

GHSGT Review: Biology (Day 8)

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OBJECTIVE: Describes the anatomy and physiology of each phylum of invertebrates.

Phylum	Body Symmetry	Locomotion (motile or sessile or both)	Reproduction Asexual / sexual / both	Invertebrate / vertebrate	Lifestyle – Parasitic, free-living, or both	Habitat	Examples
Porifera	Asymmetry	Sessile	Sexual and Asexual	Invertebrate	Free-living	Aquatic and marine	Sponges only
Cnidaria	Radial symmetry	Sessile and free-floating	Sexual and Asexual	Invertebrate	Free-living	Mostly Marine	Jellyfish, hydra, sea anemones, coral
Ctenophora	Radial Symmetry	Free-floating	Sexual and Asexual	Invertebrate	Free-living	Marine	Comb jellies
Platyhel-minthes	Bilateral Symmetry	Motile	Sexual and Asexual	Invertebrate	Free-living and parasitic	Aquatic, marine, and within animals	Planaria, fluke, tapeworm
Nematoda	Bilateral Symmetry	Motile	Sexual	Invertebrate	Free-living and Parasitic	Aquatic and terrestrial	Roundworms, hookworms, pinworms
Rotifera	Bilateral Symmetry	Motile	Sexual and Asexual	Invertebrate	Free-living	Aquatic	Rotifers
Annelida	Bilateral Symmetry	Motile	Sexual	Invertebrate	Free-living and parasitic	Aquatic and terrestrial and within animals	Earthworms, leeches, polychaetes
Mollusca	Bilateral Symmetry	Mostly motile	Sexual	Invertebrates	Free-living	Terrestrial and aquatic	Snails, slugs, clams, squid, mussels, octopus
Arthropoda	Bilateral Symmetry	Motile	Sexual	Invertebrates	Free-living and parasitic	Terrestrial and aquatic	Insects, spiders, mites, ticks, scorpions, crustaceans
Echino-dermata	Bilateral Symmetry	Motile	Asexual and Sexual	Invertebrates	Free-living	Terrestrial and Aquatic	Starfish, sand dollars
Chordata (VERTEBRATE)	Bilateral Symmetry	Motile	Sexual	Vertebrates	Free-living	Mostly terrestrial	Dogs, cats, humans, whales, birds

OBJECTIVE: Describes the anatomy and physiology of classes of vertebrates.

Class	Habitat	Respiration – Gills/lungs/skin	Internal or External Fertilization	Endothermic or Exothermic	Number of chambers in heart
Fish (all three classes)	Aquatic	Gills	External Fertilization	Exothermic	2
Amphibia	Aquatic and Terrestrial	Gills/lungs/skin	External	Exothermic	3
Reptilia	Mostly Terrestrial	Lungs	Internal	Exothermic	3
Aves	Terrestrial	Lungs	Internal	Endothermic	4
Mammalia	Terrestrial and Aquatic	Lungs	Internal	Endothermic	4

OBJECTIVE: Analyzes the overall organization of the human body.

HUMAN BODY

Humans are members of the kingdom Animalia, phylum Chordata, class Mammalia, and order Primates. The traits that make us humans are refinement of traits found in other primates. Primates include monkey, apes, and orangutans. Several primate characteristics include a complex and well-developed brain, sophisticated eyes that can distinguish small details, opposable thumbs (a thumb positioned opposite the other fingers), long arms with flexible shoulders and wrist joints, and four types of teeth (incisors, canines, premolars, and molars).

Humans are distinguished from other primates by having a brain larger than any other primate. We can stand upright and walk under all conditions. Our jaws and teeth are different. Our teeth are smaller than primates and allow us to hold food as well as tear it. We have the capacity for language - both spoken and written.

The human body is divided into four main parts - head, neck, trunk, and limbs. The body is built around a jointed, bony skeleton covered with layers of muscle and skin. Inside the trunk of the body is the coelom. The coelom is divided into two smaller cavities by the diaphragm. The thoracic cavity lies above the diaphragm and contains the

heart, lungs, and esophagus. The abdominal cavity lies below the diaphragm and contains the organs of digestion, reproduction, and excretion. The cranial cavity is inside the skull and contains the brain.

There are four tissues associated with the body. Epithelial tissue has one or more layers and it protects all internal and external body surfaces. It makes up our skin, the lining of blood vessels and intestines, and the protective covering of the heart and lungs. Connective tissue is the most widely distributed tissue in the body. It joins, supports, and protects other types of tissue. It includes bones, blood, fat, and the tissue surrounding nerves. Muscle tissue is specialized cells with the ability to contract and produce movement. Nervous tissue is composed of cells that can transmit messages throughout the body.

SYSTEMS OF THE HUMAN BODY

Digestive System:

The digestive system is responsible for both mechanical and chemical digestion that break down food into molecules so that they can move into the cell and be used for the living process. The mouth, teeth, and tongue begin the chemical digestion by mechanically breaking down food through the chewing process and the addition of saliva. The enzyme amylase breaks down carbohydrates and starts the break down of starches. Food moves from the mouth to the stomach by way of the esophagus. In the stomach, other digestive enzymes and hydrochloric acid begin the breakdown of proteins. The stomach mixes and churns the food. Food, now in a liquid-like state called chyme, moves from the stomach into the small intestine, where it is absorbed through the villi (walls of the intestine) into the bloodstream where it is delivered and taken in by the cells of the body. The majority of chemical digestion and absorption takes place in the small intestine. Waste materials and unused food are carried back to the large intestine where they mix with roughage and water. The undigested materials are excreted from the body.

Circulatory System:

The circulatory system is composed of the heart, arteries, veins, red blood cells, white blood cells, antibodies, thrombin, water, and plasma. A four chambered heart, controlled by a pacemaker, rhythmically controls the pumping action by alternating contractions of the atria and ventricles. Blood circulates in the body in two loops - arteries carrying oxygenated blood from the heart to all parts of the body, and veins returning deoxygenated blood to the heart and lungs to be reoxygenated. Blood flows through the arteries due to the pumping pressure of the heart. In the veins, blood flow back to the heart (against gravity) is helped by skeletal muscles that squeeze the veins and push blood along and by one-way valves located in the veins themselves. An auxiliary portion is the lymphatic system, which drains excess tissue fluids back into the circulatory system along with white blood cells that destroy harmful organisms.

Skeletal System:

The skeleton is the basic framework of the human body and is made of connective tissue - bones and cartilage. Bone is living tissue with vitamins, collagen, and minerals to give it strength and hardness. The process by which the bones harden is called ossification. Bones are joined by cartilage at joints. Joints are classified as to the amount of movements they allow: stationary (skull), hinge (jaw), and ball and socket (hip).

Muscular System:

Three human muscle types are skeletal, smooth, and cardiac. All muscle tissue exerts force when it contracts; therefore muscles are responsible for all movement of the body, voluntary and involuntary. Energy for all movement is derived from an ample supply of mitochondria in the muscle cell. ATP, a high level energy carrier, is produced by the mitochondria for use by other cells and tissue parts during movement of exercise. Muscles are paired to accomplish full movement. Each contracting muscle will be paired with an muscle that works against it and tendons attach paired muscle groups to bones to complete the movement action. The skeletal muscles make up this grouping of muscles and are mainly voluntary. Smooth muscles are found in the linings of the body such as the digestive tract and blood vessels. They are generally involuntary muscles. Cardiac muscle is found only in the heart. The heart is the strongest muscle of the body. It is responsible for keeping the blood flowing through the circulatory system at a given pressure. The cardiac muscle is an involuntary muscle.

Nervous System:

The basic unit of the nervous system is the neuron (nerve cell). Its structure allows electrochemical signals to travel across synapses to activate muscles, glands, or organ tissue. The nervous system is divided into two parts. The first part is the central nervous system, which includes the brain and the spinal cord. The second part is the peripheral

nervous system, which is a large network of nerves that totally connect all parts of the body. Receptors located in sense organs (eyes, ears, etc.) and in the skin send information along sensory neurons to the spinal cord and then to the brain where the information is chemically interpreted, causing a motor response.

Respiratory System:

Respiration involves actions started by nerves stimulating muscles and bones to mechanically enlarge the respiratory cavity of the body. The diaphragm contracts and moved downward. The breathing rate is controlled by nerves originating in the brain based on carbon dioxide content. The human nasal passages are adapted to clean, moisten, and warm the air before it enters the lungs by way of the trachea and the bronchi. The lungs are made up of many tiny air sacs called alveoli that are found at the end of the bronchiole in clusters. The exchange of gases between the lungs and the blood vessels occurs in the alveoli.

Excretory System:

The excretory system is made up of the kidney, bladder, connecting tubes, and capillaries joined to the kidney. Urine is collected by structures in the kidney called nephrons. From the nephrons, the liquid wastes are collected and stored in the bladder. Urine leaves the body through the urethra.

Endocrine System:

The endocrine system produces hormones which travel by way of the bloodstream to specific target cells. Endocrine glands include the thyroid, adrenals, pancreas, parathyroid, gonads, pituitary, and the hypothalamus. The manner in which the hormone acts on the target cells depends on whether it is a protein or steroid. Each will cause a feedback, which is one way to regulate hormones secreted into the body. Homeostasis depends on the actions of the nervous and endocrine systems. Organs, like the kidney, function based on endocrine stimulation.

Integumentary System:

The integumentary covering of the body is called the skin. Skin consists of two layers, the epidermis, and the dermis. Skin protects the body, rids the body of mineral salts and wastes, regulates body temperature, and picks up environmental signals. The skin is the bonding or holding agent that keeps the body intact and functioning. Also part of the integumentary system is the nails and hair.

Reproduction System:

The reproductive organs in males and females are called gonads. Gonads produce sex cells called gametes. Gametes are haploid - they have half the normal amount of chromosomes. When an egg and sperm unite, the resulting fertilized egg, or zygote, has a full set of 46 chromosomes. In the male, the gonads produce sperm and male hormones. In the female, the gonads produce the egg cells. Reproduction starts with the union of a sperm and an egg. Fertilization occurs in the fallopian tube (the oviduct in human females). The combined cell, called a fertilized egg cell, develops quickly into a ball of many cells that implants itself on the inner wall of the female uterus. Here it develops into a fetus, the name given to the beginning stage of a human being. For nine months the fetus grows, it receives nourishment from the mother's circulatory system.