

Key Words

fishes:	vertebrates that live in the water and breathe with gills
gills:	respiratory structures that allow fishes to breathe in water
ectothermic:	having a body temperature that changes with the temperature of the environment
jawless fishes:	fishes with a smooth, round body and no jaw
cartilaginous fishes:	fishes with hinged jaws and skeletons made of cartilage
cartilage:	tough, flexible tissue of the skeletal system
bony fishes:	fishes with hinged jaws, scaly skin, and skeletons made of bone

KEY IDEAS

Fishes are vertebrates that live in the water and breathe with gills. They are classified into three groups depending on the structure of their skeleton.

Imagine walking into the schoolyard and finding a live dinosaur. That's just how scientists felt with the discovery of the coelacanth. The coelacanth is a fish thought to be extinct for *60 million* years. Then in 1938, a live coelacanth was caught in the ocean off the coast of South Africa. Since then, about 200 coelacanths have been found living near some islands off the eastern coast of Africa. Scientists hope that studies of this fish can give them clues to the evolution of all fishes and, perhaps, of humans.

Fishes are a large group of vertebrates that live only in water. Sharks, tuna, eels, and colorful clown fish are some types of fishes that live in the ocean. Bass and trout are just a few of the fishes that live in freshwater streams, rivers, ponds, and lakes.

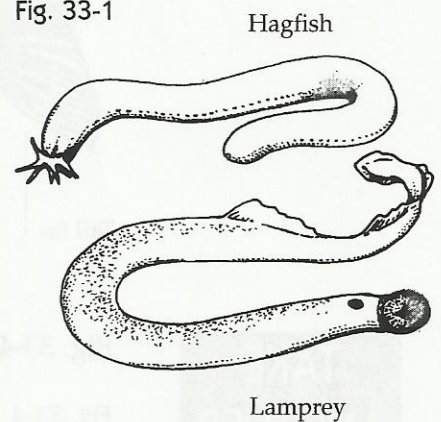
Characteristics of Fishes. Vertebrates that live in the water and breathe with gills are **fishes** (FIHSH-ehz). The **gills** (gihlz) are respiratory structures that allow a fish to breathe in the water. All fishes are **ectothermic** (EHK-toh-thuhr-mihk) animals. Their body temperature changes with the temperature of the environment.

A fish's body has three distinct parts: a head, a tail, and a trunk. Most fishes have fins, membranes that extend out from the body and help the fish swim. Fins are supported by bones that are part of the skeleton. Most fishes also have scales covering their bodies. Like other vertebrates, fishes have well-developed organ systems such as the digestive, circulatory, and nervous systems. All fishes have a heart with only two chambers.

- ✓ 1. What is an ectothermic animal? _____

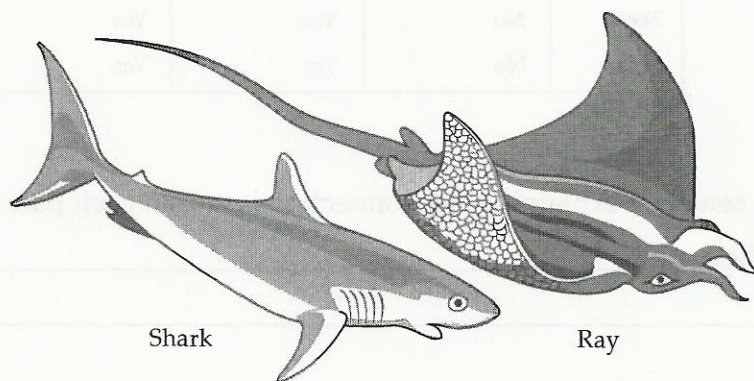
Classification of Fishes. Fishes are classified into three groups. The simplest group is the jawless fishes. **Jawless fishes** (JAW-lehs FIHSH-ehz) have round mouths and no jaws. They have wormlike bodies that are covered with mucus. Jawless fishes do not have teeth or scales. They have soft backbones. The two kinds of jawless fishes, hagfish and lampreys, are shown in Fig. 33-1. Hagfish are scavengers that live in the ocean. Lampreys live in both fresh water and salt water.

Fig. 33-1



Sharks and rays belong to the group of fishes called cartilaginous fishes. **Cartilaginous fishes** (kahrt-uhl-AJ-uh-nuhs FIHSH-ehz) have soft, flexible skeletons made up of cartilage. **Cartilage** (KAHRT-uhl-ihj) is a tough, flexible tissue found in the skeletons of most vertebrates. Cartilage is not hard like bone. Unlike jawless fishes, cartilaginous fishes have both jaws and scales. They also have pairs of fins on their bodies. Sharks have long bodies covered with tiny, smooth scales. Rays have flat bodies with winglike fins. All sharks and rays live in the ocean. See Fig. 33-2.

Fig. 33-2



The third and largest group of fishes is the **bony fishes** (BOH-nee FIHSH-ehz). As their name suggests, these fishes have skeletons made up of hard bone. There are more than 30,000 species of bony fishes. That's more

than all other species of vertebrates combined. Bony fishes live in salt water and fresh water. Fig. 33-3 shows the main body parts of a perch. The perch is a typical bony fish.

Fig. 33-3

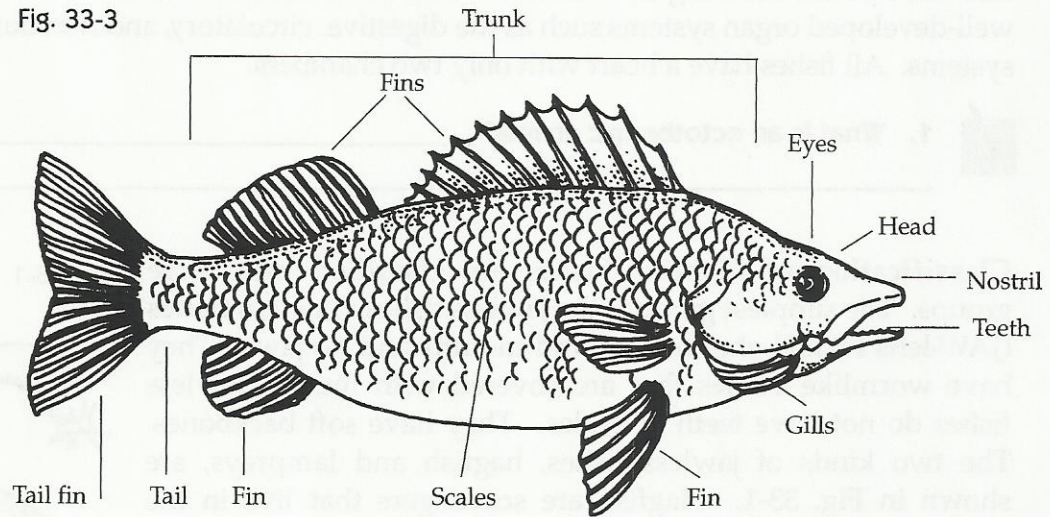


Fig. 33-4 shows the characteristics of the three groups of fishes.

Fig. 33-4

Characteristics of Fishes			
	Jawless	Cartilaginous	Bony
Habitat	Fresh water or salt water	Salt water	Fresh water or salt water
Skeleton	Cartilage	Cartilage	Bone
Jaws	No	Yes	Yes
Scales	No	Yes	Yes
Teeth	No	Yes	Yes
Fins	No	Yes	Yes

**TAKE
ANOTHER
LOOK**

**Check Your
Understanding**

Write a sentence explaining the connection between each pair of words.

2. fishes, gills _____

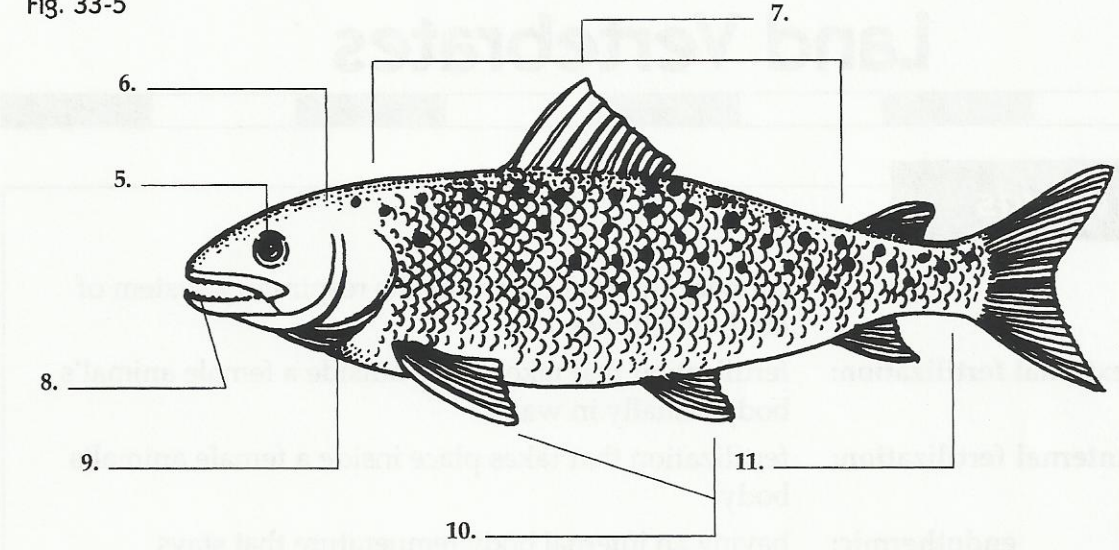
3. jawless fishes, cartilaginous fishes _____

4. cartilaginous fishes, cartilage _____

What Do You Know?

On the figure below, label the main parts of a bony fish.

Fig. 33-5



12. What are three characteristics of a fish? _____

13. What is the primary difference between jawless fishes and other kinds of fishes? _____

14. What is the primary difference between a cartilaginous fish and a bony fish? _____

15. Tropical fishes must have a high body temperature to live. Why wouldn't you put tropical fishes in a tank full of cool water?
