

## Lesson 1 Cells

### Objectives

Tell what cells are.

Describe how scientists first observed cells and developed the cell theory.

Vocabulary - page 5

### Cells

basic units of structure and function in living things (organisms)

some cells absorb oxygen (lung cells)

some cells absorb food (cells in your digestive system)

all cells work together to keep organisms alive

**What does it mean to say that the cell is the basic unit of structure in living things?**  
all living things are made of cells

**What does it mean to say that the cell is the basic unit of function of living things?**

All cells carry out the same basic life functions.

How did they know cells existed?  
they used a microscope

**microscope** - makes small objects look bigger

1 square centimeter on your skin's surface has more  
100,000 cells

### Robert Hooke

built a microscope to look at objects.

Hooke discovered cells in 1663

Cell Theory was developed between 1838 and 1855

every cell starts out as 1 and others are formed from that  
first cell

human - start out as a zygote (fertilized egg) and all the cells  
are derived from that cell

### Anton van Leeuwenhoek (Lay von hook)

first to discover living cells through his microscope

All of this work led to the development of the cell theory.

## Cell Theory

an accepted explanation based on many observations that every cell is descended from another cell

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

## Section 2

### Objectives

Describe the functions of cell structures and organelles.

Describe how cells are organized in many-celled organisms.

Vocabulary - page 13

The cells we are looking at are called **Eukaryotes** cells.

Eukaryotes contain membrane-bound organelles like chloroplasts and mitochondria. These are not present in Prokaryotes.

Examples

Fungi, plants, protists and animals

Cells contain smaller structures that carry out functions to the cell.

### Structures

#### Organelle

small cell structures that carry out the functions inside the cell

#### Cell Wall

a layer that surrounds the cell membrane in **Plants**

helps to protect cell

supports cell

How are a plant's cell walls like your skeleton?

They support the plant, just as the skeleton supports the soft tissues inside the body.

How are they different?

Cell walls are small and surround all cells in the plant. Bones are larger and are not part of every cell in the body.

## **Cell Membrane**

controls which substances pass in and out of the cell

all cells have a cell membrane

outermost layer of an animal cell but cell wall surrounds cell membrane in a plant cell

## **Nucleus**

large oval structure

cell's control center - directs cell's activities

### **Chromatin**

thin strands of material that are in the nucleus that contain the information for directing a cell's function

### **Nucleolus**

round, small structure in the nucleus - ribosomes made here

## **Ribosomes**

produce proteins

look like little bb's

## **Cytoplasm**

gel-like fluid that fills space between cell membrane and the organelles

fluid moves constantly

## **Mitochondria**

convert the food into energy

## **Endoplasmic Reticulum (ER)**

ribosomes that are attached are helped by the ER to make proteins

## **Golgi Apparatus**

receives the proteins from the ER then packages and moves to other parts of the cell

## **Vacuoles**

a sac that fills with water, food, or other materials needed by the cell

may store wastes

large in a plant cell

## **Chloroplast**

takes in the sunlight to help plant make food

only in plants

leaves are green due to chlorophyll in the chloroplast

## **Lysosomes**

only in animal cells

break down food particles into smaller ones

break down old cell structures to release the materials  
(recycling center)

Where is the water stored in the plant?

**Vacuole**

Why do plants wilt?

A plants cell can only provide support for a plant when it is full of water. If the cells lose water, the cell walls lose rigid structure and the plant wilts.

How do all these cells work together?

## **Multicellular**

made of many cells

## **Unicellular**

single-celled organism

## **Specialized Cells**

cells that have specific jobs to do that help the entire organism

Lets look at page 20 Figure 6.

Look at the cells and characteristics

1. Blood cell
2. Chloroplasts
3. Extensions on the root cell
4. Nerve cell

Division of Labor

how cells divide the jobs amongst cells

cells do one job

## Example

### Cell

individual functions

### Tissue

group of similar cells that work together to perform a specific function

### Organ

made of different tissues that function together

### Organ system

made of different organs that work together to perform a function

### Organism

complete living thing

## Similarities and Differences of Plant and Animal Cells

### Homework

Do pages 16-17.

### Some things you should have pointed out!

Which structures are found only in plant cells?

**Chloroplasts and cell wall**

What structure is found only in animal cells?

**Lysosomes**

Which structure is larger in the plant cell than the animal cell?

**Vacuole**

Do all structures carry out the same functions even in different

types of cells?

**Yes**

Which structures control the movement of materials in the cell?

**Cell membrane, endoplasmic reticulum, Golgi apparatus**

Which are involved in making proteins?

**Nucleus, ribosomes, endoplasmic reticulum, Golgi apparatus**

Which break down food to release energy?

**Mitochondria (plural)**

**Mitochondrion (singular)**

Why do cells look different from each other?

Because they have different functions in the organism

What is the function of the chloroplasts?

Make food for the plant

Why are plants green?

Chloroplasts have chlorophyll which is green colored

Why don't animals make their own food?

Animals cells do have chloroplasts

Why are lysosomes more common in animal cells?

Lysosomes break down food particles that have been engulfed by the animal cell and plant cells make their own food inside the cell.

### Section 3

#### Objectives

Define elements and compounds.

Identify the main compounds that are important in cells.

Vocabulary - page 23

element

lipid

nucleic acid

compound

protein

DNA

carbohydrate

enzyme

double helix

#### Look at My Planet Diary

Camel

camel's humps store fat for energy

#### Element

any substance that cannot be broken down into simpler substances

#### Compounds

form when two or more elements combine

H<sub>2</sub>O - water

made of hydrogen and oxygen

#### How do these relate to the cell?

every cell must either make or absorb some compounds to survive

#### inorganic compound

compound that does not contain carbon water and table salt

## **organic compound**

compound that contain carbon

carbohydrates, lipids, proteins, nucleic acid

How do our cells use inorganic and organic compounds?

### **Carbohydrates**

comes from elements made of carbon, hydrogen and oxygen

potatoes, pasta, rice, bread

body stores excess sugar as what is called a starch which is a large molecule of sugar that has combined. When your body needs energy it will break down the starch into glucose (sugar)

cell wall and cell membranes - cellulose sugar our bodies can not digest

### **Lipids**

mostly carbon and hydrogen and some oxygen

fats, oils, waxes

store fats for energy

### **Proteins**

carbon, hydrogen, oxygen, nitrogen and some cases sulfur

meat, dairy products, fish, nuts, beans

hair, skin, muscle are made out of proteins

### **Nucleic Acids**

carbon, oxygen, hydrogen, nitrogen, and phosphorus

contain the instructions for the cell to carry out

Type

#### **DNA**

deoxyribonucleic acid

contains information passed down from parents

found in the nucleus

double helix - ladder

Water

2/3 of human body is water

water helps cells keep their shape

holds temperature

## Section 4

### Objectives

Describe how materials move into and out of cells.

### Our Goal

You should be able to describe the processes that will move materials in and out of a cell.

### Vocabulary - page 29

Selectively Permeable  
Osmosis  
Endocytosis

Passive Transport  
Active Transport  
Exocytosis

Diffusion

### Selectively Permeable

cell membrane allows some substances to cross through the membrane and others cannot

A cell moves substances across a membrane by:

### Passive Transport

moving substances across the cell membrane without using the cell's energy

Three forms of Passive Transport

#### 1. Diffusion

process in which molecules move from a higher concentration to a lower concentration

cooking, farting

#### 2. Osmosis

diffusion of water molecules

cells need water and for a cell to gain water it is done through Osmosis

Why do your fingers get wrinkled when you swim or take a bath?

this is caused by Osmosis

#### 3. Facilitated Diffusion

helping substances cross the cell membrane by forming channels

this is done by the proteins in the cell membrane separating to form a channel that will allow sugars to pass

## **Active Transport**

movement of materials across a cell membrane using cellular energy

using the cell's energy, transport proteins pick up molecules and carry them through the cell membrane

this process transports calcium, potassium, and sodium

## **Transporting Large Molecules**

### **1. Endocytosis**

membrane changes shape and surrounds the particle to bring a substance into the cell

### **2. Exocytosis**

the cell removing a substance from the cell

## **Review**

- 1. What is the difference between active and passive transport?**
- 2. How do sugars cross the membrane?**
- 3. What is this process called?**
- 4. Is this passive or active transport?**
- 5. Why does oxygen diffuse into the animal cell?**
- 6. Why do our fingers wrinkle in the bathtub?**

## Answers

**1. What is the difference between active and passive transport?**

Active uses the cell's energy and passive does not

**2. How do sugars cross the membrane?**

Through the channel formed by the proteins

**3. What is this process called?**

Facilitated Diffusion

**4. Is this passive or active transport?**

Passive

**5. Why does oxygen diffuse into the animal cell?**

cells need oxygen and it is less oxygen in the cell so it goes from a higher concentration to a lower concentration

**6. Why do our fingers wrinkle in the bathtub?**

The outermost layer of the skin swells when it absorbs water. It is tightly attached to the skin underneath, so it compensates for the increased area by wrinkling.