

Unit 8: Biodiversity

Content Outline: Circulatory and Respiratory Systems (8.11) – Part 1

- I. Circulatory System - Responsible for connecting all the cells of the *whole* organism.
 - A. It *distributes* nutrients, oxygen, hormones, and functions in waste retrieval.
- II. Evolution of the Circulatory system:
 - A. It started with a **Gastrovascular Cavity**. (As seen in Cnidarians and Platyhelminthes.)
 - B. **Open Circulatory** system is one type that evolved. (Arthropods and some Mollusks)
 1. **Blood** bathes the organs by moving through sinuses (spaces).
 2. The system has a tubular heart with directional arteries to distribute blood.
 - C. **Closed Circulatory** system (Annelids, some mollusks, vertebrates)
 1. **Blood** is confined to traveling through blood vessels under pressure.
 2. A muscular **chambered heart** mostly (Not in annelids.)(2,3,4 chambers)
 - a. **Atria** – These chambers receive blood coming *into* the heart.
 - i. They are composed of a thin layer muscle tissue.
 - b. **Ventricles** – These chambers pump blood *away* from the heart.
 - i. They are composed of a thick layer of muscle tissue.
 3. Mammals, birds, reptiles, and amphibians have a **Double loop system**.
 - i. One loop for getting oxygen; one loop for delivering oxygen.
 4. **Water vascular system** (Echinodermata) (Madreporite, Tube feet, canals are the parts.)
- V. Blood Vessel types of the body:
 - A. Arteries – These are large blood vessels carrying blood *away* from the heart.
 - B. Arterioles – These are medium sized vessels carrying blood *away* from the heart.
 - C. Capillaries – These are the smallest blood vessels where nutrients and oxygen *diffuse out*.
 - D. Venules – These are small blood vessels that *collect waste* materials from the tissues.
 - E. Veins – These are large blood vessels that carry blood *toward* the heart.
- VI. Blood distribution
 - A. **During digestion of food** – The blood mainly is in the digestive organs.
 1. Swimming? The blood is not in the muscles, which are needed to swim, so you cramp if you go swimming right after eating. So wait 30 minutes.
 - B. **During Exercise** – The blood is mostly in the muscles and skin; not the digestive organs.
- VII. Types of Blood cells:
 - i. **Erythrocytes** - These are red blood cells-RBC's ("erythro" means "red"; "cyte" means "cell")
 1. **Hemoglobin** uses iron (Fe) to hold oxygen. ("heme" means "iron")
 - a. Each RBC can hold *1 billion* oxygen molecules.
 - ii. **Leukocytes** - These are white blood cells – WBC's ("leuko" means "white")
 1. They protect our bodies against invading organisms or materials.
 - iii. **Platelets** – These are pieces of RBC's used for making clots.

Part 2

- I. Respiratory Systems - These are for gas exchange with the environment.
 - A. Gas exchange (Oxygen *in* and Carbon dioxide *out*.)
 1. Oxygen is need for *cellular respiration*; Carbon dioxide is the waste product of cellular respiration.
 - B. **Respiratory Medium** - This term refers to where the oxygen molecules are located. It is either water or air.
 - C. **Respiratory Surface** - This term refers to where the gas exchange occurs.
 2. Diffusion must occur across a *wet* surface. *Gases do not diffuse across dry surfaces.*
 3. A *large* surface area is needed to get large amounts of gas exchange to occur.
 - a. *Folds* in the surface *increases surface area* within a small space.
 4. Gills, Lungs, Tracheal tubes, Skin, membranes are *all* respiratory surfaces.
 - ii. *Works with the circulatory system (That is why they are always located together.)*
- II. Mammalian Respiratory system
 - A. Located in the Thoracic Cavity (Chest)
 - B. **Nostrils and Nasal cavity**
 1. These cavities *warm, moisten, and clean the air* using mucous and hairs.
 - C. **Pharynx** (This is the back of mouth) and **Larynx** (This is the top of trachea.)
 1. **Epiglottis** - This muscular flap covers the trachea by bending over the opening.
 2. True and false vocal cords - These vibrate to make sounds. (You can only talk while exhaling because the moving air is causing the vibration by “catching” the wind, much like a parachute catches air.)
 - D. **Trachea (A.K.A. windpipe)**
 1. It is protected by C- shaped cartilage rods on the front side.
 - E. **Bronchi** (There is one for each lung.) Cartilage keeps them open for air to travel through.
 - F. **Bronchioles** - These carry air into each lobe of each lung.
 1. **Bronchitis** – This is an inflammation of the air ways. (“itis” means “inflammation of”)
 2. **Asthma** – This condition is having trouble breathing due to airways swelling shut.
 - G. **Alveoli** (means “air sacs”)
 1. This is the site of gas exchange by diffusion. (*If it is a wet surface.*)
 2. They are only one cell layer thick which allows for *rapid diffusion* of gases.
 3. They are surrounded by capillary beds. (This makes it 2 cell layers thick. It leads to rapid diffusion in and out.)
 4. WBCs that keep these areas clean. (Smoking? Kills the WBCs.)