

Lab

Dissecting a Perch

**Background Information**

Fish are the largest group of vertebrates found in fresh and salt water. In fact, over 25,000 species of fish comprise about 50% of the vertebrate population. Part of the reason for the large numbers of fish is due to how well adapted they are to life in an aquatic environment. In this laboratory you will observe the internal and external structures of a perch, a typical bony fish. You will see how its structures make it ideally suited to living in an aquatic environment.

**Problem**

How are the structures of the perch adapted to life in the water?

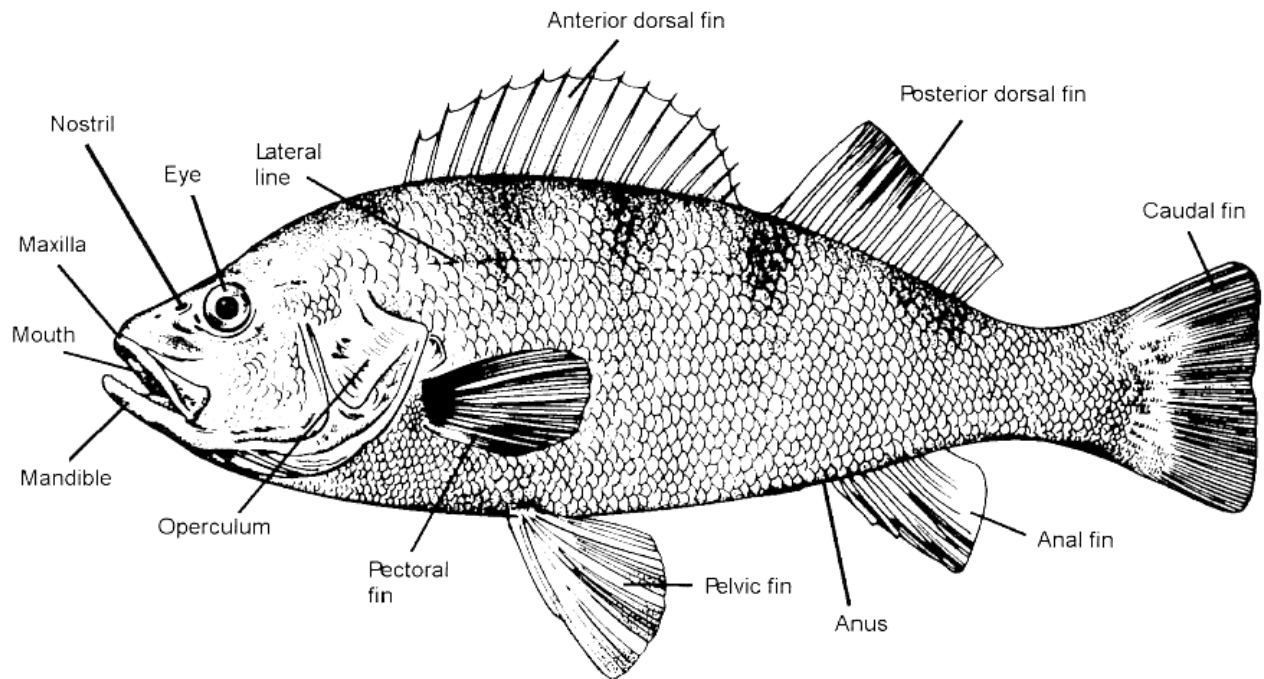
**Materials** (per group)

Dissecting kit  
Preserved perch  
Cover slip  
Lamp

Aquarium with goldfish  
Compound microscope  
Slides  
Dissecting microscope

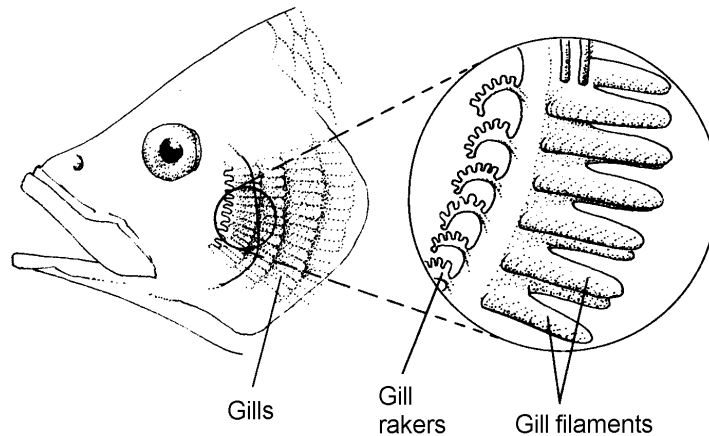
**Procedure****Part A Observing the Fish's External Anatomy**

1. Place the fish in the dissecting pan.
2. Locate all the external structures as shown in Figure 1 on your specimen and then answer the questions in Observations.

**Figure 1**

- Open and close the perch's mouth to observe the action of the *mandible* and *maxilla*. Examine the *teeth*. Note the appearance of the teeth and the direction that the teeth point.
- Explore the inside of the *nostrils* with the probe.
- Place your probe in the fish's mouth and gently push it out from under the *operculum*. You should notice several *gill arches*, as shown in the enlarged circle in Figure 2. Remove one gill arch by cutting its dorsal and ventral attachment. Place it in a container of water and examine it with a dissecting microscope. Look for the thin delicate structures called *gill filaments*. These filaments are filled with *capillaries* that carry blood from the heart.

Figure 2

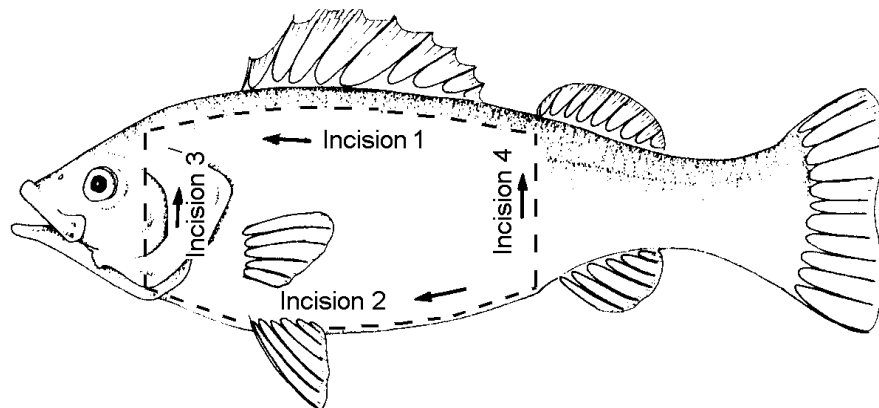


- Locate the *gill rakers* on each gill arch. These projections separate the gill arches from each other and create spaces between each of the gill arches. Notice how the *gill rakers* project inside the fish's mouth.

### Part B Observing the Fish's Internal Anatomy

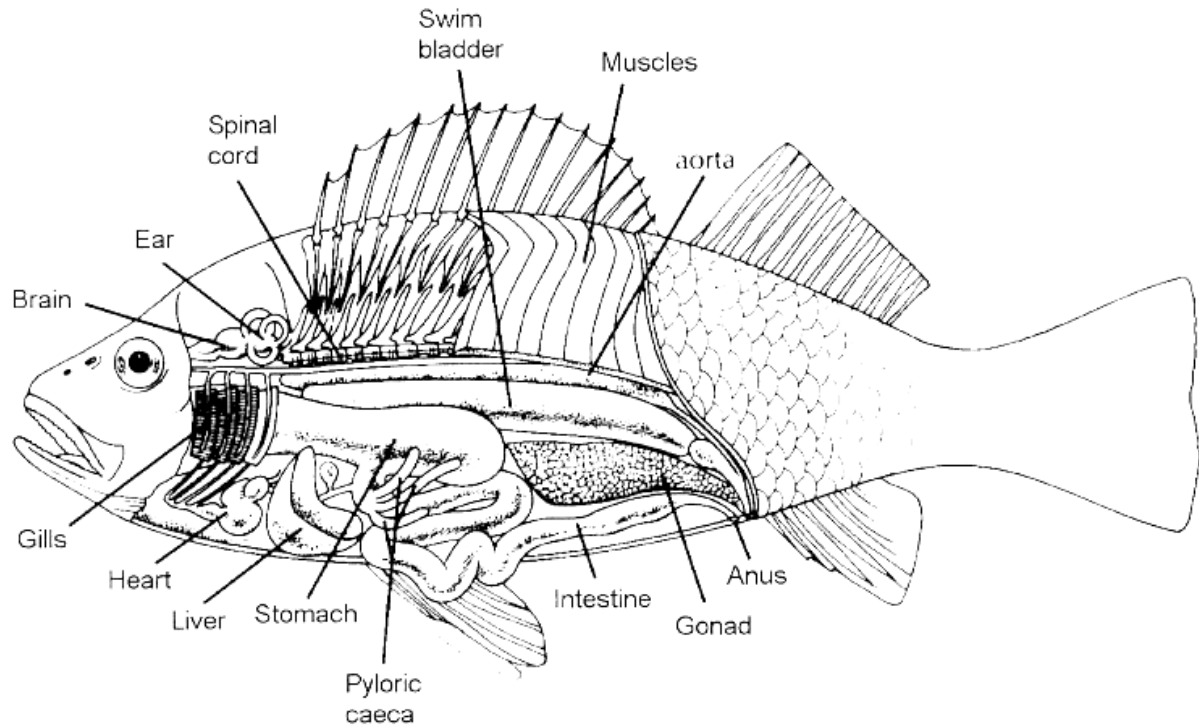
- Figure 3 shows the incisions to be made for viewing the internal structures of the perch. Begin the incision along the dorsal side of the fish near the lateral line. Be careful not to cut too deeply, you might destroy some of the internal organs. Use your scalpel or scissors and make the incision toward the head, as shown in the diagram. Incision 2 should begin on the ventral surface just forward of the anus. When you reach the gills, cut upward behind the gills. This will complete incision 3. Lastly, finish this process by making incision 4 as shown in Figure 3. Very carefully, lift away the cut section of the body wall. Use your scissors to remove any membranes that adhere to the body wall. If the body organs are covered with fat, you may use a forceps to remove this material.

Figure 3



- Refer to Figure 4 to aid in locating the fish's internal organs.

Figure 4



3. **Digestive System** - Find the tan-colored liver with the gallbladder attached to and underneath the liver. Cut the liver free from the body to expose the esophagus and stomach. Then, trace the route a piece of food would travel as it passes through the fish's digestive system. Find the mouth, pharynx, esophagus, pyloric caeca, stomach, intestine, and anus. To aid in locating other organs, remove the entire digestive canal by cutting it free at the anus and at the mouth.
4. **Reproductive System** - Determine if your fish is a male or female by locating either a pair of *testes*, small, pale yellow masses on the ventral side or a single, large, yellow *ovary* filled with eggs. The testes and ovaries are connected by tubes to the *urogenital opening* found posterior to the anus.
5. **Respiratory and Excretory Systems** - Locate and remove the gas-filled swim bladder in the dorsal portion of the fish. On the dorsal wall of the body cavity locate the kidneys. The kidneys are connected by urinary ducts to a urinary bladder from which wastes pass out of the body through the urogenital opening.
6. **Circulatory System** - Cut through the fish's body wall anterior to where the liver was located. Doing this exposes a cavity where the heart is suspended. Find the one thin-walled atrium and the one thicker-walled muscular ventricle. Locate the one enlarged vein where blood enters the heart and the one enlarged artery where the blood leaves the heart. The blood leaving the heart goes to the gills where it flows through capillaries in the gills and then throughout the body in various veins and capillaries and arteries and finally returns to the heart to be pumped throughout the body again. The four chambers of the perch heart are the sinus venosus, atrium, ventricle, and bulbus arteriosus.

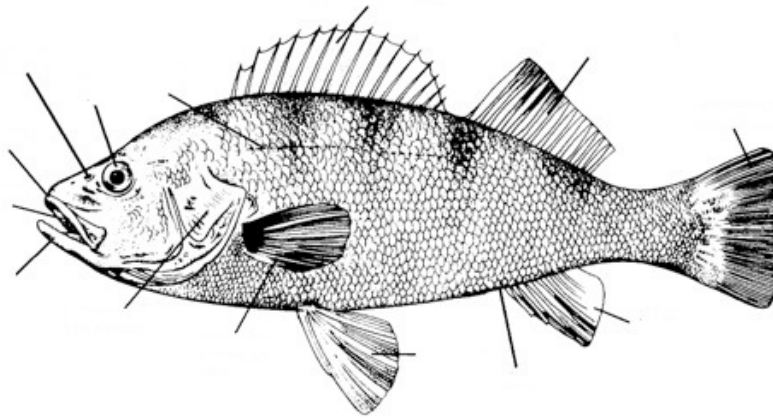
**Observations**

1. Describe the general body shape of the perch. In what way does the body show adaptations for life in the water?
2. What could be one function of the gill rakers?
3. Observe a fish swimming in the aquarium. Describe the function of each fin used for movement. Tell whether the action provided by each fin is for propelling, steering, or maintaining balance. Which of the fins contain spines in the perch?  
Pectoral and pelvic Fins -  
Dorsal Fin -  
Caudal Fin -
4. Describe the scales of the perch. Which direction do they face? What is the advantage of this?
5. How many nostrils does the perch have? How are they different from your nostrils?
6. What characteristics can you observe in the gills that make them an efficient respiratory organ?
7. Describe the lateral line. What is the function of the lateral line of a perch?

**Critical Thinking and Application**

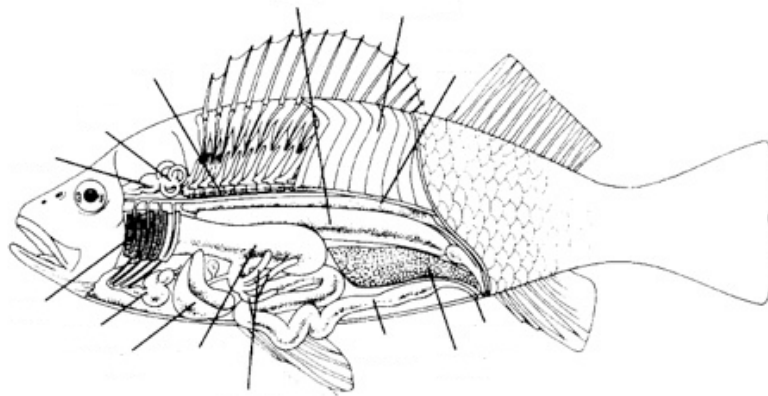
1. While many invertebrates have an exoskeleton, vertebrates such as fishes have an endoskeleton. Of what advantage is the endoskeleton to these animals?
2. The perch fertilizes its eggs externally and leaves them exposed on rocks. The guppy fertilizes its eggs internally and gives birth to live young. Which fish produces fewer eggs? Compare the survival rate of these two species.
3. The perch possesses a gas-filled structure called a swim bladder. What is the function of the swim bladder?
4. Certain fish that live deep in the ocean have chemicals in their skin that make them luminescent. What advantage is this characteristic to these fish?

5. Label the perch below. Try to label the figure WITHOUT looking back at the lab handout.

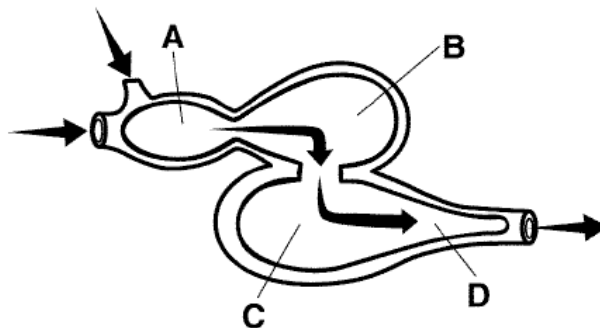


6. Label the figure below, again from memory. Then, color using the following guide:

- Digestive = Blue
- Circulatory = Red
- Nervous = Green



7. Label the figure of the fish heart below using the following terms: *atrium*, *bulbus arteriosus*, *sinus venosus*, and *ventricle*.



8. When blood leaves the heart through the structure labeled D, where does it go? Is the blood in the heart oxygenated or deoxygenated?