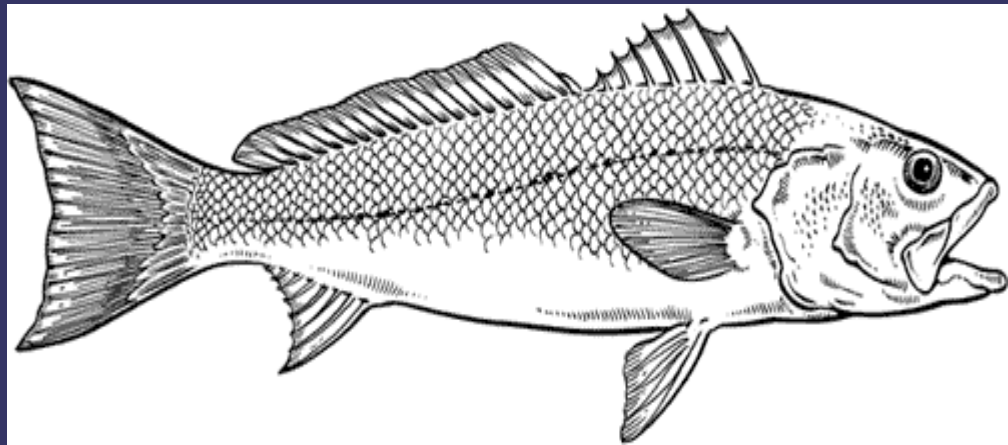
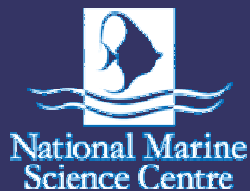


# Fish Biology



**Name:** \_\_\_\_\_  
**School:** \_\_\_\_\_  
**Date:** \_\_\_\_/\_\_\_\_/\_\_\_\_



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# Introduction

## 1) BASIC FISH ANATOMY

- **Body shape**

- There is a tremendous diversity of fish in the world. Each species is adapted to life in a specific habitat. By examining the body shape of the fish, we can learn much about the habitat of the fish. For example:



Surface dwelling fish have an upturned mouth, a flattened back.



Tall bodied, laterally compressed species like Discus and Angelfish are adapted to life in slow-moving waters.



Slender, torpedo shaped fish are better adapted to moving waters.

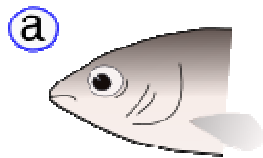


Bottom-dwelling fish have flattened bellies and inferior mouths. Some bottom-dwellers have altered swim bladders so they "hop" along the substrate instead of swimming.

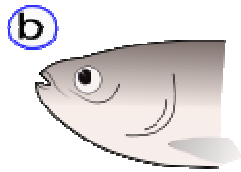
- **Head**

- There are **three** general locations of the mouth in fish which often indicate the specie's feeding habits.

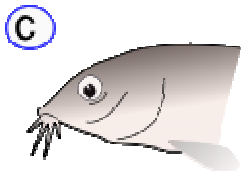
- Surface feeding fish usually have an undershot, upturned (**superior**) mouth for feeding on insects. Fish that feed in mid water have a **terminal** mouth, which is usually considered the "normal" fish mouth. Predatory fish usually have a **wide** mouth, while omnivorous fish have **smaller** mouths. Bottom feeding fish generally have an under slung or **inferior** mouth.



**Positions of the fish's mouths:**



**(a) terminal**



**(b) superior**

**(c) inferior**

- **Fins**

- The fins are used for movement, stability, nest-building, spawning, and as tactile organs. Fins can be **single** or **paired**.

- The **caudal** or tail fin is used for **propulsion**. Fish that have forked caudal fins are regular fast-swimmers. Fish that have rounded caudal fins are fish capable of quick action like predators. Large, elongated caudal fins are often used to attract mates.

- **Body covering**

- Most fish are covered with **scales**, which protect the body. Some fish such as catfish have bony plates which serve the same purpose. Other species have very small scales or no scales at all.

- **Gills**

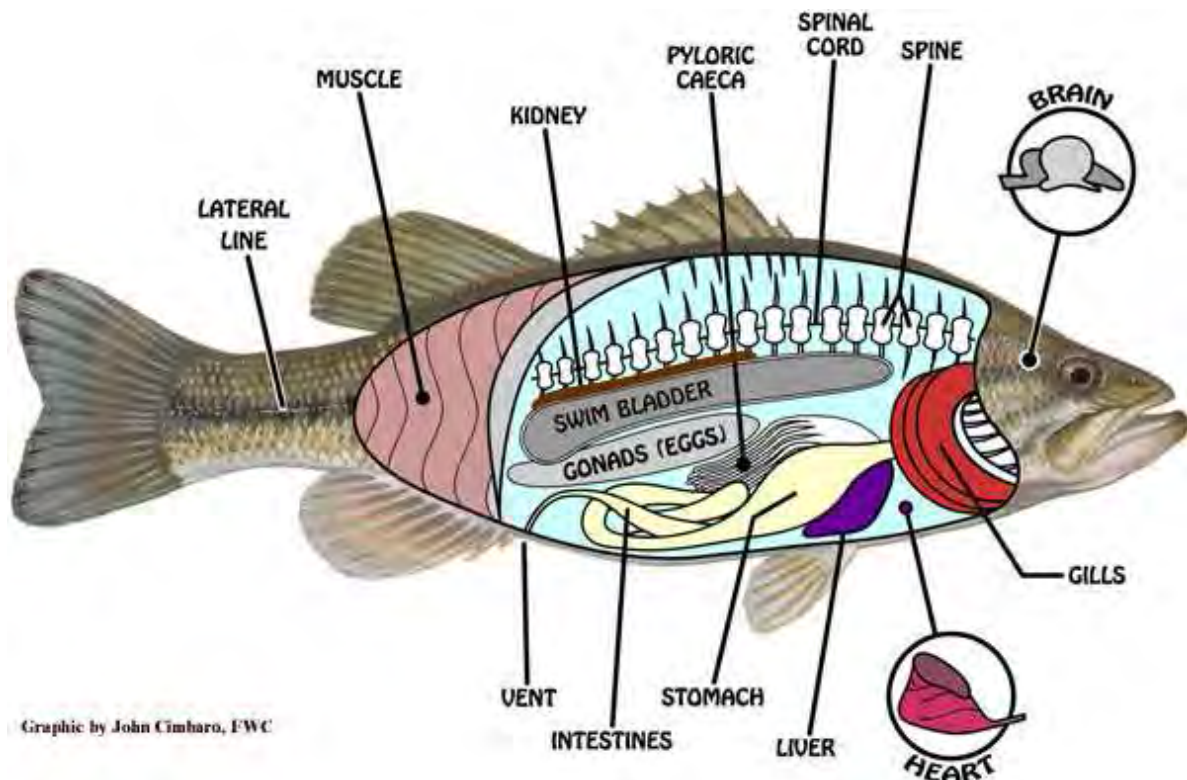
- The gills are the organ by which **gases** are **exchanged** between the fish and the surrounding water. Through the gills, fish are able to absorb **carbon oxygen** and give off **carbon dioxide**. Like the lungs, the gills have a large area for gas exchange.

- **Lateral Line**

- The lateral line organ is a series of fluid-filled ducts located just under the scales. The lateral line system picks **vibrations** in the water. Thus fish are able to detect predators, find food, and navigate more efficiently. Many fish species can navigate without vision in darkness or muddy water.

- **Swim Bladder**

- The swim bladder is an **air-filled bladder** used for keeping the fish in a state of neutral buoyancy where they neither sink nor float. Thus fish are able to sleep in mid water. Numerous species have altered swim bladders to fit their living habits. Some species can swallow air, which is passed to the swim bladder, where the oxygen is extracting. This adaptation is especially convenient in oxygen-starved waters.



**Figure 1. Internal organs of a Fish**

## **Study Aims**

- **Objectives:**

- Following completion of this lesson, the students will be able to:



Identify the various parts of a fish.



Describe the concept of fish morphology.



Relate shape, form and structure of a fish's parts to Function.



Draw inferences about where and how fish might live based on its morphology.

## **Study Equipment**

- Dissecting microscope
- Fish specimen
- Scissors
- Forceps
- Scalpel
- Probe
- Cutting board
- Labels



**(Per group)**

# Study Methods

- **Dissection of a Flathead**

- This dissection consists of three parts: an **external examination**, the **internal organs**, and the **mouth** and **gills**.

## 1. Getting started

- You will need a scalpel, scissors, probe, forceps, cutting board and a fish.

- Place your fish on the cutting board.



**Figure 2. Fish and instruments**

## **Diagram 1: Fish body**

- Sketch a diagram of the fish, showing the position of the eyes, number and position of the fins and any other distinguishing features.



## 2. External examination - fins

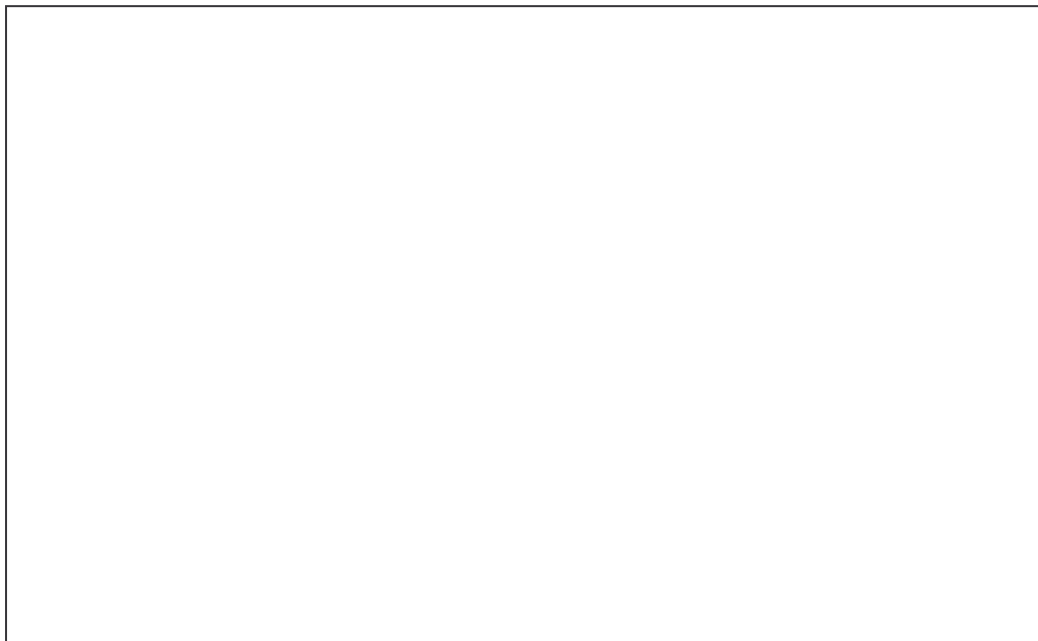
- Examine the shape of the fish.
- Examine the position and size of the fins.
- The image shows the distinctive pattern on the tail of the Flathead.



**Figure 3. Caudal fin**

### **Diagram 2. Fins**

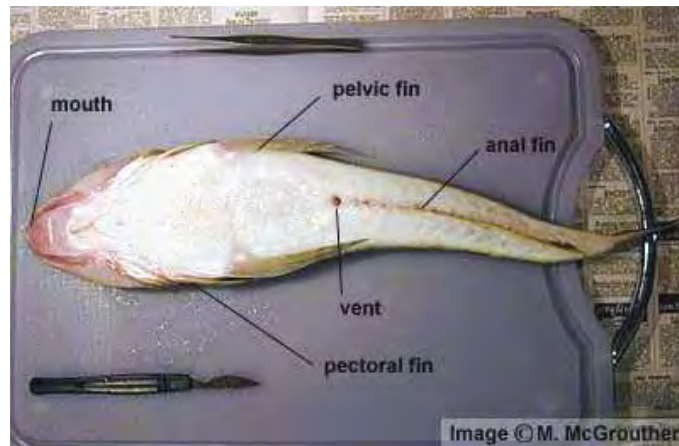
- Sketch one of the fins. Does the fin have spines or rays? \_\_\_\_\_





### **3. External examination - ventral surface**

- Turn the fish over and note any features on your diagram.
- The image shows the ventral (lower) surface of fish with the vent (anus) and fins labeled.



**Figure 4. The ventral (lower) surface of the Flathead**

### **4. Internal examination - first incision**

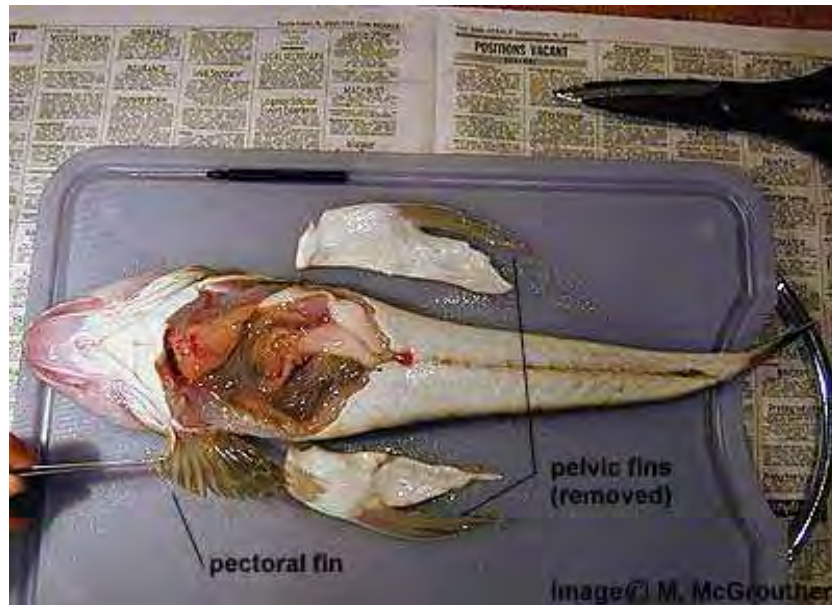
- Make a small incision (cut) at the anus with a scalpel. Use the scalpel or scissors to extend the cut towards the head.
- The image shows the fish after the first incision.



**Figure 5. The lower surface of Flathead showing the first cut of the dissection**

## 5. Internal examination - the body cavity

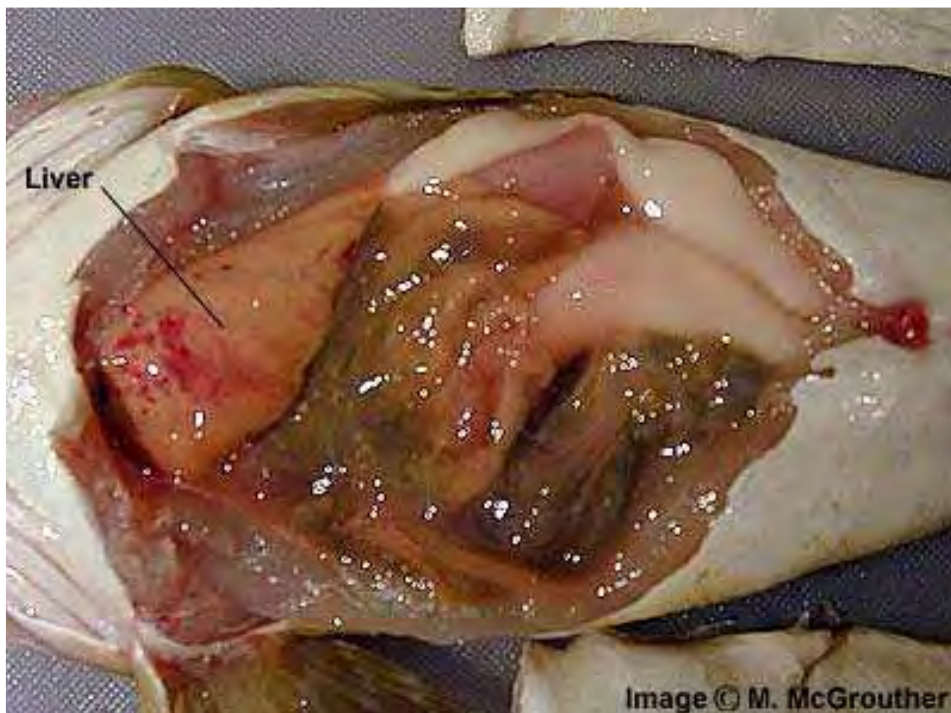
- Once you have opened the body cavity, draw the parts you can see.
- Add labels if you can identify the internal organs (parts).



**Figure 6. The body cavity of a Flathead showing the internal organs**

## 6. Internal examination - the liver

- What does the **liver** do? \_\_\_\_\_
- Label the liver on your diagram.
- Remove the liver using the forceps and scalpel.



**Figure 7. Internal organs, the liver (The liver of the Flathead is the orange organ at the head-end of the body cavity)**

## **7. Internal examination - blood in fishes**

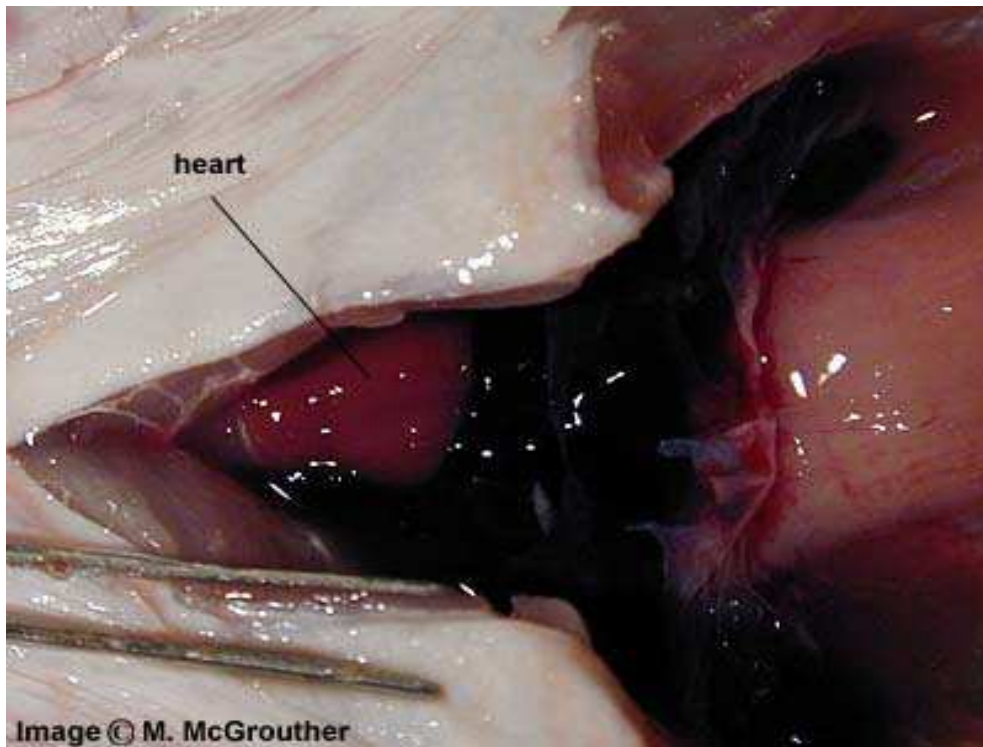
- The dark red areas on the left are rich in blood.
- Most of the other organs visible are used for digesting the fish's food or for reproduction



**Figure 8. Liver removed, heart exposed (Some of the internal organs of the Flathead. The dark red areas on the left are rich in blood. Most of the other organs visible are used for digesting the fish's food or for reproduction)**

## **8. Internal examination - the heart**

- The **heart** is positioned closer to the head than the digestive organs.



**Figure 9. The heart of a Flathead**

## 9. Internal examination - the gonads and kidneys

- The two long pale organs are the **testes**. The fish in the picture is a male. Is your fish **female** or **male**? \_\_\_\_\_
- The deep red strips of tissue either side of the backbone are the **kidneys**.



**Figure 10. Gonads (The gonads and kidneys of a Flathead. The gonads (testes) are the large, pale organs and the kidneys are the red tissue either side of the backbone)**

## 10. Internal examination completed

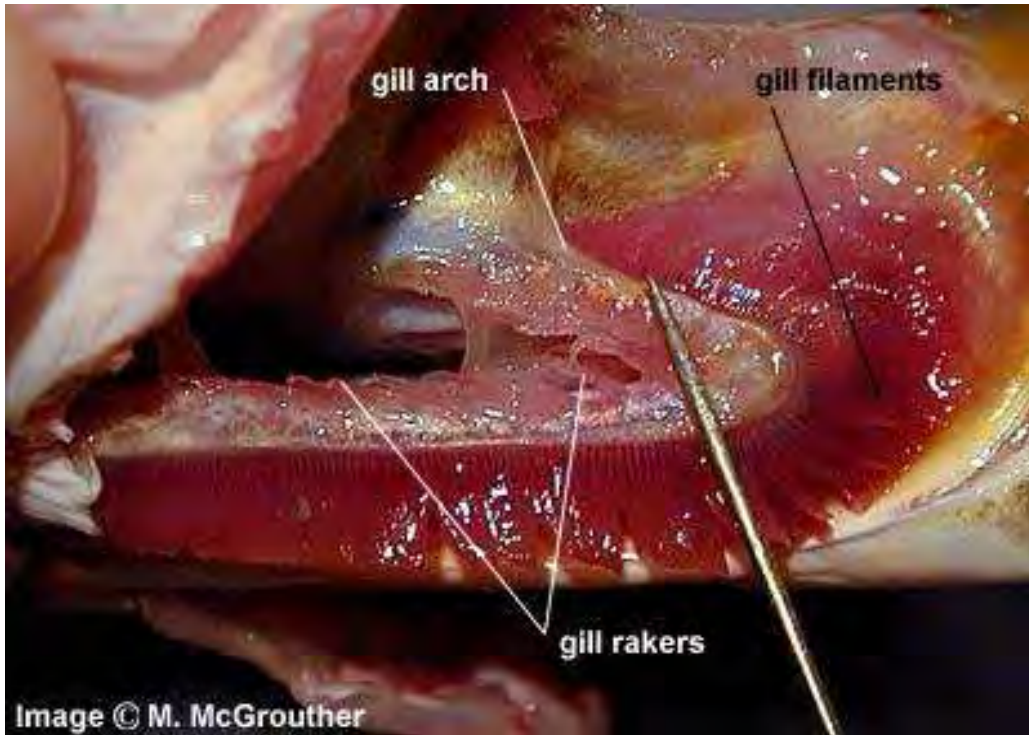
- You have now finished the examination of the internal organs.
- Continue to the examination of the **gills** and **mouth**.



**Figure 11. Completed dissection (The dissection of the Flathead's body cavity is now finished)**

## 11. The gills

The gills of a fish are usually made up of **filaments**, **arches** and **rakers**.



**Figure 12. Gills (The gills of a fish are usually made up of filaments, arches and rakers)**

**- Draw your fish's gills**



- Why are the gills red in colour?

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Why do the gills have a feather like appearance

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## 12. The mouth



**Figure 13. Mouth, teeth and tongue of a Flathead**

- Draw a diagram of the mouthparts of your fish.

**Why does this fish have a tongue?**

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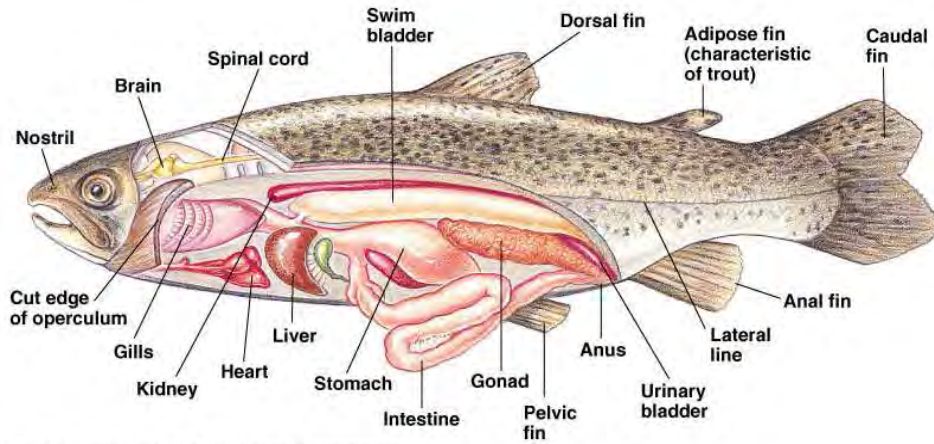
**What do you think this fish eats?**

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## Extension Questions

1. The anatomy of bony fish share many characteristics with other vertebrate. As you look at a diagram showing the internal organs of a typical bony fish. Can you identify some organs that humans also have?



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2. The respiratory system of fish differs greatly from land animals. Check out the same diagram above. What organs are unique to fish?

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3. The circulatory system of all bony fish, share characteristics common to many other animals. Some characteristics are unique. Do they have closed or open system?

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4. What is the difference between the heart of a fish and human?

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5. Which organ controls the buoyancy of fish and how does it work? How does this organ differ between fish living near the surface and fish living at the bottom?

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6. What is the name of the part of the body that fish use to detect water movement and vibration?

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