


## Cells

### What Are the Main Characteristics of organisms?

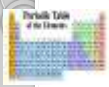


1. Made of **CELLS**
2. Require **ENERGY** (food)
3. **REPRODUCE** (species)
4. Maintain **HOMEOSTASIS**
5. **ORGANIZED**
6. **RESPOND** to environment
7. **GROW** and **DEVELOP**
8. **EXCHANGE** materials with surroundings (water, wastes, gases)

### Organization Levels of Life



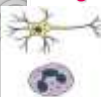
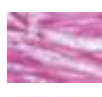

*Atoms to Organisms*

### Nonliving Levels




ATOMS → MOLECULES → ORGANELLES

### Living Levels

CELLS – life starts here → TISSUES – Similar cells working together

### More Living Levels



ORGANS → ORGAN SYSTEMS → ORGANISM

Different tissues working together → Different organs working together

## History of Cells



### First to View Cells

- In 1665, **Robert Hooke** used a microscope to examine a thin slice of **cork** (dead plant cell walls)
- What he saw looked like small boxes

### First to View Cells

- Hooke is responsible for naming cells
- Hooke called them "CELLS" because they looked like the small rooms that monks lived in called Cells

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### Anton van Leeuwenhoek

- In 1673, **Leeuwenhoek** (a Dutch microscope maker), was **first to view organism** (living things)
- Leeuwenhoek used a simple, handheld microscope to view **pond water & scrapings from his teeth**




### Beginning of the Cell Theory

- In 1838, a German botanist named **Matthias Schleiden** concluded that **all plants were made of cells**
- Schleiden is a cofounder of the cell theory**




### Beginning of the Cell Theory

- In 1839, a German zoologist named **Theodore Schwann** concluded that **all animals were made of cells**
- Schwann also cofounded the cell theory**




### Beginning of the Cell Theory

- In 1855, a German medical doctor named **Rudolph Virchow** observed, under the microscope, **cells dividing**
- He reasoned that **all cells come from other pre-existing cells** by cell division



### CELL THEORY

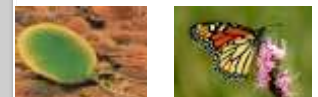
- All living things are made of **cells**
- Cells are the basic unit of structure and function in an organism (**basic unit of life**)
- Cells come from the **reproduction of existing cells** (cell division)



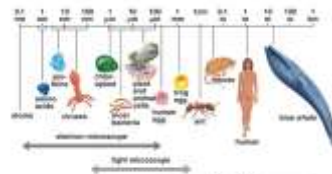
### Number of Cells

Although **ALL** living things are made of cells, organisms may be:

- Unicellular** – composed of one cell
- Multicellular** – composed of many cells that may organize into tissues, etc.



### CELL SIZE

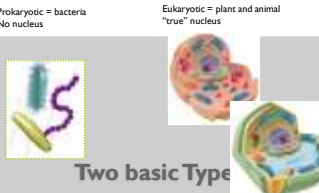


Typical cells range from 5 – 50 micrometers (microns) in diameter

### Two basic Type


Prokaryotic = bacteria  
No nucleus

Eukaryotic = plant and animal  
"true" nucleus



### Which Cell Type is Larger?

Plant cell > Animal cell > bacteria



**Common Features in ALL cells:**

- All cells have:
  - Cell membrane
  - DNA
  - Cytoplasm
- Obtain energy and nutrients from their environment
- Cell function limits cell size (cell parts can not be too far away from cell membrane; nutrients/waste must enter and exit at membrane)

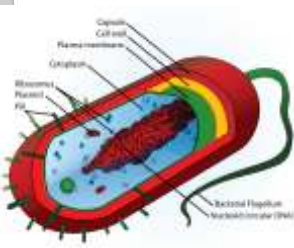
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**What is an ORGANELLE?**

- Organelle = membrane-enclosed structure performing specific functions for the cell
- Example: chloroplast = make glucose from photosynthesis

**Prokaryotic Cells**

- Small, simple (no membrane-bound organelles)
- Surrounded by cell wall and cell membrane
- Lack nucleus (nucleoid region)
  - PRO = NO nucleus
- Single, circular, coiled chromosome (DNA) inside nucleoid region
- Cytoplasm
- Ribosome (to make proteins)
- Specialized projections on surface (cilia and flagella)



**Eukaryotic Cells**

- Larger, complex (contain membrane-bound organelles)
- Cytoskeleton (network of protein fibers giving shape and organization to cell)
- Has a nucleus
  - EU = TRUE NUCLEUS or "YOU" HAVE A NUCLEUS
- Cytoplasm
- Ribosome PLUS a whole lot more!!!
- Also has specialized structures (cilia and flagella)
- 2 types: Plant and Animal



**Two Main Types of Eukaryotic Cells**



Plant Cell



Animal Cell

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**Organelles**



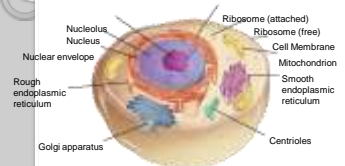
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**Organelles**

- **Very small (Microscopic)**
- **Perform various functions for a cell**
- **Found in the cytoplasm**
- **May or may not be membrane-bound**

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**Animal Cell Organelles**



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### Plant Cell Organelles



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### Major Organelles – find and define

- Nucleus (nuclear envelope, nuclear pores, nucleolus)
- Complex system of membrane organelles working together:
  - Nuclear envelope, rough endoplasmic reticulum, smooth endoplasmic reticulum, golgi, lysosome, cell membrane
- Vacuoles
- Mitochondria
- Cytoskeleton
- Cilia & flagella
- Chloroplast (plants only)
- Centrioles (animals only)