

# Fishes and Amphibians

## Objectives

- **List** the four common body parts of chordates.
- **Describe** the two main characteristics of vertebrates.
- **Explain** the difference between an ectotherm and an endotherm.
- **Describe** four traits that fishes share.
- **Describe** the three classes of living fishes, and give an example of each.
- **Explain** how amphibians breathe.
- **Describe** amphibian metamorphosis.
- **Describe** the three groups of amphibians, and give an example of each.

# I. Chordates

- A. Animals that have a backbone are called **vertebrates**.
- B. Vertebrates belong to the phylum *chordata*.
- C. While vertebrates make up the largest group of chordates, some chordates, such as lancelets and tunicates, do not have a backbone.

## Chordate Body Parts

### Tail

Chordates have a tail that begins behind the anus. Some chordates have a tail only in the embryo stage.

### Notochord

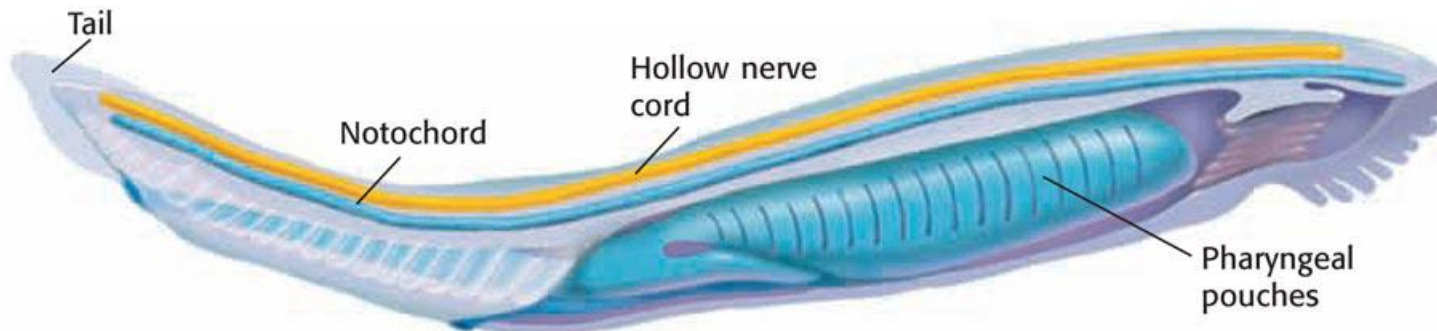
A stiff but flexible rod called a notochord (NOHT uh KAWRD) gives the body support. In most vertebrates, the embryo's notochord is replaced by a backbone.

### Hollow Nerve Cord

A hollow nerve cord runs along the back and is full of fluid. In vertebrates, this nerve cord is called the *spinal cord*.

### Pharyngeal Pouches

All chordate embryos have pharyngeal (fuh RIN jee uhl) pouches. These pouches develop into gills or other body parts as the embryo matures.

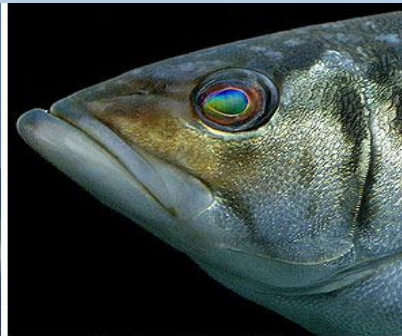


# I. Vertebrate Characteristics

- A. Fishes, amphibians, reptiles, birds, and mammals are vertebrates.
- B. Vertebrates have a backbone which is a strong, flexible column of bones called *vertebrae*.
- C. Vertebrates have a well-developed head protected by a skull. The skull can be made of either bone or cartilage.



Class Chondrichthyes: Hammerhead Shark



Class Osteichthyes: Kelp Bass



Class Amphibia: Tree Frog



Class Reptilia: Day Gecko



Class Aves: Broadbill



Class Mammalia: Caracal

## II. Are Vertebrates Warm or Cold?

- A. All vertebrates need to live at the proper temperature. Animals have different ways to keep their body at the right temperature.
- B. **Staying Warm** An **Endotherm** is an animal that can use heat from chemical reactions in the body's cells to maintain a constant body temperature.
- C. Birds and mammals are endotherms. These animals are sometimes called warmblooded.
- D. **Cold Blood?** An **ectotherm** is an organism that needs sources of heat outside of itself. Their body temperature changes as the temperature of the environment changes.
- E. Nearly all amphibians, reptiles, and fishes are ectotherms. These animals are sometimes called coldblooded.

Endoderm or  
Ectoderm?





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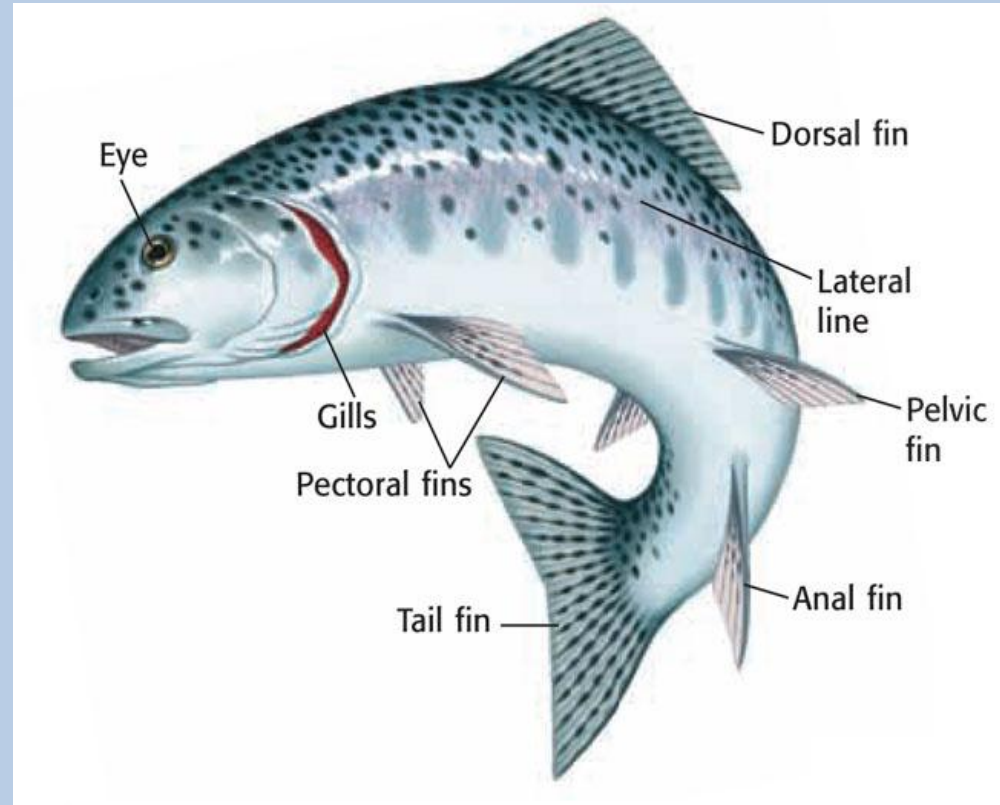
# III. Fish Characteristics

## A. Making Sense of the World

Fishes have a brain that keeps track of information coming in from the senses.

B. Most fishes also have a lateral line system. The lateral line is a row or rows of tiny sense organs on the side of fishes that detect water vibration.

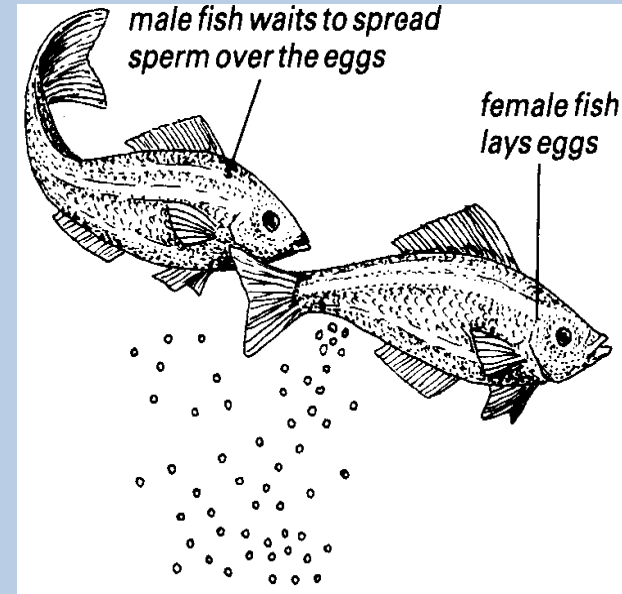
C. **Underwater Breathing** Fishes use their gills to breathe. A **gill** is respiratory organ in which oxygen from the water is exchanged with carbon dioxide from the blood.





# III. Fish Characteristics

D. **Making More Fishes** Most fishes reproduce by *external reproduction*. The female lays unfertilized eggs in the water, and the male drops sperm on them.



E. Some species of fishes have *internal fertilization*. The male deposits sperm inside the female.

F. Most females then lay eggs with embryos inside of them. In some species, the embryos develop inside the female.





# IV. Kinds of Fishes

**A. Jawless Fishes** The two kinds of modern jawless fishes are hagfish and lampreys.

1. Hagfish and lampreys are eel-like. They have smooth slimy skin and a round, jawless mouth.
2. Jawless fish have a notocord but no backbone.



[Hagfish Characteristics](#)

[Hagfish Slime Video](#)

# IV. Kinds of Fishes

**B. Cartilaginous Fishes** In most vertebrates, soft cartilage in the embryo is slowly replaced by bone. But in sharks, skates, and rays, the skeleton never changes to bone. So, they are called cartilaginous fishes.

1. Cartilaginous fishes have fully functional jaws.

2. Cartilaginous fishes store a lot of oil in their livers to help them float.



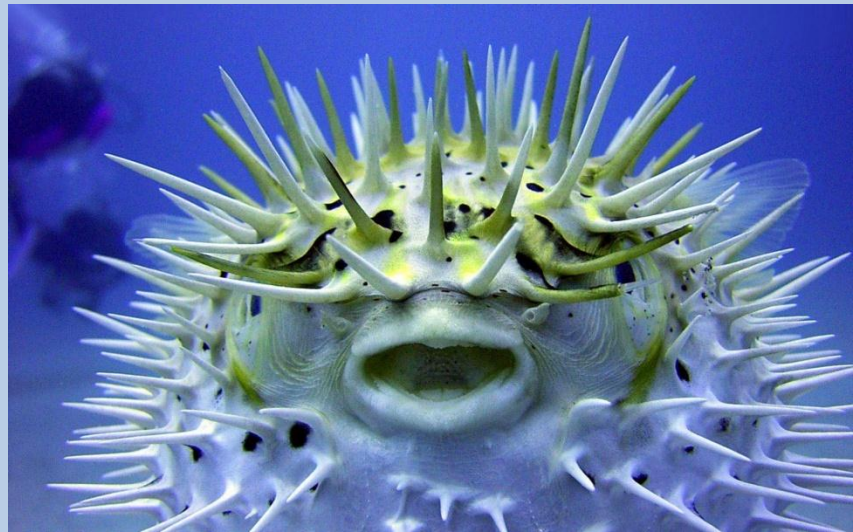
[The Difference Between Skates and Rays](#)



## IV. Kinds of Fishes

**A. Bony Fishes** The largest class of fishes is the bony fishes. These fishes have a skeleton made of bone and a body made of bony scales.

1. Bony fishes have a swim bladder. A *swim bladder* is a gas-filled sac that is used to control buoyancy.





# V. Moving to Land

- A. Amphibians are animals that can live in water and have lungs and legs.
- B. A **lung** is a saclike organ that takes oxygen from the air and delivers it to the blood.
- C. Most of today's amphibians are frogs or salamanders.
- D. Fossils have been found of amphibians that looked very different—like a cross between a fish and salamander and up to 10 m long.



South American  
Red-eyed tree  
frog

# VI. Characteristics of Amphibians

- A. *Amphibian* means “double life.” Most amphibians live part of their lives in water and part of their lives on land.
- B. Embryos must develop in water. The eggs do not have a shell or membrane that prevents water loss, so the eggs would dry up on land. Adults can live on land.
- C. Amphibians are ectotherms. Staying in water helps them maintain a stable temperature and stops water loss.



Red-backed  
salamander

# VI. Characteristics of Amphibians

- D. **Thin Skin:** Amphibian skin is thin, smooth, and moist. The skin is so thin that amphibians absorb water through it instead of drinking.
- E. Amphibians can also lose water through their skin and become dehydrated. Their thin skin is one reason amphibians live in water or damp habitats.
- F. Amphibians can breathe by gulping air. Many also absorb oxygen through their skin.



*Dendrobates azureus* is a type of poison frog found in the forests surrounded by the savannah.

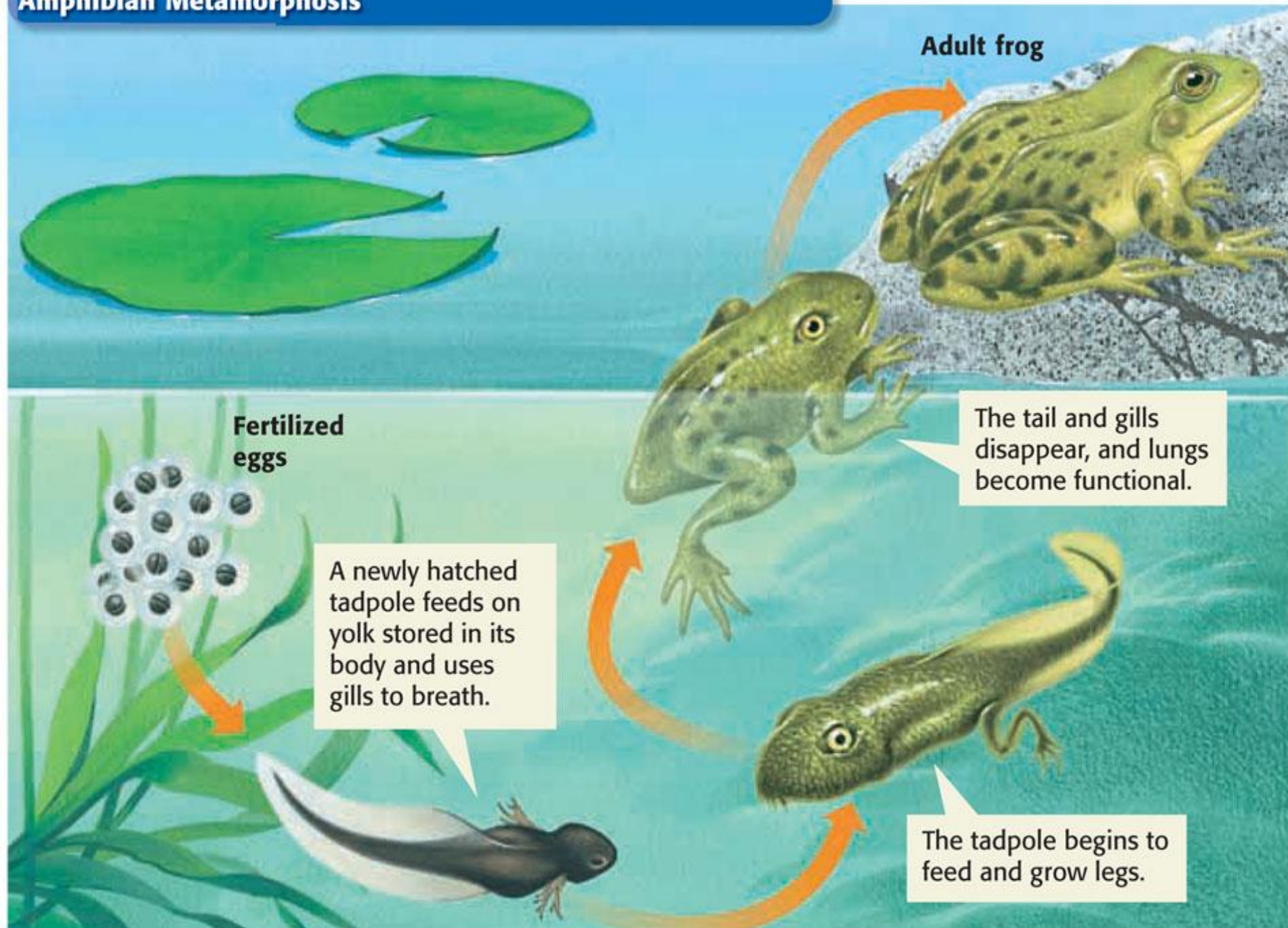


# VI. Characteristics of Amphibians

- G. **Leading a Double Life:** Most amphibians change form as they grow.
- H. A **tadpole** is an immature frog or toad that must live in the water. They have gills and tails like fishes.
- I. As a tadpole grows, it develops limbs and lungs and loses its tail and gills.
- J. This change from an immature form to an adult form is called **metamorphosis**.



## Amphibian Metamorphosis





# VII. Kinds of Amphibians

- A. Caecilians:** Caecilians live in tropical areas of Asia, Africa, and South America. They look like earthworms or snakes, but they have the thin, moist skin of amphibians.
- B. Salamanders:** As adults, most salamanders live under stones and logs in the woods of North America. They have long tails and four strong legs.
1. Salamanders do not develop as tadpoles. But most do lose gills and grow lungs during development.



Bell's False Brook  
Salamander



# VII. Kinds of Amphibians

**C. Frogs and Toads:** About 90% of all amphibians are frogs or toads. They live all over the world, except in very cold places.

1. Frogs and Toads are highly adapted for life on land. Adults have strong leg muscles for jumping.
2. They have well-developed ears, vocal cords, and a long, sticky tongue.
3. Frogs sing songs to communicate messages about attracting mates and marking territories.

What's the difference between

## FROGS & TOADS



Marsh Frog



Cane Toad