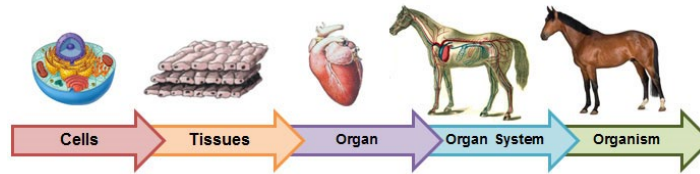


# Unit 4 Notes

## Living Systems

REMEMBER:



**Cells** - basic building blocks of life; organelles have specific functions for the life processes of the cell

**Specialized Cells** – perform specific functions; Example: muscle cells

**Tissues**- groups of cells working to perform the same function; Example: muscle cells make muscle tissue

**Organs** – tissues grouped together to perform the same function; Example: muscle tissue makes the bicep

**Systems** – organs grouped together to perform a similar or related function;

Example: muscles and tendons make the muscular system so that you can move

**Organism** – systems grouped together to work to ensure the organism lives



## Muscular and Skeletal Systems

**Skeletal System** – provide support and shape; system of bones, joints, and ligaments

**Skeleton** – provides the frame and structural support of the body; also known as the **endoskeleton** (a skeleton INSIDE the organism's body)

**Bones** – rigid organs that make up the skeleton

**Joint** – where two bones meet

**Ligaments** – tough bands of tissue that attach bone to bone

**Cartilage** – tough, smooth and flexible tissue that covers the ends of bones in joints



**Exoskeleton** – a skeleton on the outside of an organism's body; protects and provides shape

**Muscular System** – provide movement; system of muscles and tendons

**Contract** - action of muscles that causes motion

**Three Types of Muscle**

**Skeletal muscle** – attaches to bones, causes movement when contracted; Example: bicep in your arm

\* **Cardiac muscle** –also called myocardium, thickened muscle because it contracts so often to move blood throughout the body; Example: cardiac muscle in your heart

\* **Smooth muscle** – found in the walls of many organs and blood vessels – contracts to move substances like blood and food through the body; Example: stomach muscle to move food through the digestive tract



\* **INVOLUNTARY muscles** - no control over these muscles = work automatically

**Tendons** – a rope-like band of tissue that pulls on the bones when a muscle contracts

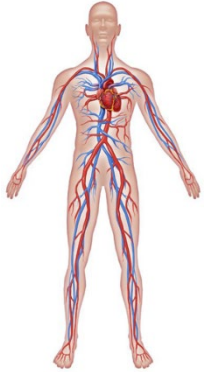
## Respiratory and Circulatory Systems

**Respiratory System** – moves oxygen and carbon dioxide in, out, and throughout the body

**Lungs** – the organs used for breathing in some amphibians, reptiles, birds and mammals



**Gills** – the organs used for breathing by fish and some amphibians



**Circulatory System** – transport system for oxygen, carbon dioxide, glucose, wastes, etc.

**Blood** – fluid that carries the materials to the body

**Blood vessels** – the system of tubes that carry the blood and connect the body to the heart

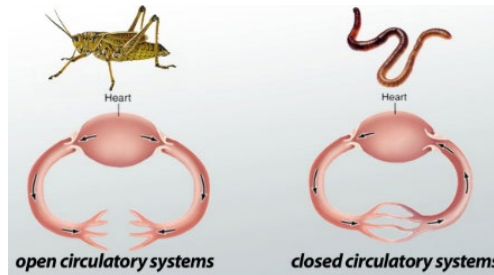
**Heart** – the main organ of the circulatory system that moves the blood through a pumping action

**Ventricles** – heart chambers that pump out to the arteries

**Atria** (singular = atrium) – heart chambers that receive blood coming from the body from veins

**Open Circulatory System** – cells are in constant contact with the blood; common in invertebrates

**Closed Circulatory System** – the blood stays enclosed in blood vessels called: arteries, veins & capillaries



## Digestive System

**Digestive System** – breaks down the food eaten, takes nutrients from the food and gives the nutrients to the body.

**REMEMBER:** Unlike plants which make their own food, animals must break down food and change it into a form that can be used as energy.

### Digestion in Single Celled Organisms

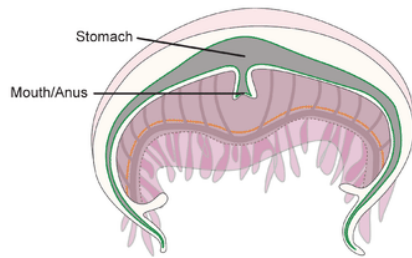
Digestion that happens inside a cell is called **intracellular digestion**.

Example: A single celled protist has a specialized compartment, called a food vacuole, for digesting food.

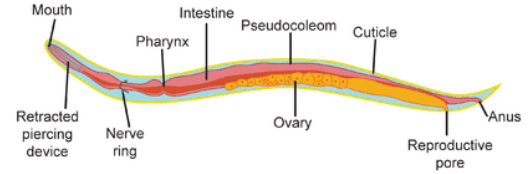
### Incomplete Digestive Systems

An **incomplete digestive system** is found in other simple animals. The digestion takes place inside a sac-like cavity with a single opening. **NOTE:** the mouth and anus are the same opening!

Incomplete Digestive System Example: The jellyfish has tentacles that sting its prey and then bring the prey into its mouth. Enzymes in the jellyfish's mouth break down the food into tiny bits. Cells lining the digestive cavity then absorb these bits, and digestion continues. Undigested food is pushed out of the opening where it originally entered.



Incomplete Digestive System (Jellyfish)



Complete Digestive System (Roundworm)

## Complete Digestive Systems

Most animals, have a **complete digestive system**. In this system, digestion takes place in a series of tubes. This system includes a **mouth** at one end and an **anus** at the other. This one-way flow allows for continuous feeding.

Example: As seen in the image above, the roundworm has a **complete digestive system**. However, **YOU** also have a **complete digestive system**. Food enters through your mouth, where it begins to break down. Then the food travels down the **esophagus** to the **stomach**, where it mixes with acid and other enzymes and is further broken down. When the food particles leave the stomach, they travel through the **small intestine**. The food particles are broken down further and then absorbed into the bloodstream with water. Finally, undigested food passes through the **large intestine** and is expelled through the anus.

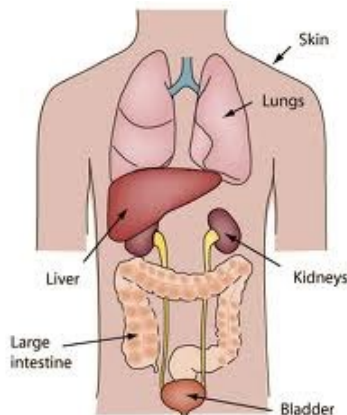
## What do we get from food?

After food is broken down, nutrients from the food are delivered to cells.

There are **six main types of nutrients**: carbohydrates, proteins, nucleic acids, fats, vitamins, and water.

Cells use all of these nutrients to function. However, some cells, depending on their specific function, might need more of one nutrient than another.

## Excretory System



**Excretory System** – removes wastes from the body

**Lungs** – exhale carbon dioxide from the respiratory system

**Livers** - of vertebrate animals, convert ammonia to urea which is excreted with water as urine.

**Kidneys** - are the main organs of the **excretory system** in vertebrates. Waste material, such as urea, filters out of the bloodstream into a tubule, which runs alongside capillaries in the kidneys.

**Bladder** - From the kidneys, waste material goes through the tubes of the ureter into the urinary bladder. The bladder stores waste until it is excreted as urine through the urethra.

## Nervous System

**Nervous System** – the network of nerve cells and fibers that transmits nerve impulses between parts of the body

**Nerve Cells or Neurons** – a specialized cell transmitting nerve impulses

- **Axons** - the long threadlike part of a nerve cell along which impulses are conducted from the cell body to other cells



- **Dendrites** - a short branched extension of a nerve cell, along which impulses received from other cells at synapses are transmitted to the cell body

### Simple to Complex Nervous Systems

- **Nerve net** – a diffuse network of neurons that conducts impulses in all directions from a point of stimulus; found in simple invertebrates
- **Ganglia** – a structure containing a number of nerve cell bodies; found in more complex invertebrates
- **Brain** – an organ of soft nervous tissue contained in the skull of vertebrates, functions as the coordinating center of sensation and intellectual and nervous activity

### Nervous System Diversity

- **Central Nervous System** - the complex of nerve tissues that controls the activities of the body. In vertebrates, it comprises the brain and spinal cord
  - **Peripheral Nervous System** - the nervous system outside the brain and spinal cord
  - **Somatic Nervous System** - part of the peripheral nervous system associated with skeletal muscle voluntary control of body movements
  - **Autonomic Nervous System** - the part of the nervous system responsible for control of the bodily functions not consciously directed, such as breathing, the heartbeat, and digestive processes

### Triggers of the Nervous System

- **Stimuli** – a thing or event that evokes a specific functional reaction in an organ or tissue
- **Reflexes** - an action that is performed as a response to a stimulus and without conscious thought.

## OTHER SYSTEMS

### Immune System

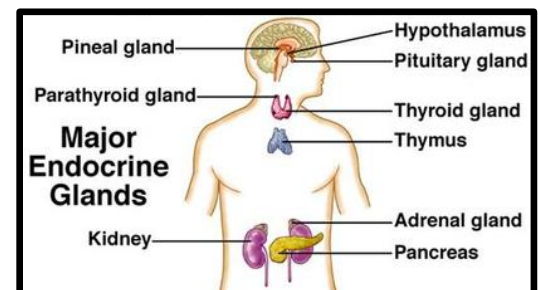
**Immune System** – protects the body from foreign substances or pathogens; destroys infected cells; removes cellular waste

- **Pathogen** – a bacterium, virus or other microorganism that can cause disease
  - **NOTE:** some bacteria can be good

### Endocrine System

**Endocrine System** – responsible for maintaining homeostasis (a stable condition in the body) through the production of hormones in glands;

- regulates the body's metabolism, sleep, mood, and levels of substances in the blood;
- does this through glands and tissues;
- the endocrine system responds much slower than the nervous system.



- **Hormones** – chemicals that circulate in the blood which carry signals to the cells; many are directed to stimulate specific glands or tissues
- **Glands** – an organ that secretes hormones for use in the body; Examples - Thyroid, Pituitary, Pineal, Hypothalamus