

Cells

What Are the Main Characteristics of organisms?

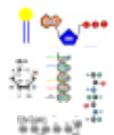
1. Made of **CELLS**
2. Require **ENERGY** (food)
3. **REPRODUCE** (species)
4. Maintain **HOMEOSTASIS**
5. **ORGANIZED**
6. **RESPOND** to environment
7. **GROW** and **DEVELOP**
8. **EXCHANGE** materials with surroundings (water, wastes, gases)

Organization Levels of Life



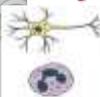
Atoms to Organisms

Nonliving Levels


ATOMS → MOLECULES → ORGANELLES

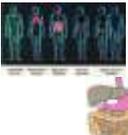
Living Levels





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)



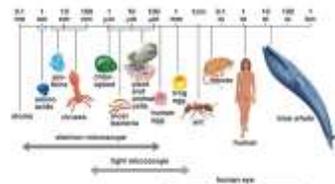
Number of Cells

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

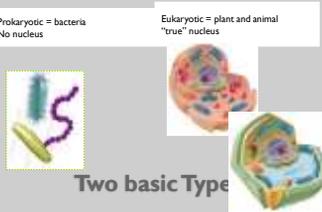


Typical cells range from 5 – 50 micrometers (microns) in diameter

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)

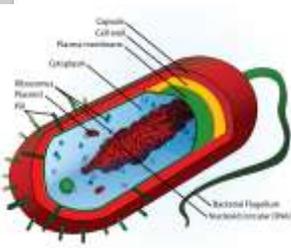
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What is an ORGANELLE?

- 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



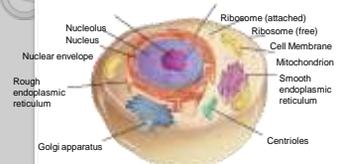
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Organelles

- **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)