

Chapter 13 Study Guide

A. Vertebrate Animal Characteristics

They all have vertebrae.

They all have a living skeleton – it grows as the organism grows

Vertebrates have an endoskeleton.

Made of a combination of cartilage and bone

Cartilage – strong but flexible – example: ear, nose, joints between bone

Bone – strong support, not flexible

Parts of the skeletal system:

Vertebrate column supports body and protects spinal cord

Skull that protects brain

Ribs that protect vital organs

Limbs (arms, legs, fins, flippers, wings) that help in movement

How do they regulate their body temperature?

Endotherm – “warm-blooded” -able to maintain a constant body temperature

Mammals and birds

Heavy fur, feathers or fat can insulate to keep body warm

Surface blood vessels can cool off body (ears, tongue, lungs)

Sweat secretion can cool through evaporation

Advantage - organism can remain active regardless of outdoor temperature

Disadvantage – must eat more

Ectotherm – “Cold-blooded” -cannot control body temperatures internally

Fish, Reptiles and Amphibians

Must maintain warmth by moving to warm surroundings or wait for surroundings to change. Often body temp same as surroundings

Body enzymes process slower in cooler temps resulting in slower movements

Frogs need to stay cool, snakes need to stay warm

B. Organ Systems in Vertebrates

Circulatory System – oxygen and nutrient transport system

Major parts – heart and blood

Blood carries oxygen, wastes, and hormones – maintains internal balance of body

Oxygenated blood – blood that carries oxygen to cells for use in aerobic cellular respiration

Deoxygenated blood – given up oxygen to cells and transporting carbon dioxide away

Parts of the heart – chambers, muscular walls to pump, valves to direct flow one way

Blood Vessels – arteries away, veins return to heart

Fish – 2-chambered

Reptiles and adult amphibians – 3-chambered

Birds and Mammals – 4-chambered

Example of irreducible complexity – dependent on other systems. Could not have evolved independently

Respiratory System functions in gas exchange

Supplies fresh oxygen and carries away carbon dioxide waste

Gills – take oxygen from water and give off carbon dioxide

Blood moving through capillaries (microscopic blood vessels) where gas exchange occurs

Lungs – air chambers inside an animal's body where blood receives O₂ and releases CO₂

Breathing – Frogs – mouth, Birds – air sacs, Mammals – diaphragm

Diaphragm – muscle that separates chest chamber from abdomen

Contract – inhale

Relax – exhale

Nervous System – system that moves impulses

CNS – Central nervous system – brain and spinal cord (controls reactions)

PNS – Peripheral nervous system – nerves, sensory receptors and sensory organs

(receives stimuli, produce impulses that travel to CNS then from CNS to muscles)

Cranial nerves branch from the brain and carry impulses from the head's sensory organs

(eyes, nose, ear drums, tongue) to the brain.

Spinal nerves branch from the spinal cord – 1. to muscles and organs 2. From sensory

receptors in skin and internal organs

Sensory Organ collection of nerves sensing one environmental factor

Eyes -light ear drum – sound tongue - taste nose – smell

Digestive System – moves food thru body and takes in materials and releases wastes

mouth ⇒ esophagus ⇒ stomach ⇒ small intestines (liver, gall bladder, pancreas) ⇒

large intestines ⇒ anus

Stomach – Mechanical digestion - muscles mix food with existing digestive enzymes

Small intestines – chemical digestion – more materials added from liver and pancreas

Liver produces bile

Gall Bladder stores bile

Pancreas makes more enzymes

Large intestine absorbs water (Small Intestine absorbs nutrients)

Herbivores (plant eaters) – longer Small In. Carnivores (Meat eaters) – shorter Small In.

Excretory System - removal of wastes (urea) from blood

Kidney ⇒ filters urea ⇒ into Ureter ⇒ forms urine ⇒ stored in urinary bladder ⇒ out

Ectotherm Organisms – Fish, Amphibians and Reptiles

Fish are vertebrates and ectotherms (cold-blooded)

Fish are aquatic

Cold water – cold fish – slow movement

Warm water – warm fish - faster movement

Fish Anatomy

1. Swim bladder – an air-filled organ that helps them swim at a desired depth

2. Closed circulatory system – 2-chambered heart moves blood through gills to

oxygenate blood and transport it to the rest of the body. Capillaries, where oxygen

and carbon dioxide are exchanged, are concentrated in the brain, gills, digestive system, kidney and tail.

3. Scales protect and cover the outside the fish, grow larger as fish grows
4. Lateral line – sensory structures that help detect vibrations and pressure, located along side of fish.
5. Spawning – process of female releasing millions of eggs that are then fertilized by the male fish. Just a few survive to become adult.

Fish Groups

1. Jawless fish have no jaws – no scales, no fins, skeleton is cartilage – lamprey attaches on other fish – parasite
2. Cartilaginous fish – sharks, skates and rays – have jaws, paired fins and scales. They lack swim bladder. Rays flap their fins like flying birds.
3. Boney fish – catfish, trout, goldfish, etc. – endoskeleton made of bone. They have paired fins, scales and jaws.

Amphibians: vertebrates, ectotherms, usually live as young in water and on land as adults – name means “double-life”, all must lay eggs in water.

metamorphosis - Gilled creature to lunged, 2 chambered heart to 3 chambered, growth of 2 pair of limbs, sometimes loss of tail

Amphibian groups:

Tailless amphibians: Frogs and Toads

Hibernation in mud or moist soil to slow down during cold

Estivation during hot, dry weather

Maxillary teeth – ridge on upper jaw

Vomerine teeth – 2 spots on roof of mouth

Swallows by blinking huge eyes, pushing food back

Tailed Amphibians – salamanders – usually small but can grow to 5 feet long in Japan.

Reptiles – vertebrates, ectotherms, dry, scaly skin – 3 chambered heart, lungs throughout life

Reptile groups:

1. Dinosaurs – extinct
2. Snakes and Lizards
 - Snakes – no legs, no ear openings, immovable eyelids
 - Lizards – 4 legs, ear openings, movable eyelids
 - Molting – shed skin as they outgrow it
 - Snake’s tongue senses chemicals in air
 - Venomous – poison in fangs to kill prey
 - Constrictor – coils and squeezes, suffocates
 - Hinged jaw can detach to swallow large prey
 - Lizards – chameleon (change colors), Komodo dragon (10’), Iguanas, flying lizards
3. Crocodiles and Alligators
 - Alligators -broad, rounder snout
 - Crocodiles – narrow, pointed snout and teeth outside mouth when closed
4. Turtles – 2 bony shells for protection
 - Groups – Sea Turtles (ocean), Tortoises (dry land), Terrapins (fresh water)