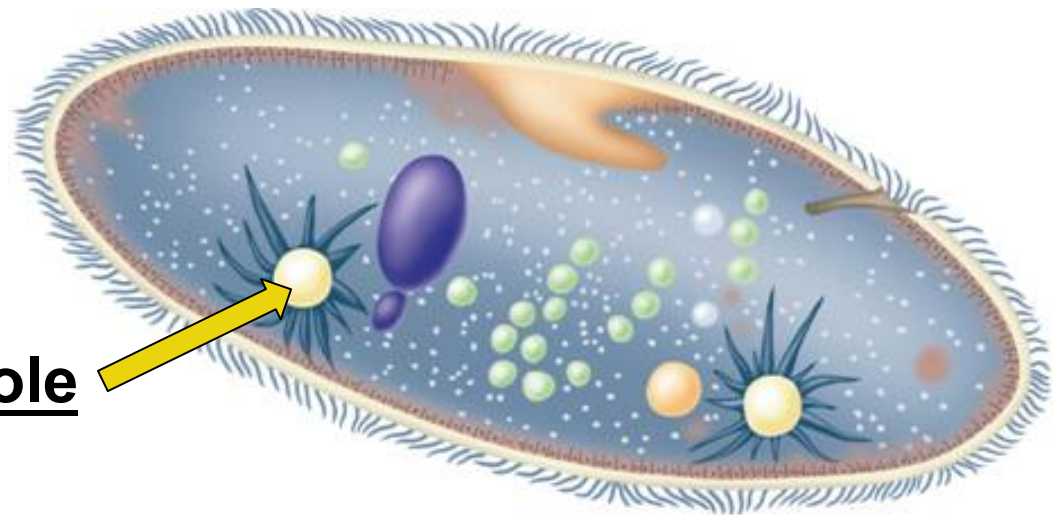
- SOME cells contain saclike structures called **vacuoles**.
- Vacuoles **store materials** (water, salts, proteins, and carbohydrates) and help support heavy structures (plants) and help cells move (paramecium).

Plant Cell



Paramecium

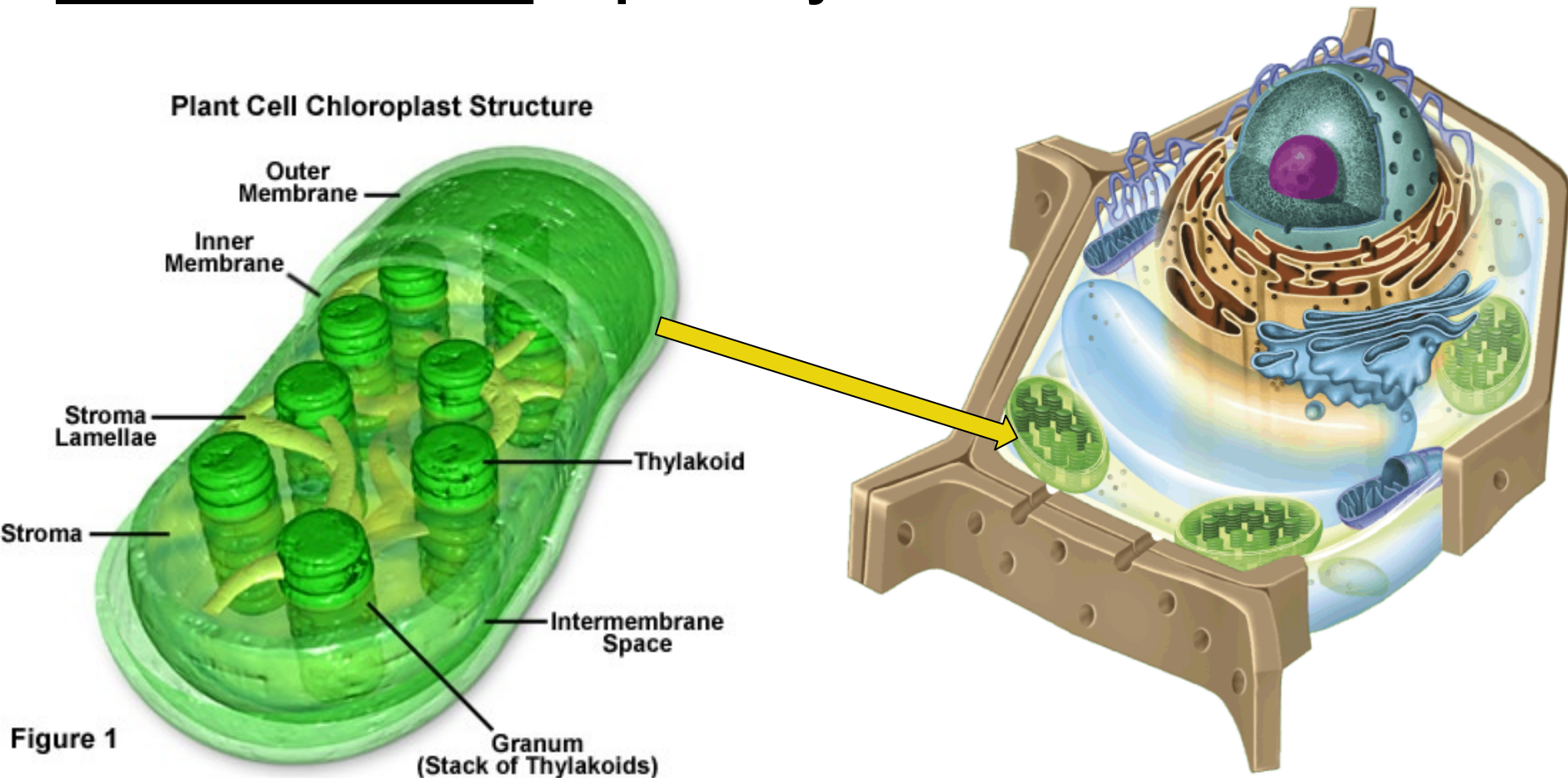
Vacuole



Chloroplasts

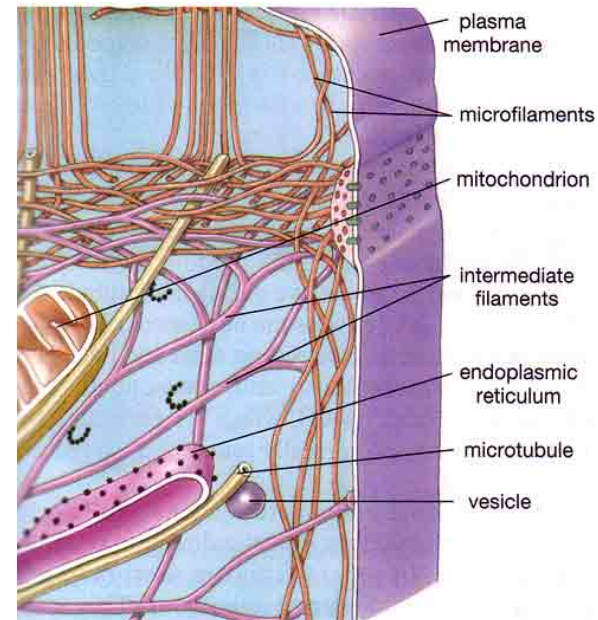
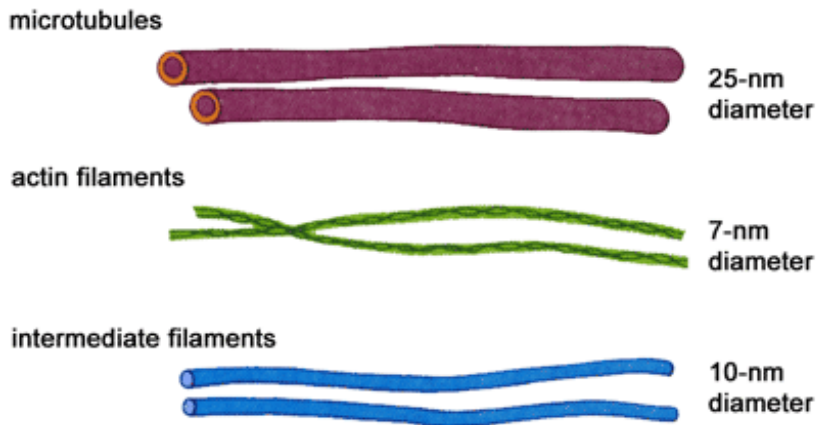
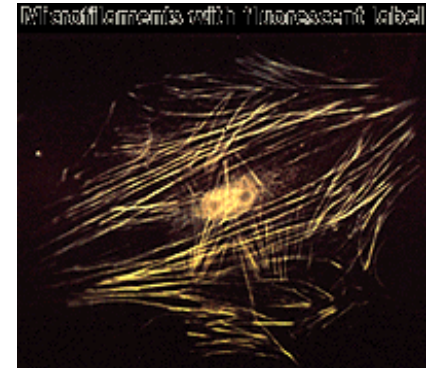
(plant's little sunshine food makers)

- Chloroplasts are found only in plant cells
- They **convert energy from the sun into sugar** using the chemical reactions of photosynthesis.



Cytoskeleton

- The **cytoskeleton** is network of **protein fibers**.
- Helps to give shape to the cell.
- Helps support the cell.



The Cell as a Factory

- The way in which proteins are made in cells is similar to the way products are made in a factory. Like a cell a factory has a:
 - Control Center
 - Support Structure
 - Assembly Area
 - Power Supply