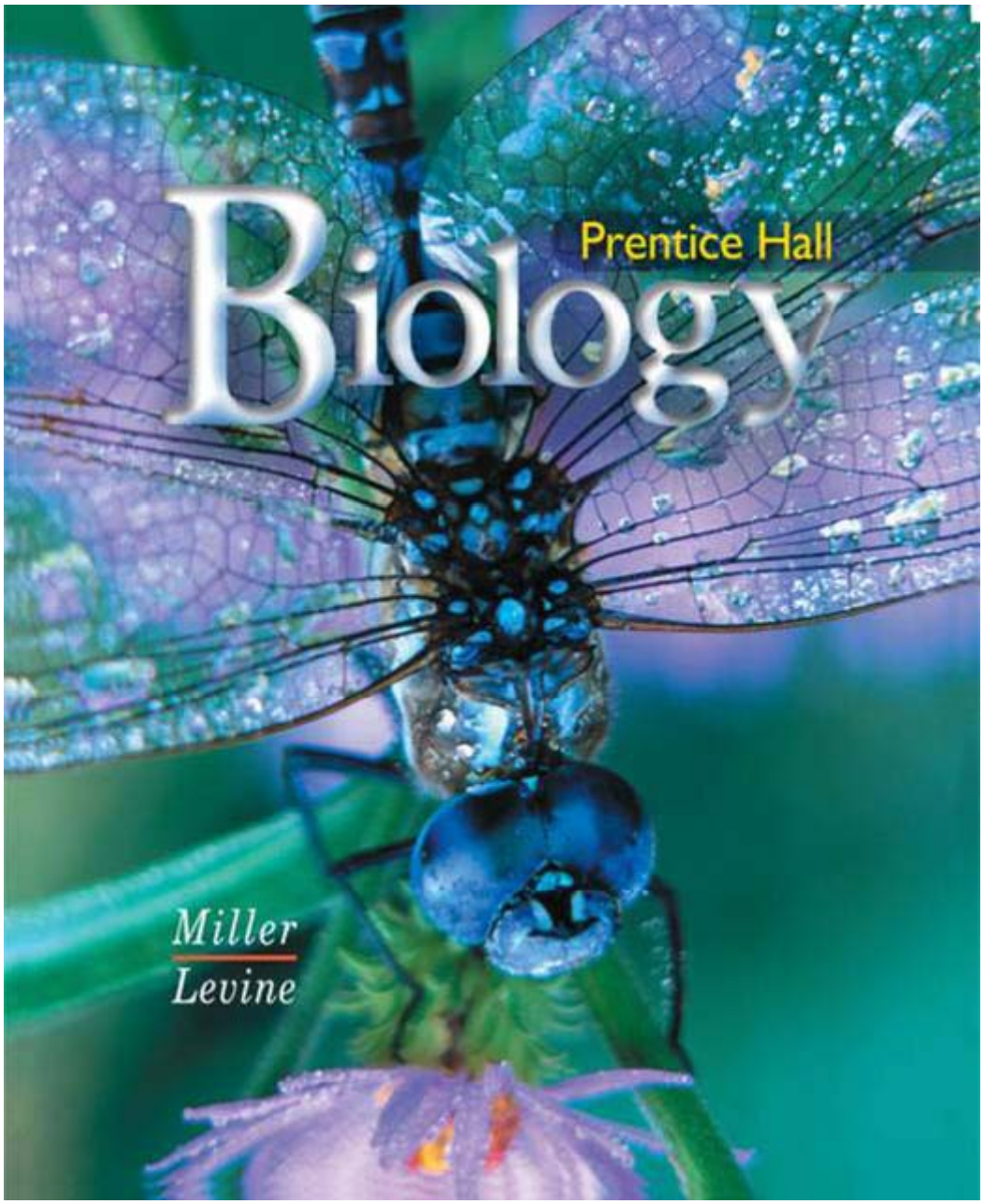
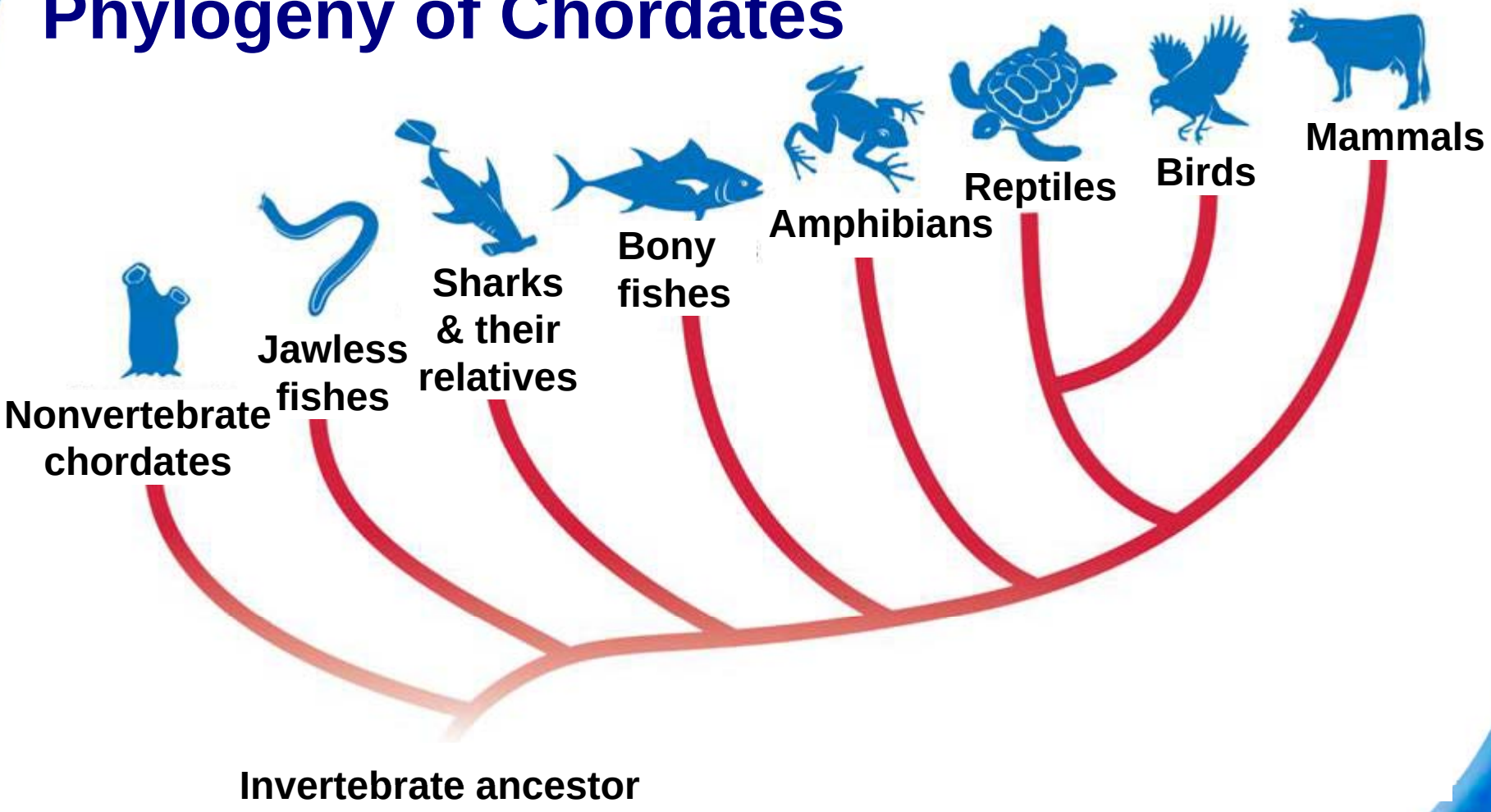
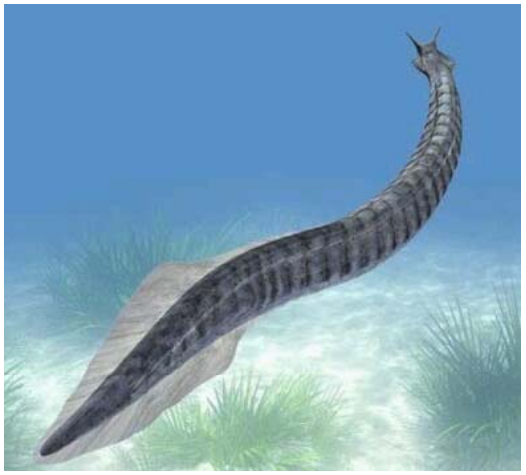


Phylogeny of Chordates



Reminder

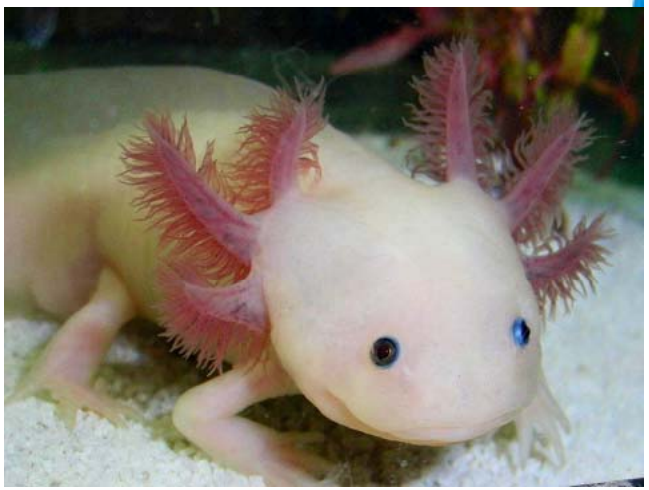
What Is a Chordate?



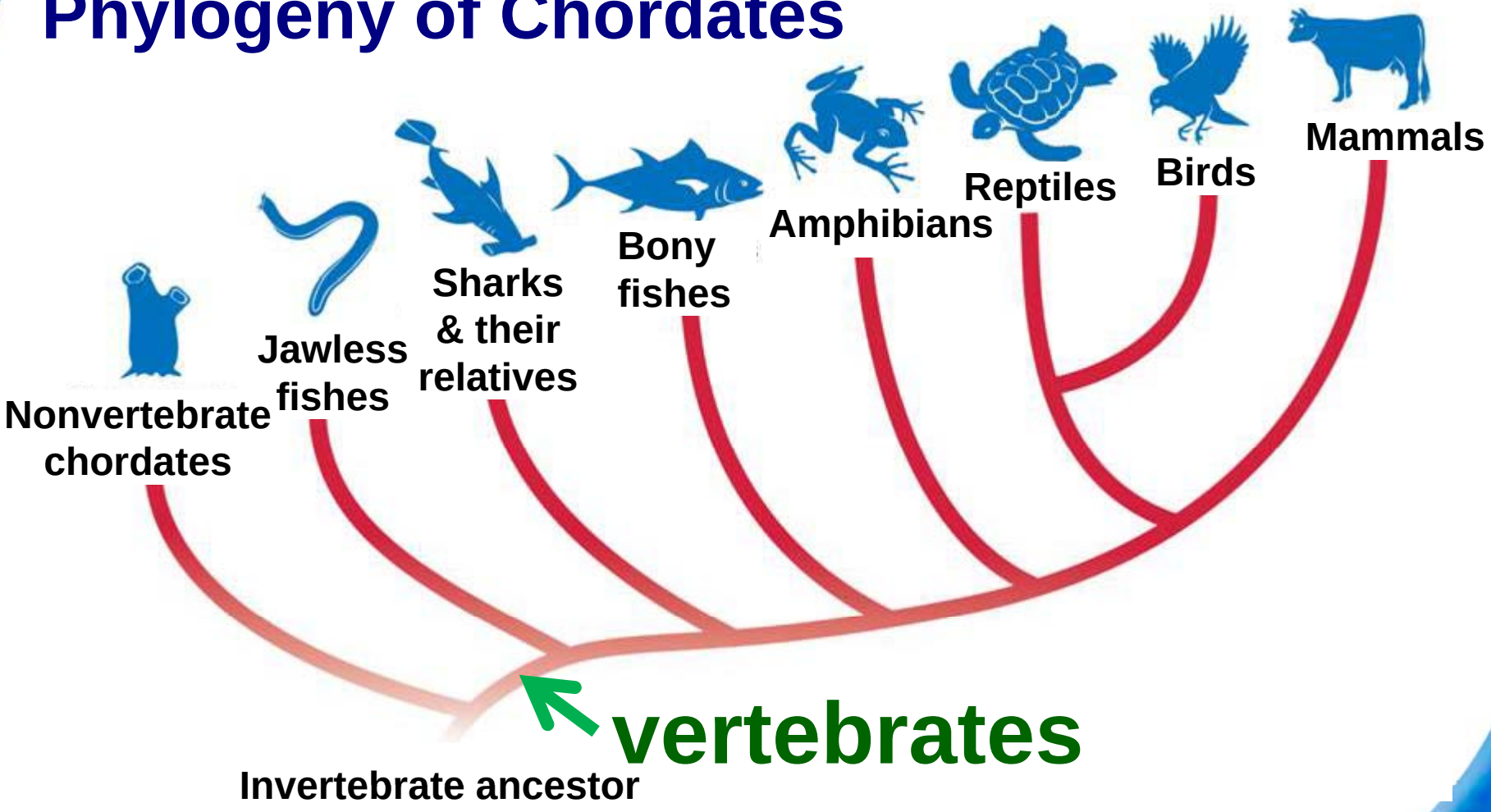
Members of the phylum Chordata are called chordates.

A chordate is an animal that has, for at least some stage of its life:

1. **a dorsal, hollow nerve cord;**
2. **a notochord;**
3. **pharyngeal pouches;**
4. **a tail that extends beyond the anus.**

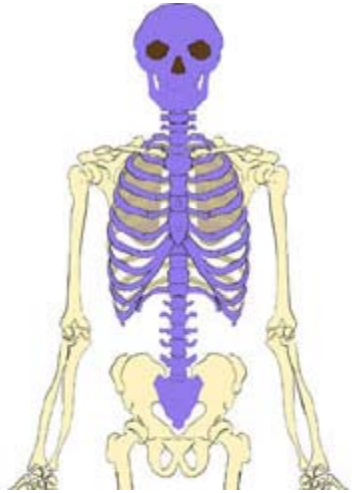


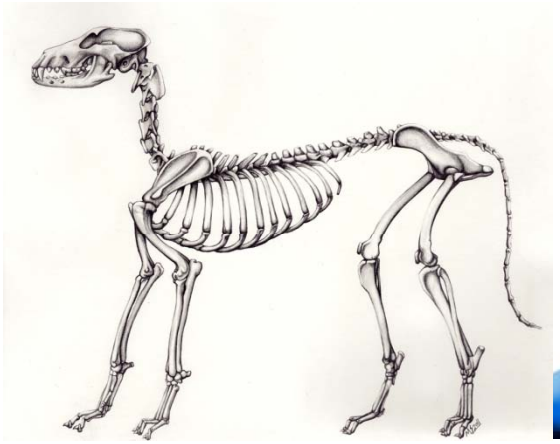
Phylogeny of Chordates



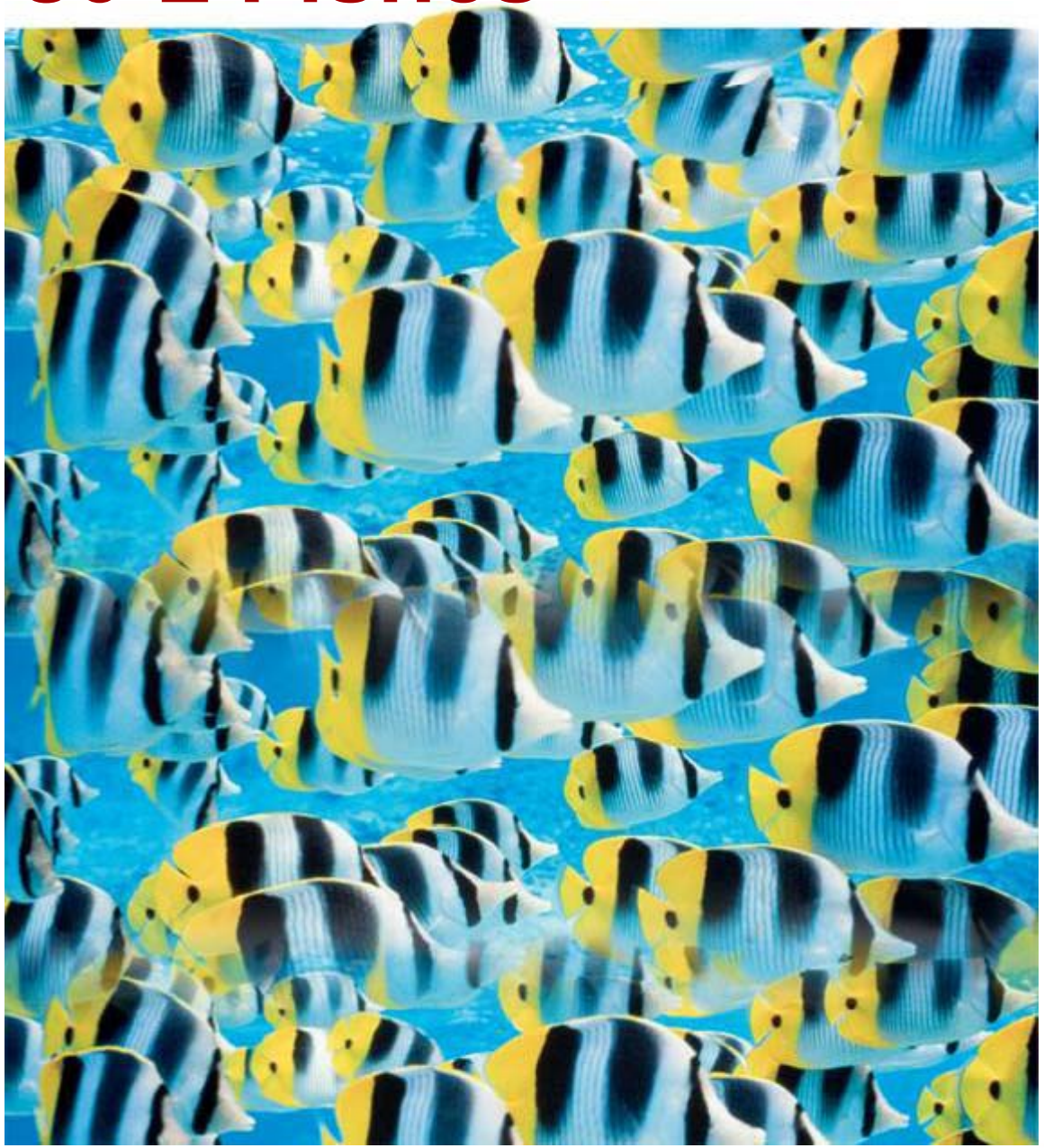
Characteristics of All Vertebrates

- Have a **backbone**, which surrounds spinal cord, is made up of bony segments called **vertebrae**
- An **endoskeleton** which has two main parts:
  - **Axial Skeleton**: made up of the **vertebral column, skull** and **rib cage**
    - supports body and protects spinal column, brain and other internal organs
  - **Appendicular Skeleton**: made of the appendage bones wide flattened girdles to which they are attached
    - is attached to axial skeleton
    - ex. arms, legs





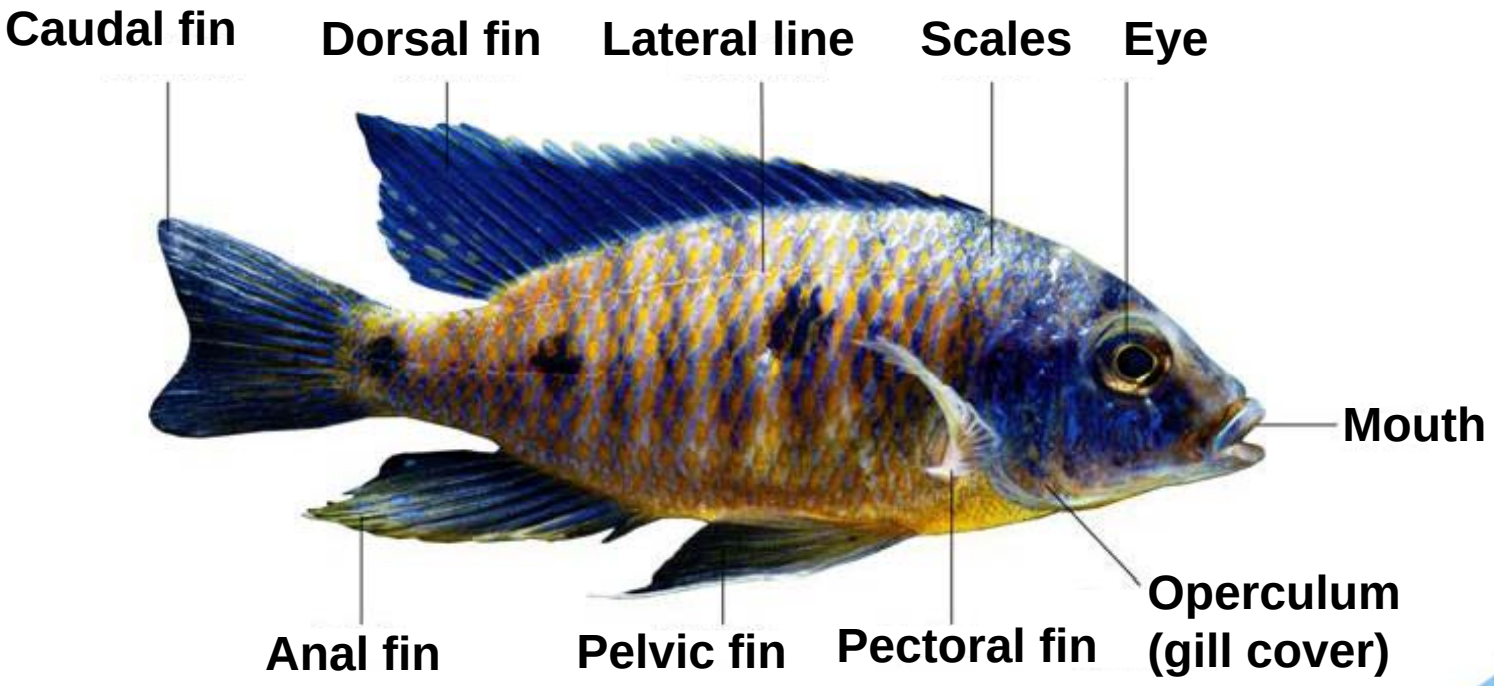
30-2 Fishes



What Is a Fish?

- Fishes are aquatic vertebrates.
- Most fishes have paired fins, scales, and gills.

Fins may include: caudal fin, dorsal fin, pectoral fin, pelvic fin. p771



Form and Function of Fishes

- Feeding
- Respiration
- Circulation
- Excretion
- Response
- Movement
- Reproduction

Feeding
p774

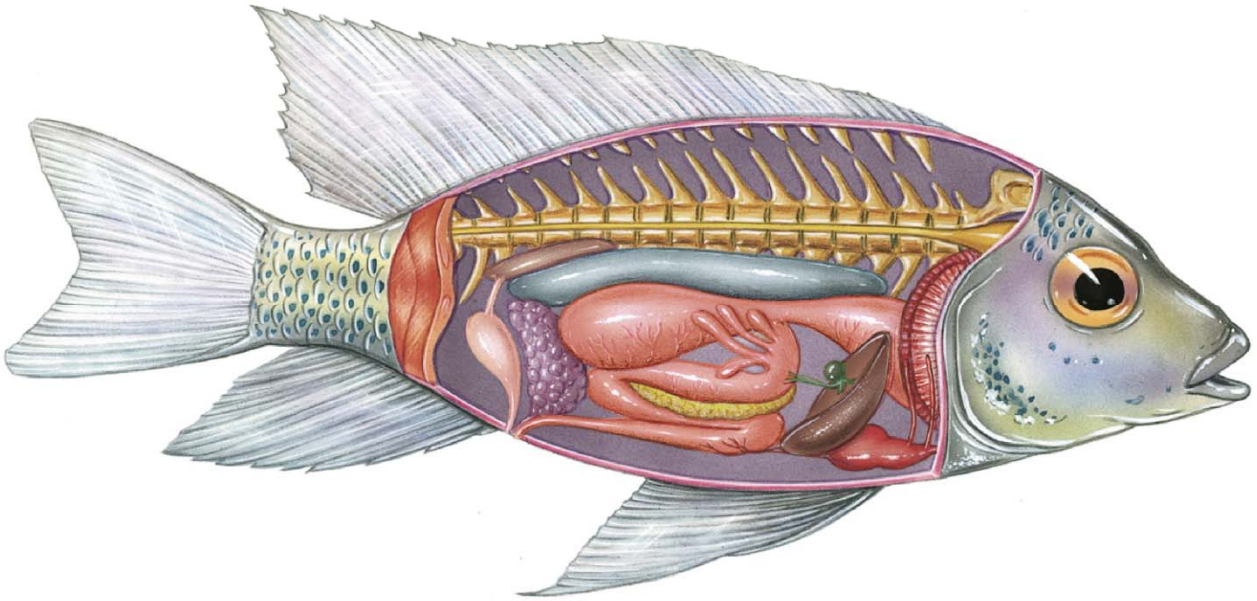
- Every mode of feeding is seen in fishes – herbivores, carnivores, parasites, filter feeders, and detritus feeders.
- Some fish may exhibit numerous modes of feeding – ex. Carp – can eat algae, aquatic plants, worms, mollusks, arthropods, dead fish and detritus
- Other fishes are specialized feeders – ex. Barracuda – carnivores; Some lampreys – parasitic.

Feeding

- Organs important in the fish's digestion include:

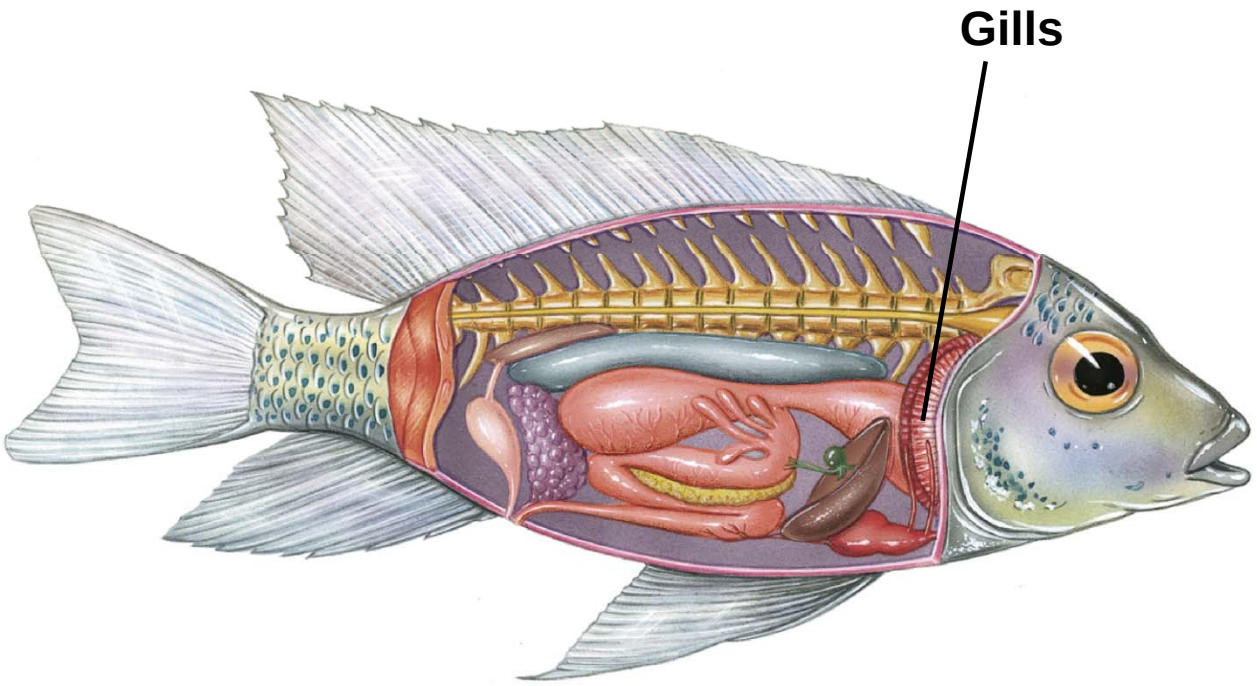
•mouth, esophagus, stomach, pyloric ceca, intestines, liver, gall bladder, pancreas, anus.

What is the function of each of the organs listed? p774



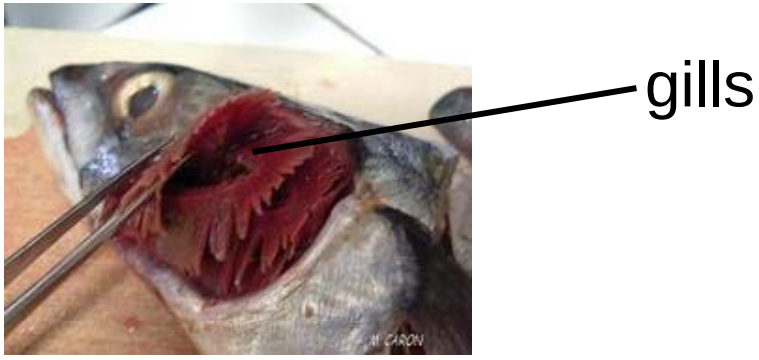
Respiration

• Most fishes exchange gases using **gills** located on either side of the pharynx.



Respiration

- Gills are made up of feathery threadlike structures called **filaments**. Each filament contains a network of **fine capillaries** that provides a **large surface area** for the exchange of **oxygen and carbon dioxide**.
- Oxygen rich water **is pulled through their mouths, pumping it over the gill filaments**, then **pushing oxygen poor water out through openings in the sides of the pharynx.**



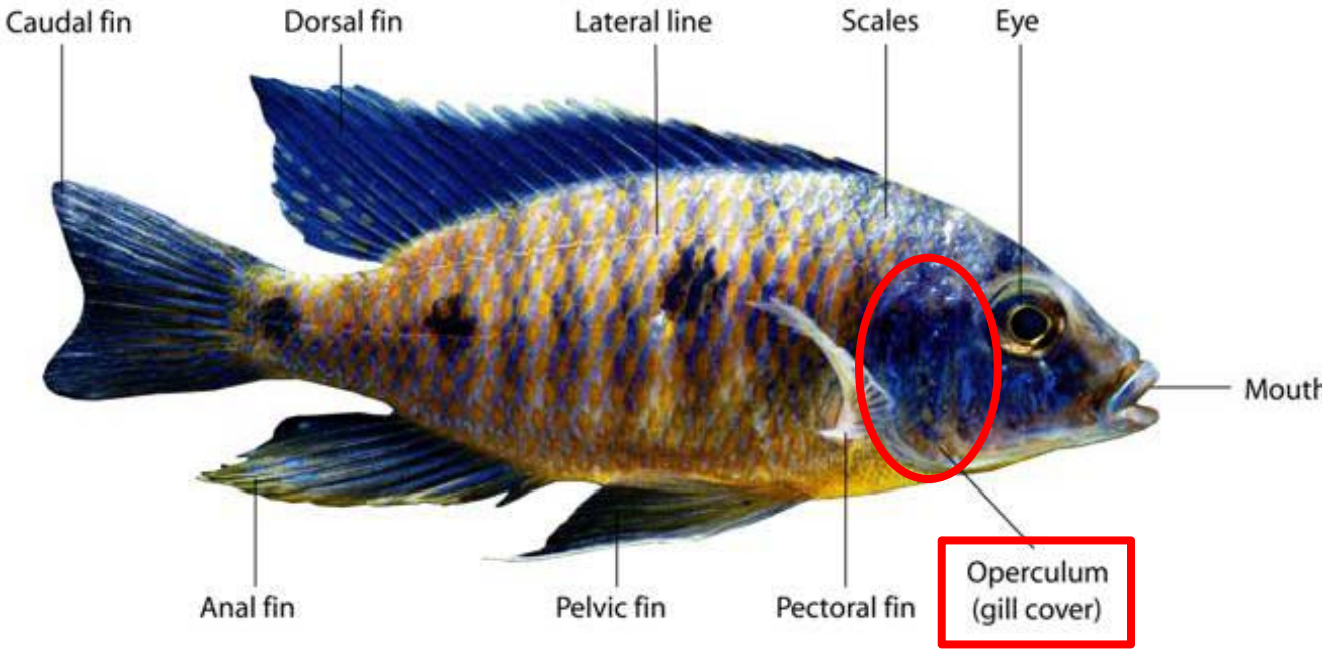
- What are the characteristics of a respiratory surface?

1.

2.

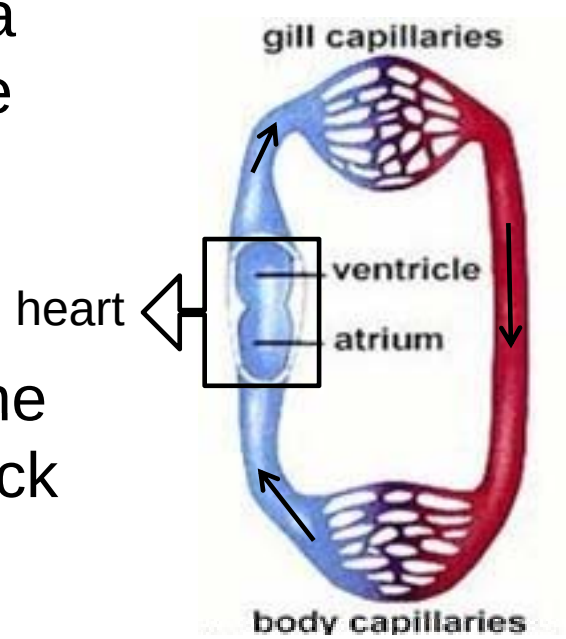
3.

The gill opening of which water is pumped out is covered by a bony structure called the **operculum**.



Circulation
p776

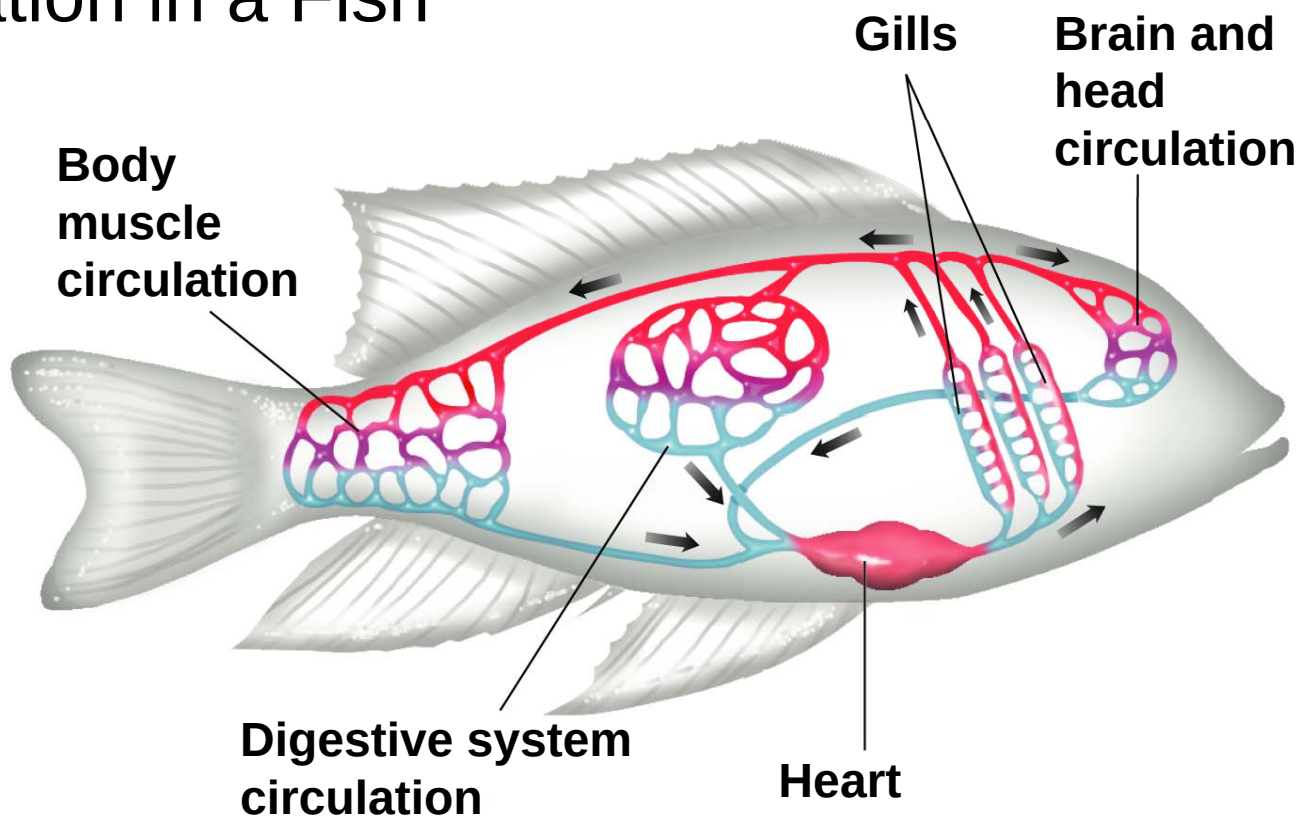
- **Closed circulatory system** with a heart that pumps blood around the body in **a single loop**



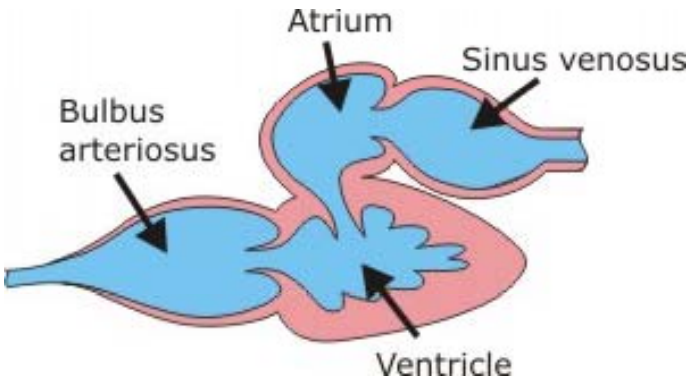
- from the heart to the gills, from the gills to the rest of the body and back to the heart.

Heart: **2 general parts (or 4)** – atrium, (sinus venous), ventricle, (bulbus arteriosus).

Circulation in a Fish



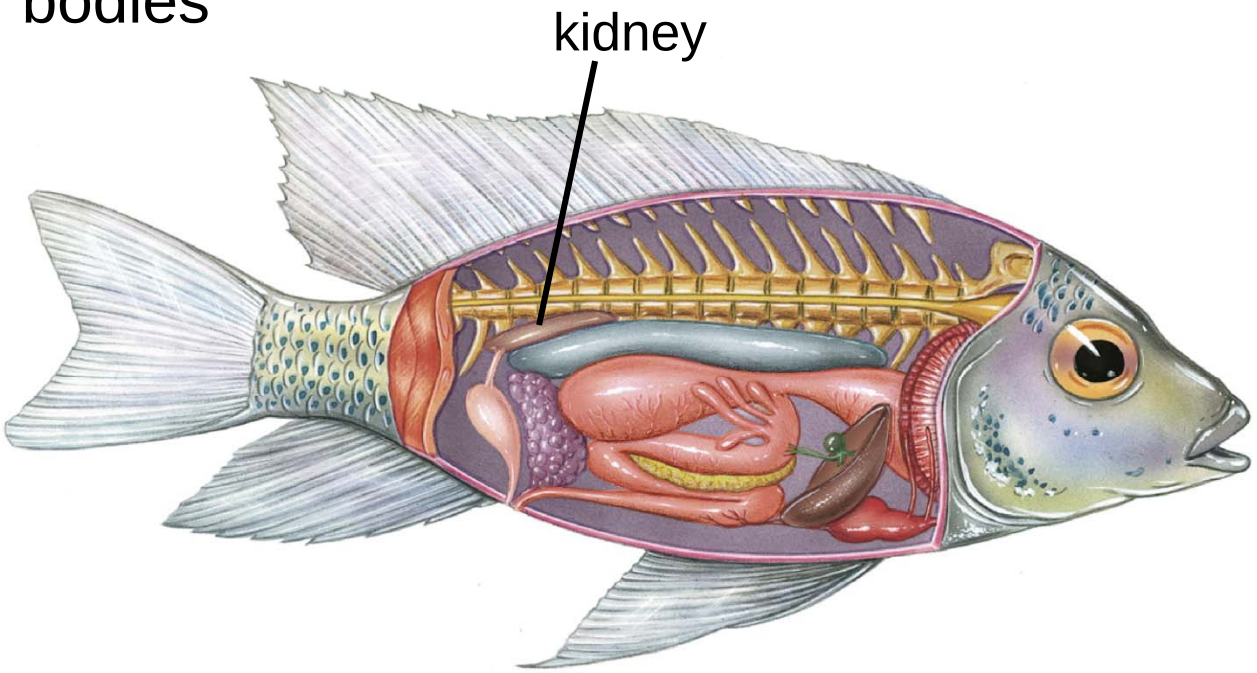
Sinus venosus – collects oxygen poor blood from the veins – blood enters the **atrium** and flows to the **ventricles** through to the **bulbus arterosus** where blood is moved into the **ventral aorta** and toward the **gills.**



fish heart

Excretion

- **Nitrogenous waste** is in the form of **ammonia** and is excreted by the kidneys.
- The kidneys filter wastes from the blood.
- **Kidneys also** help fishes control the amount of water in their bodies



Excretion

- Salt water fish lose water by osmosis – the kidneys concentrate wastes and return as much water as possible to the body.
- The kidneys of freshwater fish pump out lots of dilute urine.
- Some fish are able to move from fresh water to salt water by adjusting their kidney function.

Response p777

- Fish have **well developed nervous systems** organized around a **brain.**

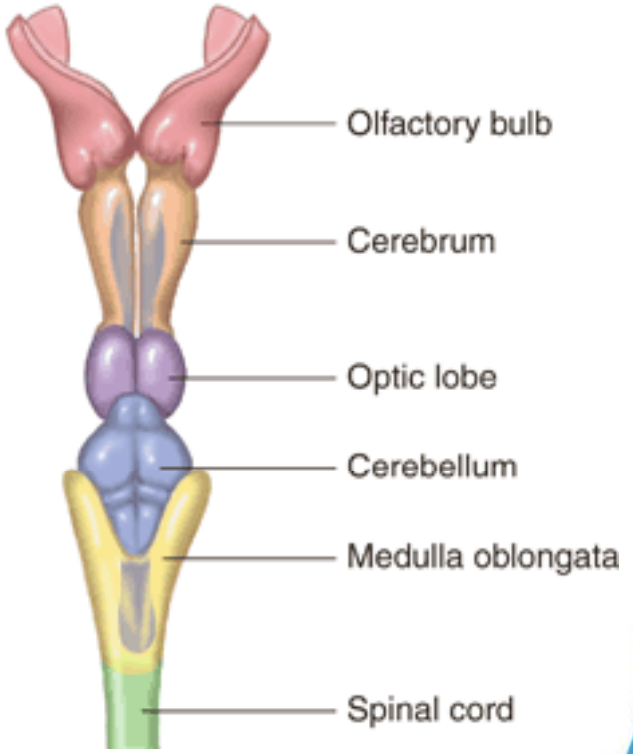
Olfactory bulb – sense of smell

Cerebrum – processes the sense of smell

Optic lobe – processes information from the eyes

Cerebellum – coordinates body mov’ts

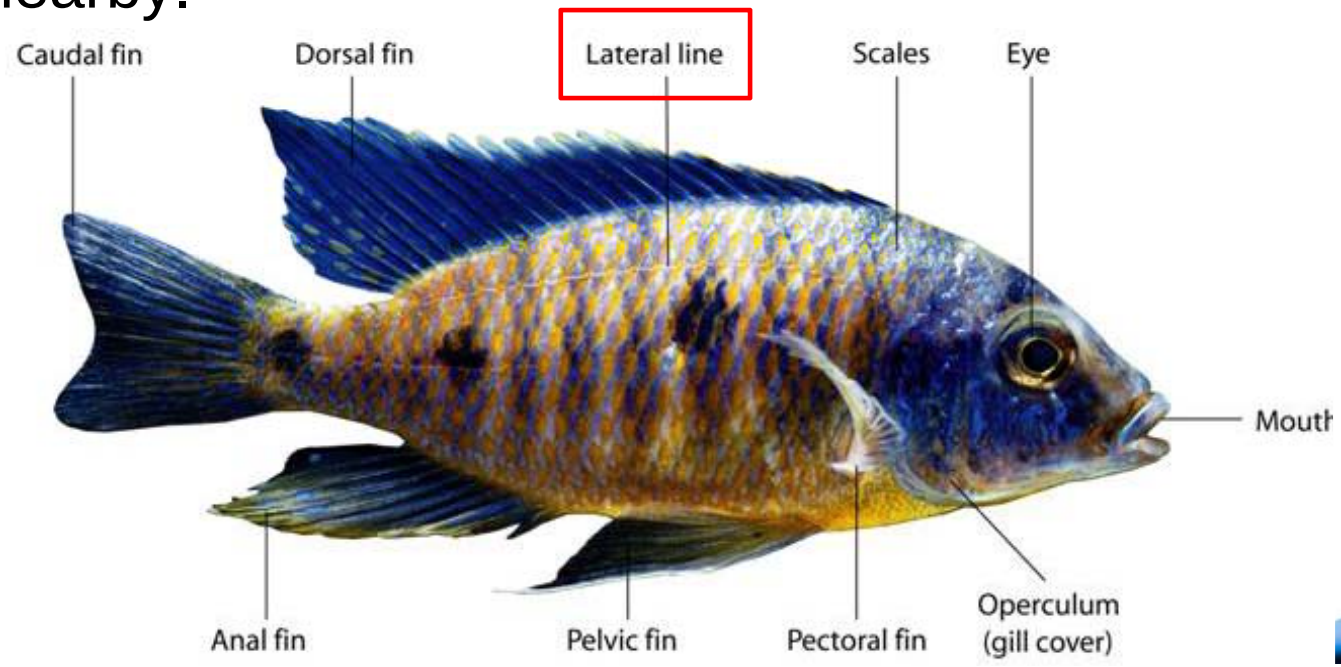
Medulla oblongata – controls the functioning of many internal organs.



Response

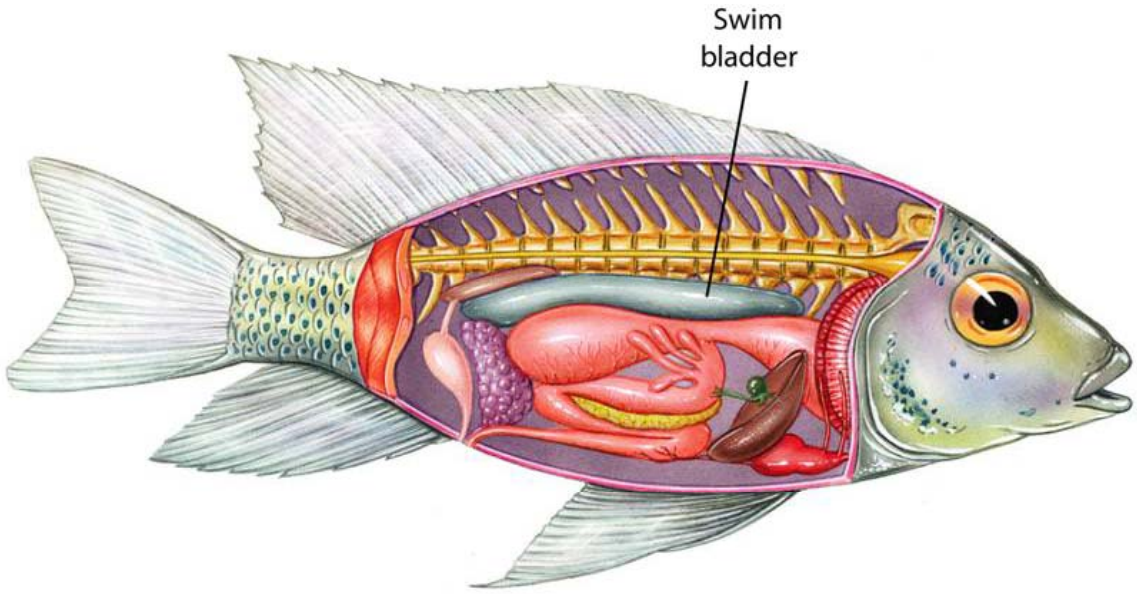
- Fish that are active in daylight have well developed **eyes** and colour vision at least as good as ours.
- **Sensory receptors** in the **lateral line system** enables fishes to detect gentle currents and vibrations in the water.

  - this system is used to detect other fishes swimming nearby.



Movement
p777

- Most fishes move by contracting paired sets of muscles either side of the backbone. The mov't of the muscles and the mov't of the fins propels the fish forward.
- To make fishes buoyant most bony fish have a **swim bladder** – a gas filled organ that lies just beneath the backbone.



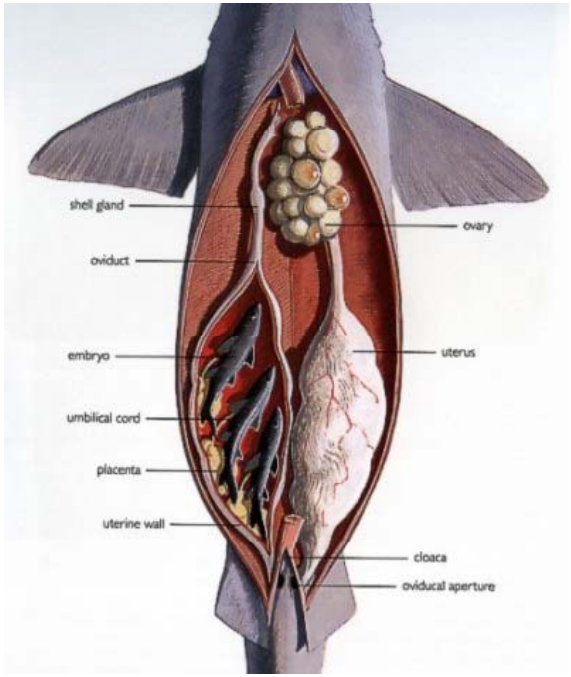
Reproduction
p779

- Fishes whose eggs hatch outside the mother's body are called **oviparous**. The embryo's develop and obtain food from the yolk in the egg. Ex. Salmon

- Fishes who eggs stay in the mother's body after internal fertilization are called **ovoviviparous**. Each embryo develops inside its egg, using the yolk for nourishment. The young are then born alive. Ex. guppies

Reproduction

- Fish such as sharks, their embryo obtains nourishment not from the yolk but from the mother's body. These fish are called **viviparous**. The young of these fish are also born alive.



- What are the three different modes of reproduction?

Groups of Fishes
p778-780

All living fishes can be classified into three groups:

- jawless
- cartilaginous fishes
- bony fishes

Jawless Fishes

- Have no true teeth or jaws.
- Their skeletons are made of fibers and cartilage.
- They lack vertebrae, and instead they keep their notochords as adults.

Modern jawless fishes are divided into two classes: **lampreys** and **hagfishes**.

Lamprey

- Filter feeders as larvae, parasites as adults
- Head is taken up by a sucking disk with a mouth in the centre.
- Attach themselves to fishes, whales and dolphins – they scrape away at the skin with small toothlike structures and a raspy tongue and suck up the tissues and body fluids of its host.

Hagfish

- Wormlike bodies with four – six short tentacles around their mouths.
- feed on dead or dying fish by making a hole into the fishes side.
- secrete large amounts of slime, have 6 hearts, have an open circulatory system and regularly tie themselves into knots.

Sharks and Their Relatives

- Sharks, rays, skates, sawfishes and chimaeras.
- Skeletons are made entirely of cartilage.
- Most sharks have toothlike scales covering their skin – shark skin can be used as sandpaper
- Sharks have 1000s of teeth arranged in several rows. A shark goes through about 20,000 teeth in its lifetime.

Sharks and their relatives

- Not all sharks have fierce-looking teeth. The basking shark is a filter feeder, there teeth are so small they are essentially useless. Other sharks have flat teeth adapted for crushing the shells of mollusks or arthropods.
- Skates and rays have a very diverse range of feeding habits.

30-2 Fishes ➡ Pacific Manta Ray

PEARSON Prentice Hall

Bony Fishes

- Skeletons are made up of hard calcified tissue called bone.
- Most bony fishes belong to ray-finned fishes.

"Ray-finned" refers to the slender bony spines, or rays, that are connected by a thin layer of skin to form the fins.

30-2 Fishes ➡ Bony Fish

End Show

Ecology of fishes

- Most fresh water fish can not survive in salt water and most salt water fish can not survive in fresh water. However, fishes such as lampreys, sturgeons and salmon spend most of their lives in salt water but migrate to fresh water to breed.

  These fish are called **anadromous**.

- **Catadromous** fish live most their lives in fresh water and migrate to the ocean to breed. Ex. European eel.

End Show

Video of the anglerfish, a deep-sea creature:

https://www.youtube.com/watch?v=VqPMP9X-89o

30-2 Section QUIZ

Continue to:

Section QUIZ

- or -

Click to Launch:

ExamView® QuickTake

End Show

30-2 Section QUIZ

1 A characteristic of almost all fish is

a. a notocord as an adult.

b. the presence of scales.

c. a skeleton made of cartilage.

d. the lack of jaws.

30-2 Section QUIZ

2 An example of a fish that is a filter feeder as a larva and a parasite as an adult is a

a. shark.

b. skate.

c. lamprey.

d. lungfish.

3 Most members of the class containing sharks and rays are characterized by

a. a cartilaginous skeleton.

b. a bony skeleton.

c. a single operculum over the gills.

d. no swim bladder.

END OF SECTION