

# Living Things



## CHAPTER 2



# Section 1: What is Life?



- **6** Characteristics of Living Things:
  1. Cell Organization
    - ✦ Unicellular vs. Multicellular
  2. Composed of **5** essential chemicals
    - ✦ Water
    - ✦ Carbohydrates- main energy source
    - ✦ Proteins
    - ✦ Lipids (Fats)
    - ✦ Nucleic Acids- genetic material that controls cell's activities
  3. Use energy
    - ✦ Growth and Repair

# Characteristics of Living Things (cont.)



4. Respond to Surroundings
  - ✦ Stimulus- change in the environment
    - Examples- temperature, light, sound
  - ✦ Response- action as a result of the stimulus
5. Growth and Development
6. Reproduction



# Life Comes from Life

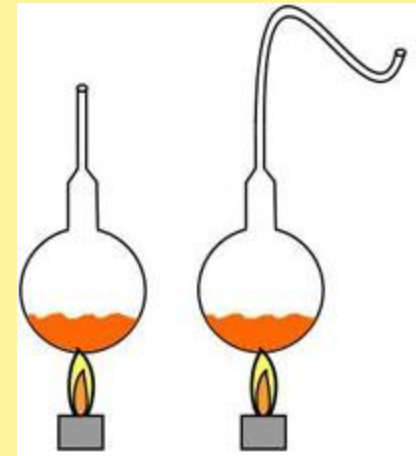


- Spontaneous Generation

- mistaken idea that life can come from nonliving things
- Two experiments that disproved this theory:

- ✦ Redi's Experiment- flies

- Pasteur's Experiment- bacteria



# 4 Needs of Living Things



1. Water
2. Food
  - Two ways to obtain food:
    - ✦ Autotrophs- make their own food
      - Plants
    - ✦ Heterotrophs- cannot make their own food
      - Animals, mushrooms, slime molds
3. Living Space
4. Stable Internal Conditions (ie., Homeostasis)
  - Temperature, blood sugar levels, water levels

# Section 2: Classifying Organisms



- **Classification**

Grouping things based on their similarities.

- **Taxonomy**

- The scientific study of how living things are classified.

- **Binomial Nomenclature**

- Developed by Linnaeus in the 1750s

- Organism groups based on observable features

- Each organism given two names (“binomial”)

- ✦ Genus- 1<sup>st</sup> name

- Felis- all cats (pumas, tigers, house cats)

- ✦ Species- 2<sup>nd</sup> name

- Refers to distinct feature

- Example: domesticus

*Felis domesticus*



# Levels of Classification



- **8** major levels
  - Domain
  - Kingdom
  - Phylum
  - Class
  - Order
  - Family
  - Genus
  - Species



# Mnemonic for Levels of Classification



- **D**aring = **D**omain
- **K**ings = **K**ingdom
- **P**lay = **P**hylum
- **C**hess = **C**lass
- **O**n = **O**rders
- **F**ast = **F**amily
- **G**reen = **G**enus
- **S**cooters = **S**pecies



# Domains



- Organisms classified according to these **3** criteria:

1. Cell type
2. Ability to make food
3. # of cells

- **3** domain system

- Bacteria

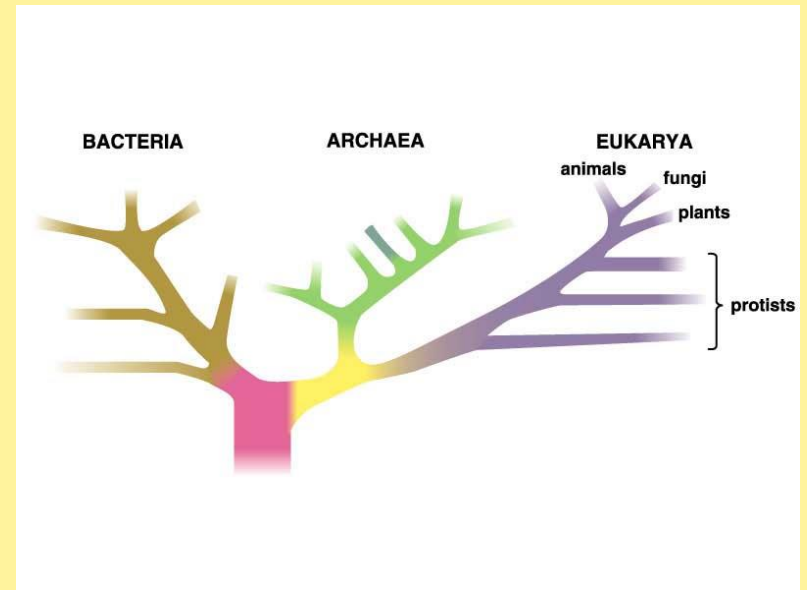
- ✦ Prokaryotes- no nucleus

- Archaea

- ✦ Unicellular; similar to bacteria
- ✦ Found in hot springs, molten gases

- Eukarya

- ✦ Eukaryotes- multicellular with nuclei



# Kingdoms

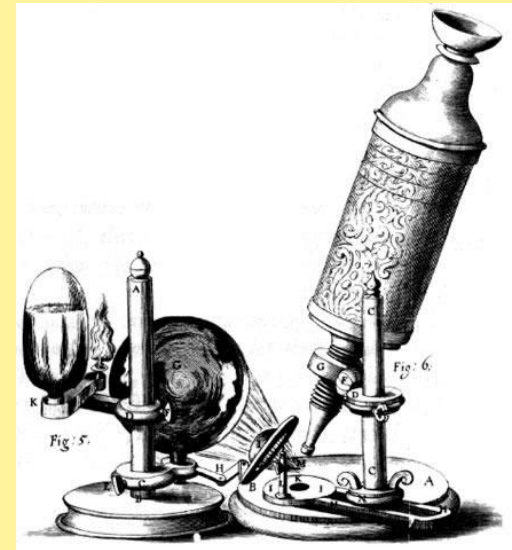


- Domain **Eukarya** split into 4 Kingdoms:
  - Protists- Eukaryotes
    - ✦ “odds and ends” kingdom
    - ✦ Example: seaweeds
  - Fungi- Eukaryotes
    - ✦ Feed by absorbing nutrients from dead or decaying organisms
    - ✦ Examples: mushrooms, molds, fungi
  - Plants- Eukaryotic autotrophs
    - ✦ trees, flowers
  - Animals- Eukaryotic heterotrophs
    - ✦ most diverse kingdom

# Section 3: Discovering Cells



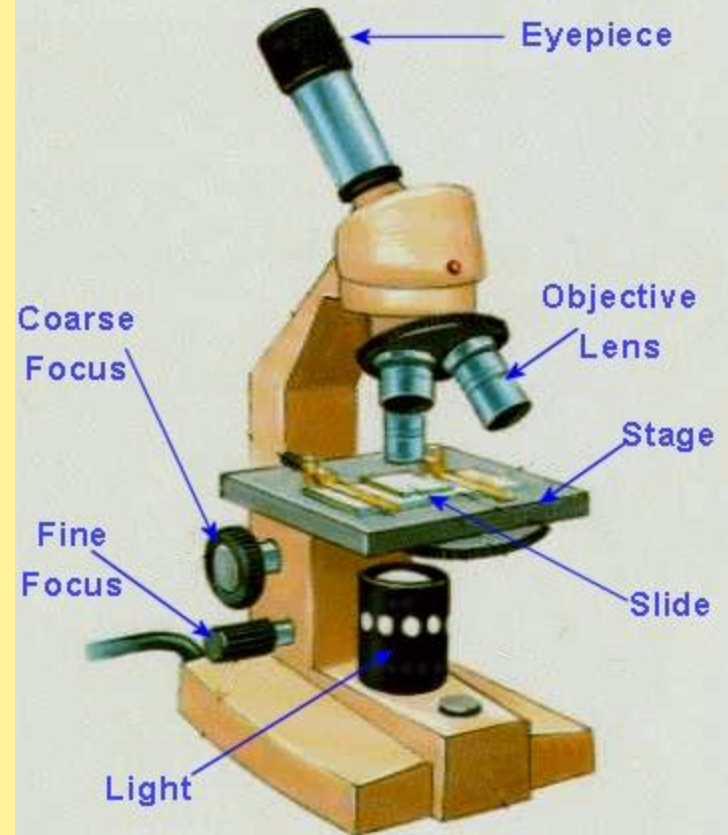
- Discovery of Cells Timeline:
  - 1590- first microscope invented
  - 1663- Hooke's compound microscope w/ illumination observed cells in a thin slice of cork
  - 1674- van Leeuwenhoek's simple microscope magnified 266 times
  - 1886- Modern Compound Light Microscope (1,000 times)
  - 1965- Electron microscope (150,000 times)
  - 1981- Scanning Tunneling Microscope  
STM (1,000,000 times)



# Light and Electron Microscope Terms



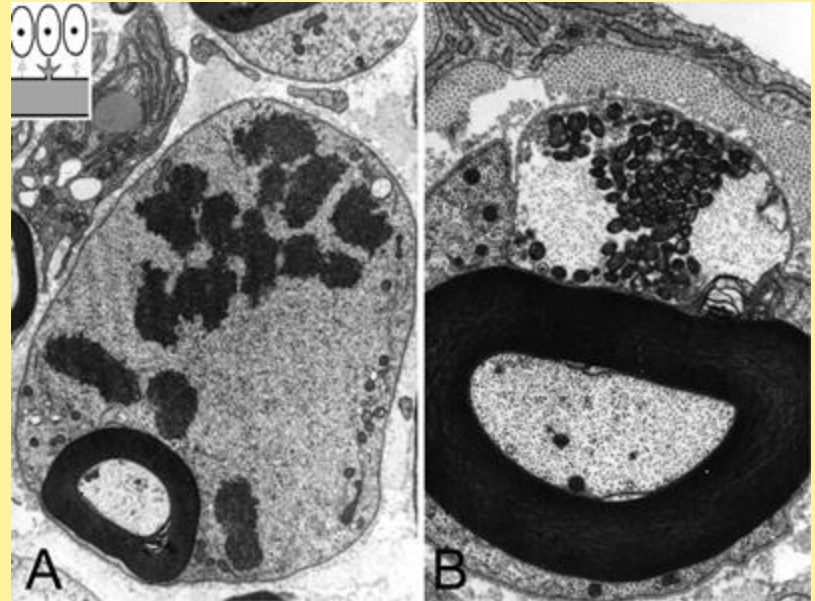
- **Magnification**
  - Ability to make things look larger than they are
- **Lenses**
  - Magnify an object by bending light
- **Resolution**
  - Sharpness of an image
- **Compound Microscope**
  - Uses more than one lens
- **Electron Microscope**
  - Use a beam of electrons



# Development of the Cell Theory



- Schleiden, Schwann, Virchow in 1855
- Cell theory says:
  - All living things are composed of cells
  - Cells are the basic units of structure and function in living things
  - All cells are produced from other cells



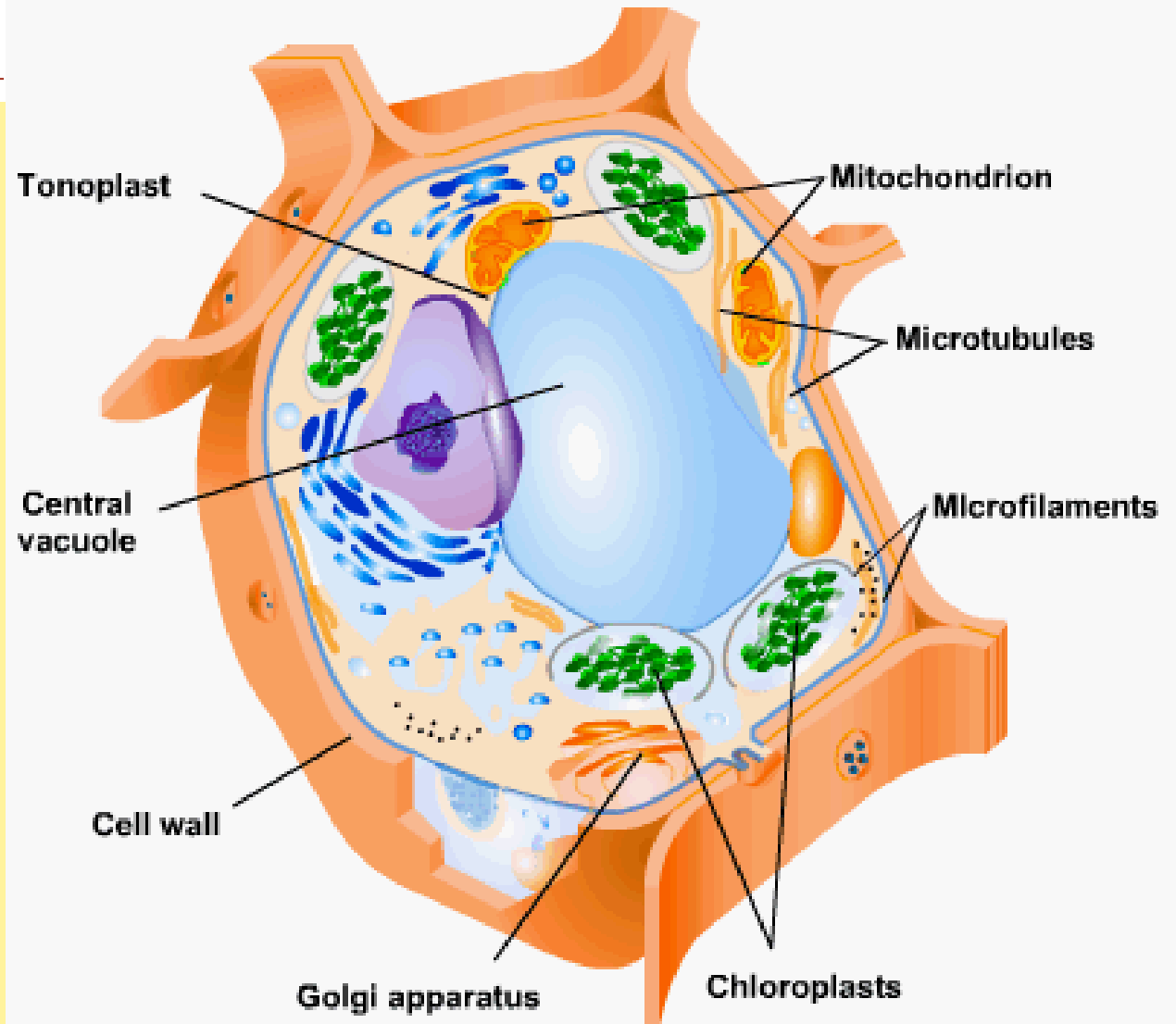
# Section 4: Looking Inside Cells



SCIENCEPHOTOLIBRARY

# Organelles

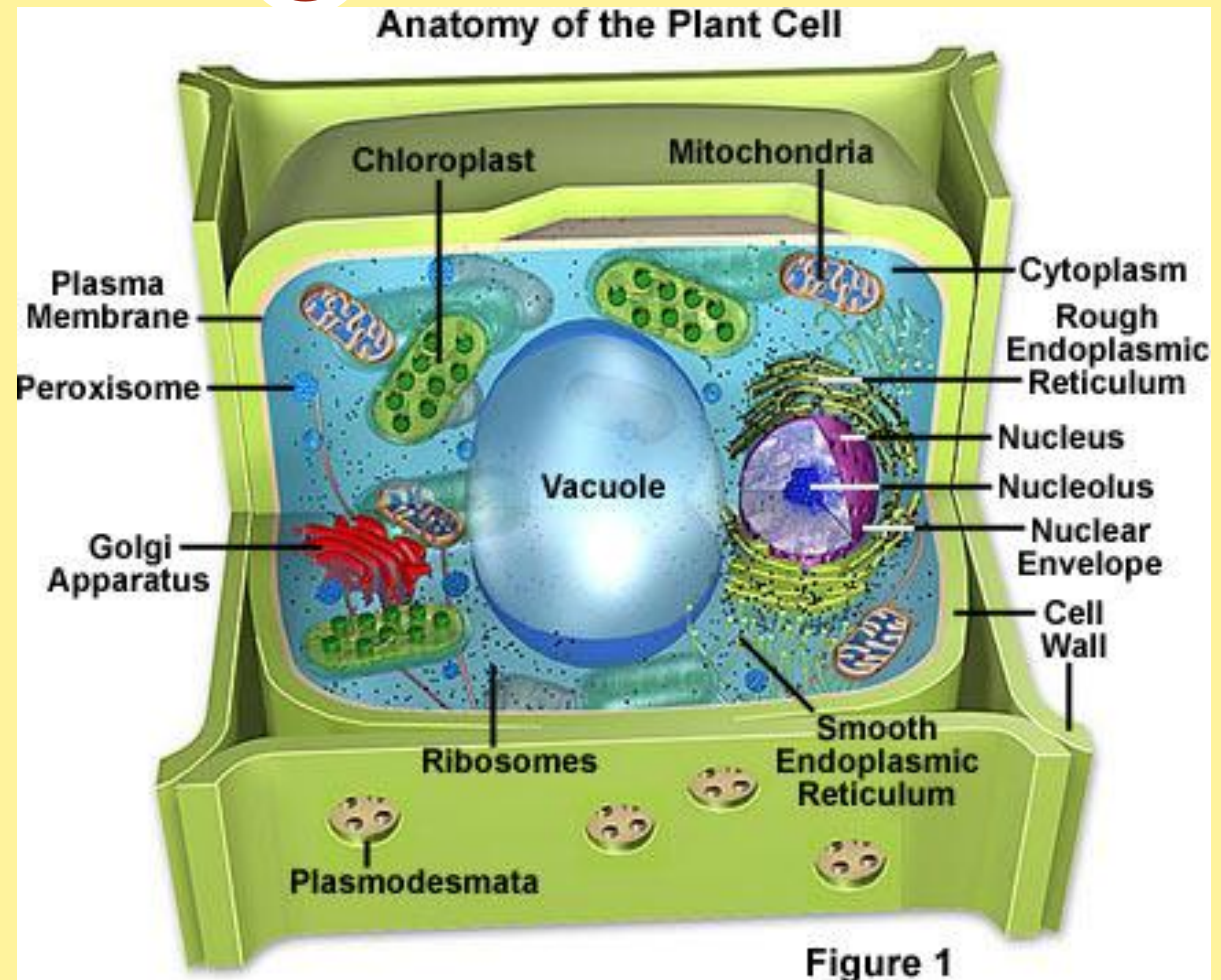
Tiny structures inside the cell with specific functions.



# Cell Wall

-Nonliving material for protection and support

-Found only in plant cells

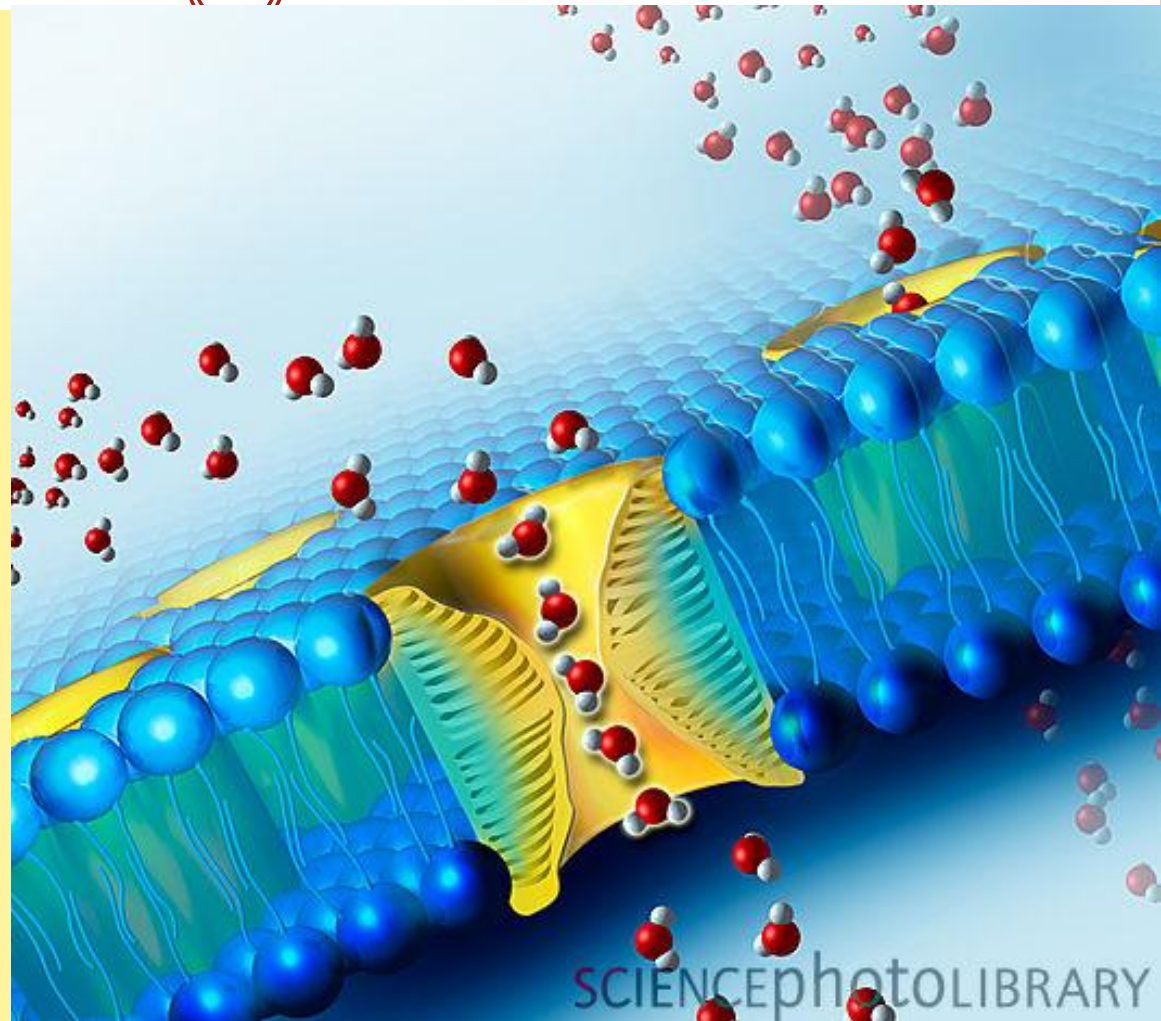




# Cell Membrane

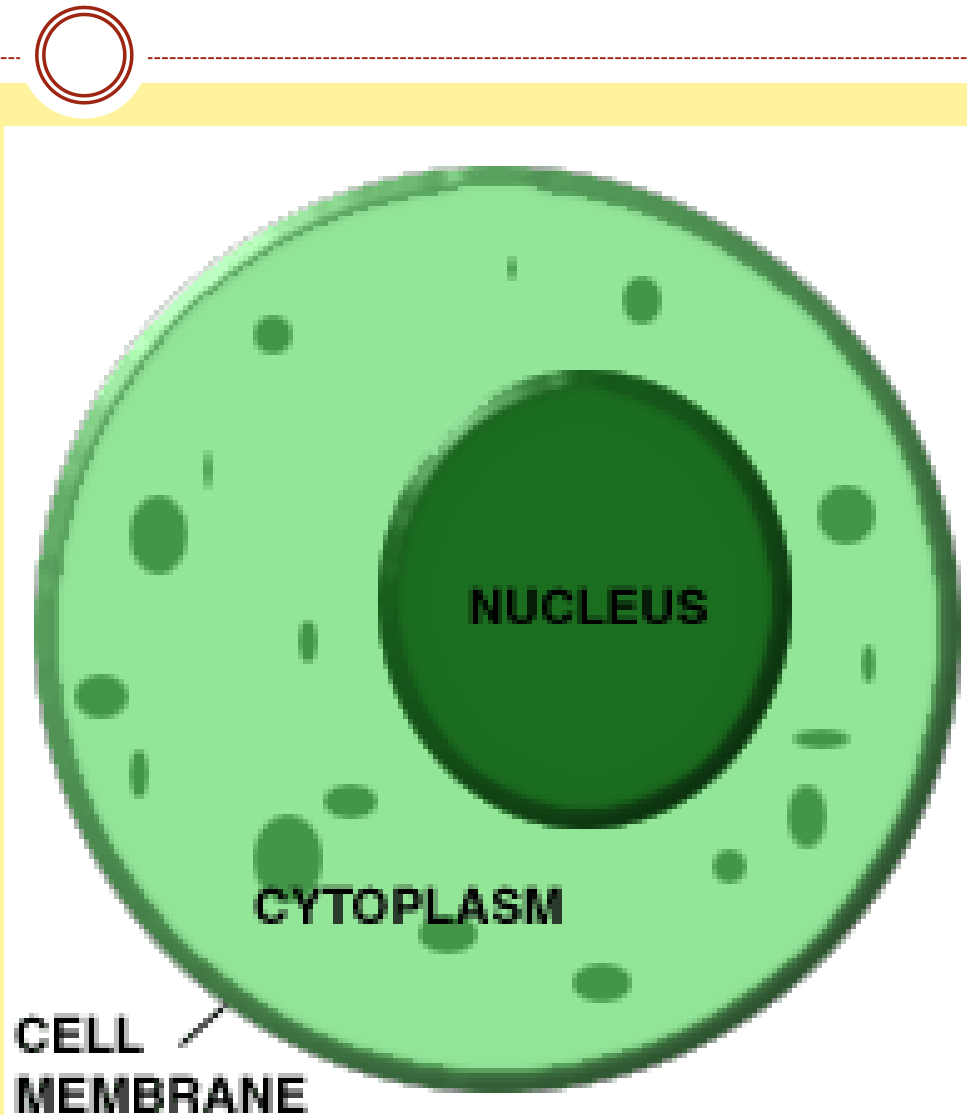


Controls what substances come in and out of the cell



# Cytoplasm

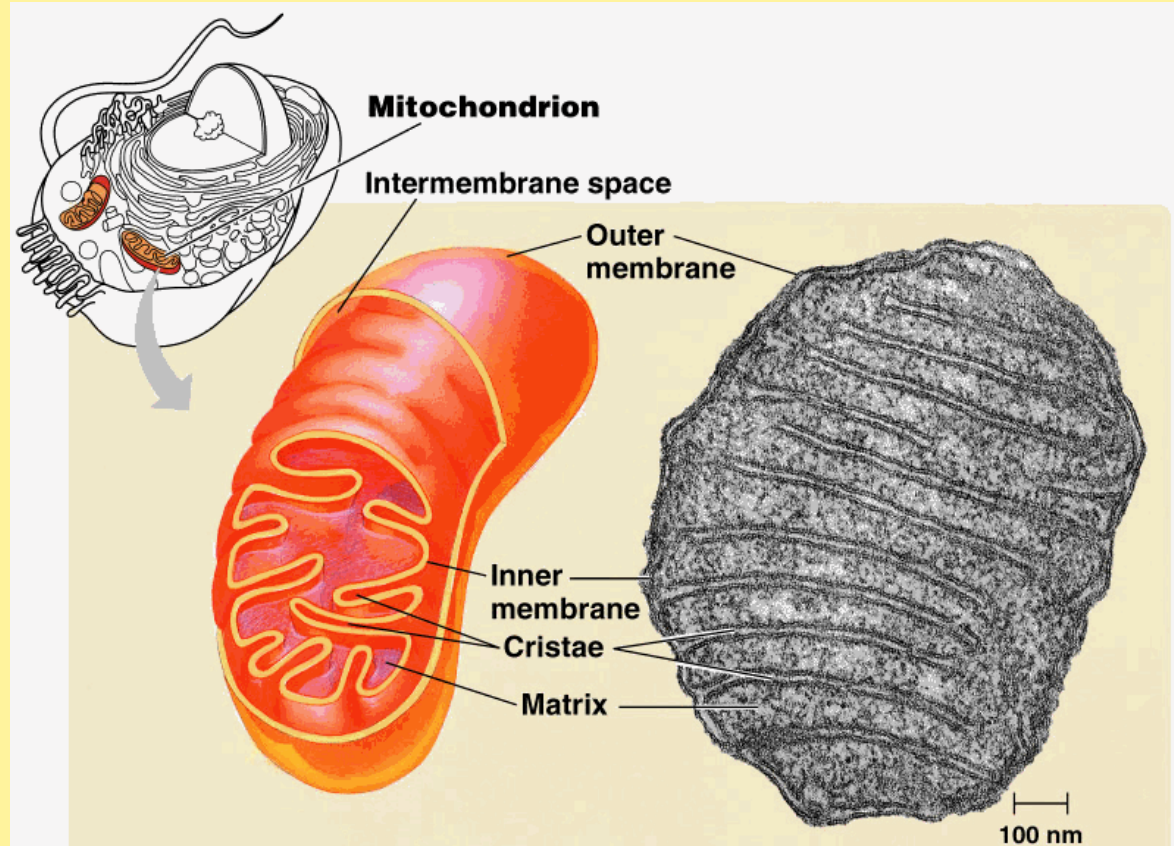
Region between  
nucleus and cell  
membrane



# Organelles in the Cytoplasm



Mitochondria  
“powerhouses”  
because they  
convert food  
into energy



Copyright © Pearson Education, Inc., publishing as Benjamin Cummings.

# Organelles in the Cytoplasm

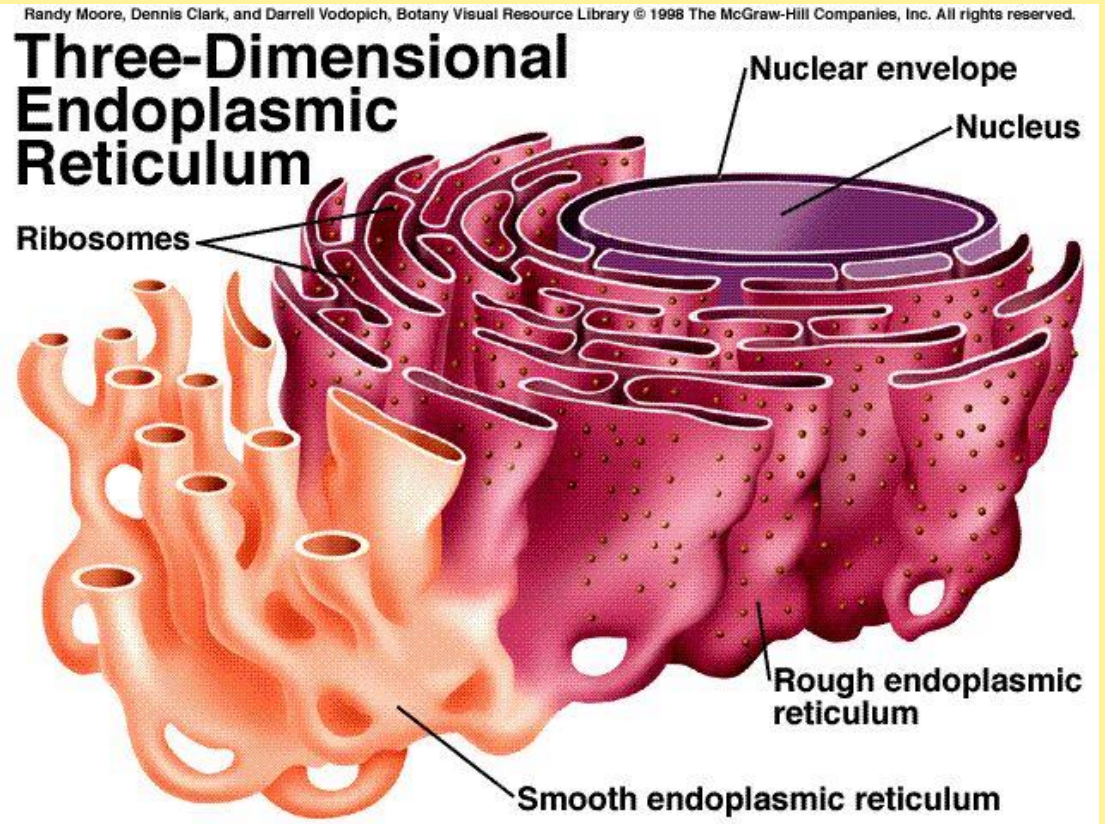


## Endoplasmic Reticulum (“ER”)

Passageways that carry proteins around cell

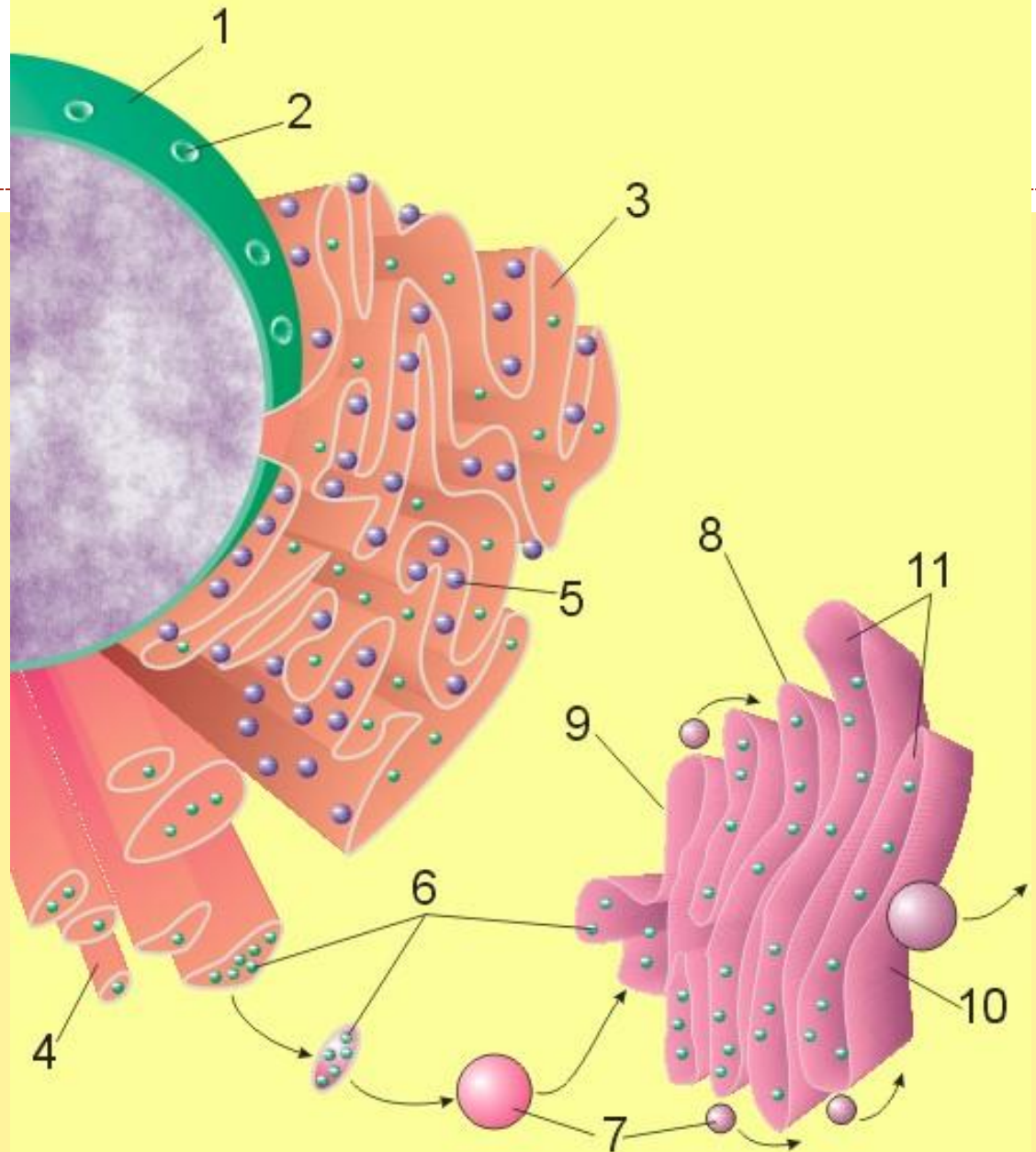
## Ribosomes

Small, grain-like bodies  
Some on ER and  
some float in cytoplasm  
**\*Produce proteins**



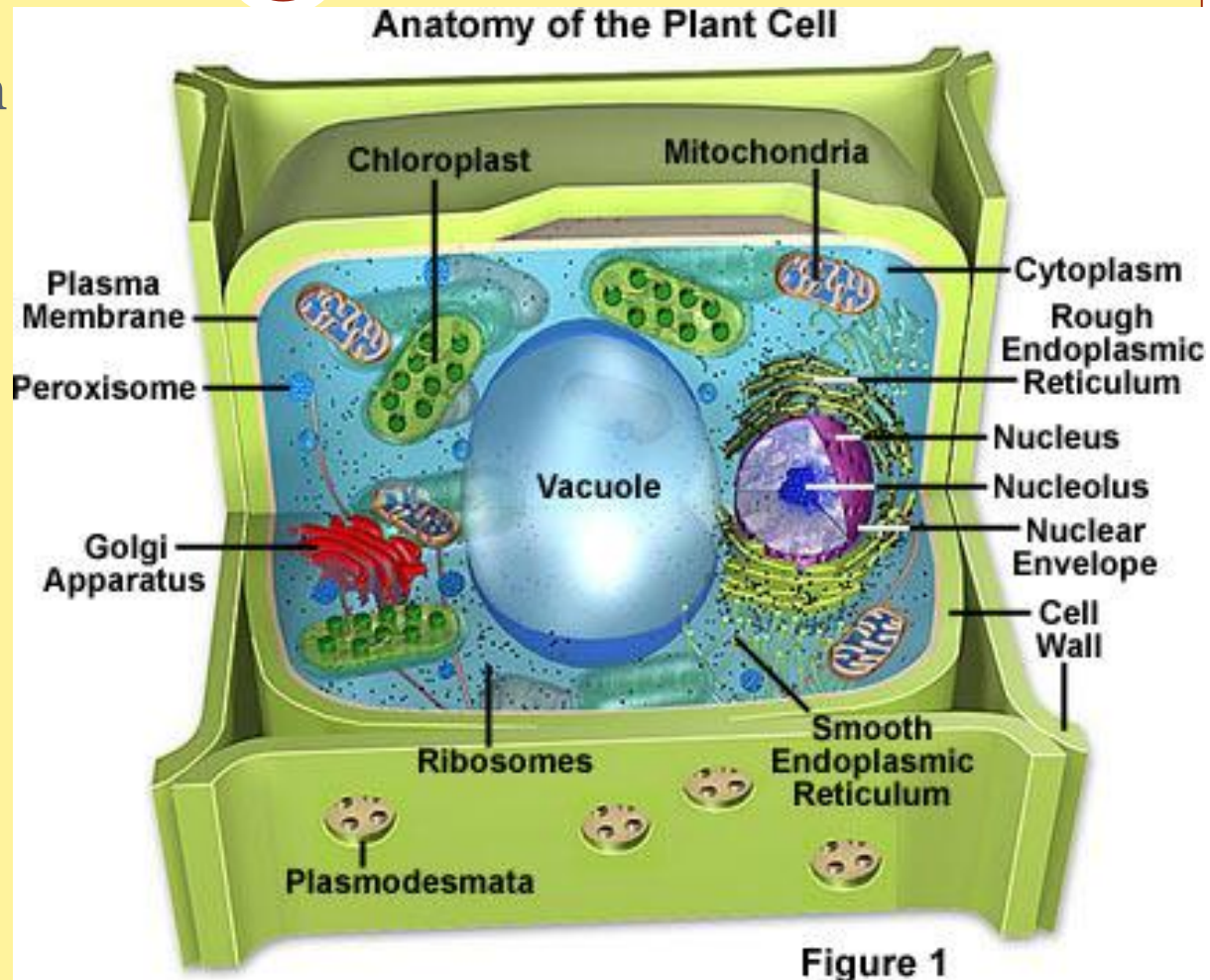
# Golgi Bodies

Receive proteins,  
package and distribute  
them to cell



# Chloroplasts

- In plant cells only
- Capture energy from sunlight to produce food

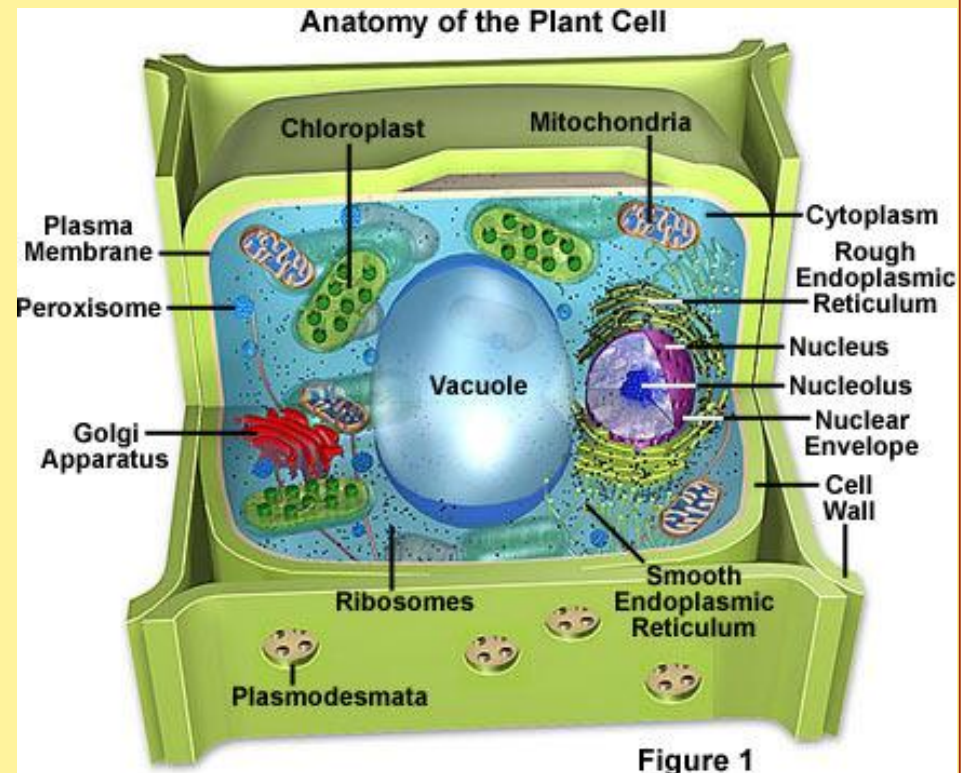


# Organelles (cont.)



- **Vacuoles**

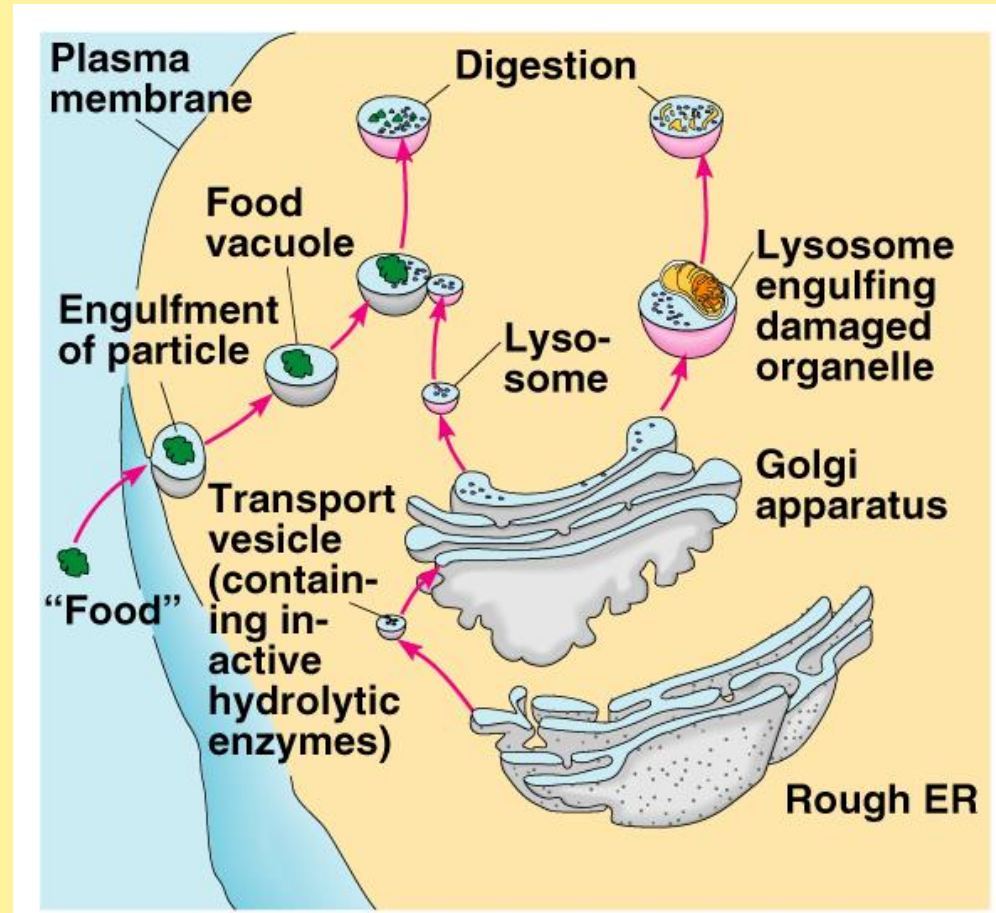
- Large, water filled sacs used for storage
- Plants have one big vacuole;
- some animal cells have much smaller versions



# Organelles (cont.)



- Lysosomes
  - Small, round structures
  - Cell's "cleanup crew"
  - Break down various substances





# Nucleus

The “Control Center of the Cell”



- **Nuclear Envelope**
  - Membrane that surrounds nucleus
  - Controls what materials go in and out of nucleus
- **Chromatin**
  - Thin strands floating inside nucleus
  - Contains genetic material
- **Nucleolus**
  - Ribosome production

