FISHES, AMPHIBIANS, AND REPTILES

Characteristics of Chordates and Vertebrates

Fish, amphibians, and reptiles are part of a group of animals called vertebrates. All vertebrates are part of the phylum Chordata and the subphylum Vertebrata.

Chordat

Organisms chordates All their life cycle. Thes throat area, a **notocho**

A **notochord** is a rod that is flexible and supports the organism's back. Most organisms that are vertebrates replace the notochord with a backbone, or spine. Some species have cartilage instead of bone. Cartilage is connective tissue that is flexible and strong, but softer than bone.

The **nerve cord** found in chordates develops into a spinal cord that is part of the nervous system. Humans have a nerve cord called the spinal cord that runs through the backbone. In humans, information travels along the nerve cord from the body to the brain and back.

Chordates also have **pharyngeal slits** at some point in their lives. The pharynx is part of the throat, just behind the mouth. In fish, the pharyngeal slits turn into gills, but in humans the pharyngeal slits disappear before birth.

Lesson Checkpoint: What is a notochord? What are pharyngeal slits?

Vertebrates

Vertebrates are chordates that develop backbones. Mammals, birds, amphibians, reptiles, fish, sharks, and rays are all groups, called classes, of vertebrates.

Backbone Development: In all vertebrate species, the notochord develops into a backbone made of vertebrae. Vertebrae are many small bones that are lined up in a row that come together to form the backbone. The vertebrae are flexible because there are joints in between the vertebrae. Each of the vertebrae has a hole in the center where the spinal cord runs through. The backbone protects the spinal cord.

The backbone is a part of a vertebrate's **endoskeleton**, which supports, [illegible] a surface for

Important [illegible] ates are that it:

- grow
- supp
- allow

Lesson Checkpoint: What do the vertebrae protect?

Body Temperature Control: Vertebrates are also grouped according to the way in which their body temperature is controlled. Fishes, amphibians, and reptiles are ectotherms.

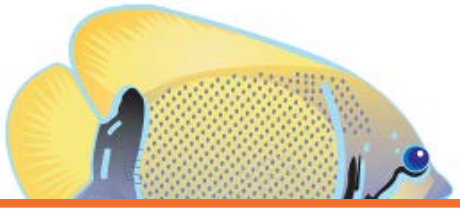
An **ectotherm** is an animal with an internal temperature that is controlled by the environment in which it lives. Ectotherms produce

very little heat within their bodies. A lizard will sun bathe on a cool desert morning in order to raise its body temperature.

The opposite of an ectotherm is an **endotherm**. An endotherm controls the internal temperature by producing heat, making it nearly the same temperature inside its body at all times. Humans are endotherms.

Lesson Checkpoint: What is an endotherm? What is an ectotherm?

Fish



Gills: Fish ment in which they moves through slits in the throat where it is channeled across the gills. In the gills, the carbon dioxide waste is exchanged for oxygen.

Circulatory System: Fish have a **closed-circulatory system**, allowing blood to reach the cells of the body through blood vessels. Blood moves one-way through the blood vessels from the heart, to the gills, and on to the cells of the body.

Reproduction: Fish reproduce using external fertilization. **External fertilization** is when the female's eggs are meeting with the male's sperm outside of the female's body.

Lesson Checkpoint: What is external fertilization?

Classification: Scientists classify fish into three major groups. They are the jawless fish, cartilaginous fish, and bony fish. The oldest of all vertebrates are the jawless fish.

- **Jawless Fishes:** Jawless fish are the only fish that do not have scales. Their fins are not paired and their skeletons are made of cartilage. Most importantly, jawless fish are not able to bite because, as their name states, they are jawless. Instead, they feed by sucking, stabbing, and scraping their food. There are two types of jawless fish: hagfish and lampreys.

- **Cartilaginous Fishes:** Cartilaginous fishes include rays, sharks, and skates. Just like the skeletons of the jawless fishes, the cartilaginous fish skeletons are made of cartilage. The major difference between the two groups is that the cartilaginous fish have jaws that they can use to bite. They also have fins that are paired.

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- **Bony Fish:** The bony fish are the fish that we know best. They have bodies that are covered with scales and movable flaps that open and close to control the water flow over their gills.

  The majority of species of bony fish have an organ called a swim bladder. The **swim bladder** is a gas-filled sac that stabilizes the fish's body at different depths in the water. The amount of gas that is in the swim bladder is controlled by the fish and can be adjusted by the fish. Bony fishes are the most abundant of all the fishes and vary drastically in their physical characteristics.

Lesson Checkpoint:
What are the three major groups of fish?

Amphibians

An **amphibian** is a vertebrate that is ectothermic. Most amphibians live the beginning of their lives in the water. Once they reach adulthood, they live on land, only to return to the water to reproduce.

Life Cycle: Amphibians lay eggs in the water, where the eggs hatch into larvae. The larvae have gills and undergo metamorphosis when entering the adult phase.

Circulatory d frogs vary. The rog has a double loo ee chambers. rt, while the lower or center chamber is the **ventricle**. The oxygen-rich blood and oxygen-poor blood enters the heart through the atria. The blood then moves into the ventricle of the heart where the oxygen-rich and oxygen-poor blood mix together and is pumped back through the circulatory system.

Lesson Checkpoint:
What is the role of the atria and the ventricle in an amphibian's heart?

Types of Amphibians: Examples of amphibians include frogs, toads, and salamanders. The adult skeletons of most amphibians are strong with muscular limbs, which they adapted for better movement on land.

Lesson Checkpoint:
What are some examples of amphibians?

Reptiles

A **reptile** is a vertebrate that is ectothermic and has scaly skin and a pair of lungs. Lizards, snakes, turtles, tortoises, and crocodiles are all examples of reptiles.

Adapted for Life on Land: A reptile has the ability to spend its entire life on land. Land animals can be considered similar to a water balloon. Th and animals fo .

The eggs c , the egg forms a m he membrane water. This allows

Lesson Checkpoint:
What two features of a reptile's egg enable it to survive on land?

The skin of reptiles is tough and is covered with scales, which keeps water inside of their bodies. The kidneys of reptiles filter wastes to be excreted by the body in watery liquid called **urine**. The kidneys keep the majority of water inside of the body while filtering the wastes.

Lesson Checkpoint:
What three adaptations of land animals help them keep water in their bodies?