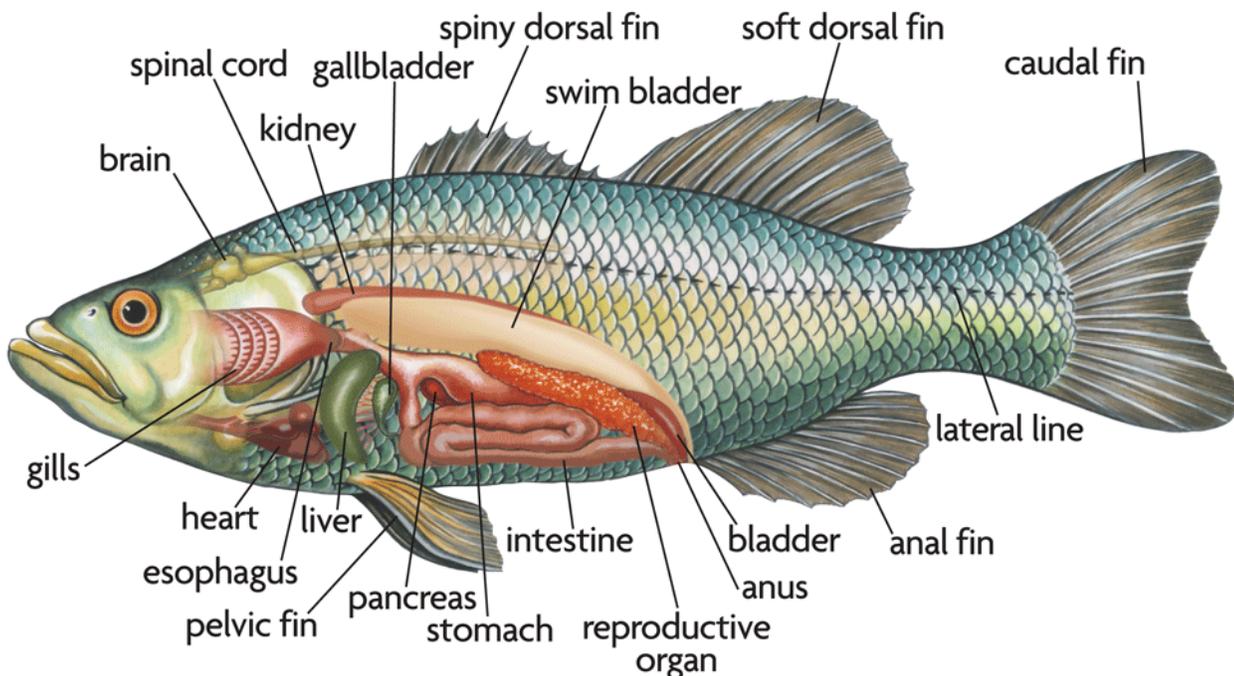
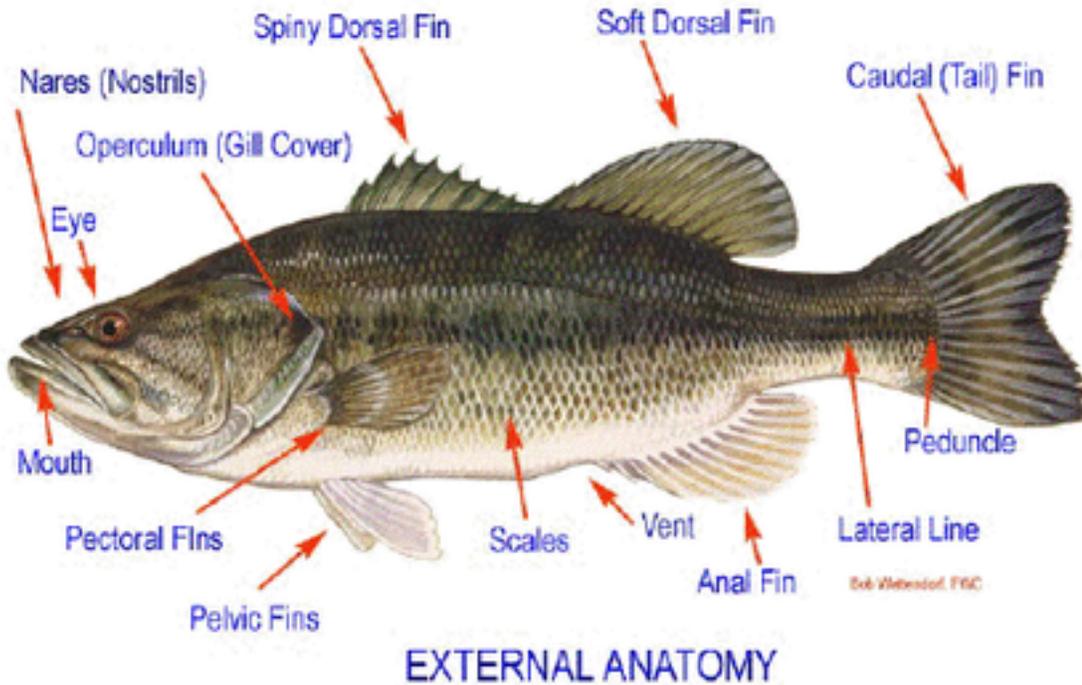


Fish Dissection

Name: _____ Pd. _____

Objective:

- *Describe the appearance of various organs found in the fish.
- *Name, locate and identify the organs that make up systems of the fish.
- *compare and contrast the fish anatomy to other dissections and our human anatomy.



Materials:

Safety goggles Dissecting tray Dissecting pins Gloves Forceps apron
Dissecting scissors Probe Hand lens Preserved perch Paper towel.

Background:

Vertebrate classification: **Kingdom-** Animalia

Phylum- Chordata

Subphylum- Vertebrata

****Classes:** Agnatha- Jawless fish; lamprey, hagfish

Chondrichthyes- Cartilage fish; Sharks and Rays

Osteichthyes- Bony fish; salmon, catfish, goldfish, walleye, perch, grouper

Ray-finned fish are built for swimming. Instead of legs, they have fan-like parts called **Fins**. Fish also have bony skulls to protect their brains. They have **Vertebra** which protects the nerve cord running through them and they have strong muscles attached to their bones so they can swim well. Bony fish have a **swim bladder** filled with air, which keeps them from sinking to the bottom. Many fish have **scales**, hard plates which are part of the skin. Fish have **Gills** that allow them to breathe underwater. The **operculum**, a bony flap, covers and protects the gills. All fish are **ectothermic** (ectotherms) so the inside temperature of their bodies is the same as the temperature of the water around them.

There is oxygen in tiny bubbles throughout the water in the ocean. Fish take in this oxygen-filled water through their mouths. The water passes over the gills. In the gills is blood, full of tiny carbon dioxide bubbles. Because the gills are so thin, the oxygen can go into the blood and the carbon dioxide goes out into the water. Then the water passes out of the body of the fish.

Fish reproduce sexually by a process called **spawning**. The females have soft eggs that she will lay in the water usually around rocks, sand or plants. The male swims over them and fertilizes them with a fluid called **milt**. Then the eggs are left to hatch on their own. Because this is external fertilization, many eggs do not hatch or are eaten by predators. Yet some do survive so more fish can be born and the species can live.

- A. Fish Phylum _____ **Chordata** _____
- B. Cartilage Fish class _____ **Chondrichthyes** _____
- C. Bony Fish class _____ **Osteichthyes** _____
- D. Jawless Fish class _____ **Agnatha** _____

External Dissection:

1. Feel the fish's skin. Why do fish have mucus?

2. Use a magnifying glass to see how the scales are arranged. Why do fish have **scales**?

3. Look at the color pattern. What is the advantage of a fish being dark on the dorsal side and light on the ventral side? _____

4. Observe the **lateral line**. What is it used for? _____

-
5. How does the lateral line work? _____
 6. Observe the shape of the fish. How is this an advantage? _____
 7. Observe the **eye**. Note the relative large size and large pupil. Hypothesize why this is important for the vision of this animal? _____
 8. Is there an eyelid? _____
 9. Locate the **nostrils**. Describe the location and the number of nostrils. _____

 10. Carefully insert a probe into one of the nostrils. Does the probe enter the mouth cavity? _____
Why? _____
 11. Feel the teeth along the gum margins and on the roof of the **mouth**. What are the **teeth** used for? _____
 12. Determine the probable use of the tongue. Does the **tongue** feel like a human tongue? _____
 13. See how wide the mouth can open. Why is it able to open so wide? _____

 14. The mouth is also used for breathing. In low oxygen conditions, fish can actively pump water over their gills by opening and closing their mouth. The gill arches can be seen by looking down the fish's mouth and gently lifting up the operculum. Use a probe to separate the arches and explore how they are arranged. How many **arches** are there? _____
 15. Place the fish on its side and look at the operculum, the bony plates which protect the gills. Lift the **operculum** and look at the gills. Now cut the operculum away at its base, exposing the **gills**.
 16. Remove one of the gills by cutting the upper and lower attachments of the arch. Look at the gill rakers, the bony projections along the inside curve of the arches. Observe the large surface area provided by the gill filaments, and the thin tissue which allows blood vessels to come into contact with the oxygen in the water. Compare and contrast gills and lungs.

Gills

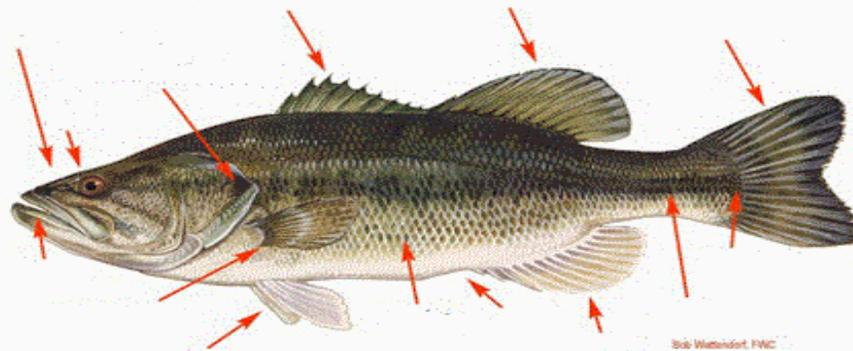
Both

Lungs

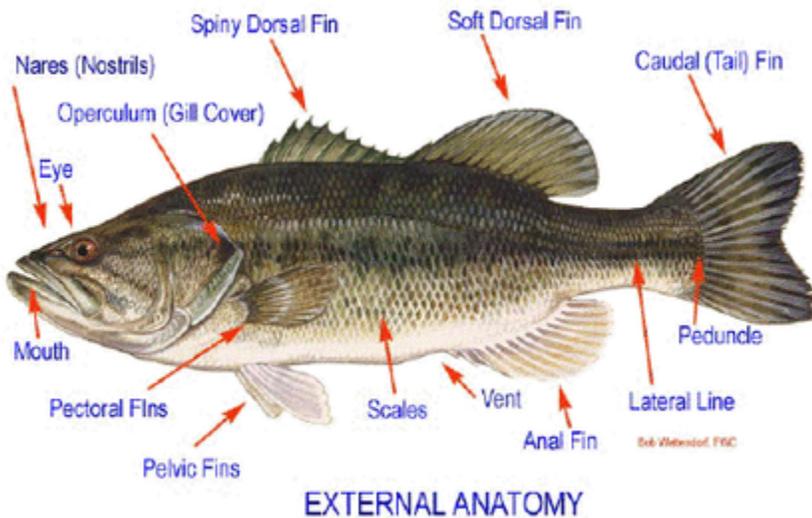


<u>Organ</u>	<u>Function</u>	<u>System</u>
1. Scales	Protects skin	skeletal
2. Anterior dorsal fin	protection	skeletal
3. Nostril	smelling	nervous
4. Lateral line	Pressure equalization and senses vibrations in water around them	nervous
5. Pectoral fin	Steering and movement	skeletal
6. Anal fin	steering	skeletal
7. Pelvic fin	Steering and movement	skeletal
8. eye	vision	nervous
9. operculum	Gill covering that protects gills	skeletal
10. mouth	Opening for food	digestive
11. Posterior dorsal fin	protection	skeletal
12. Caudal fin	Steering movement	skeletal
13. anus	Opening to remove waste	excretory

Label the diagram and color the nervous system blue and skeletal system purple.



External Anatomy



EXTERNAL ANATOMY

Internal Dissection:

1. What is an **ectotherm**? _____
2. Carefully cut the fish by inserting the dissecting scissors into the anus and open to the bottom of the mandible (jaw). Be careful not to cut into the fish's internal organs. Cut away the flap of skin and look for fat deposits (orange and greasy looking), which are found around the stomach. Why is it important for fish to have **fat**? _____

3. Locate the **swim bladder**. It is made of very thin tissue and is located in the upper body cavity, below the kidneys. What is its function? _____

4. Locate the male **reproductive organs** (testis) they will be flaccid white or orange tissue near the intestines. If you have a female, locate the ovaries. Eggs may or may not be noticeable in females. Both will vary in size depending on the maturity of the fish. Is your fish a male or female? _____
Why do fish produce so many eggs? _____

5. Put the fish on its dorsal side and find the **kidneys** located just under the backbone. They are thin, dark in color and run the whole length of the body cavity. What is their function? _____

6. Put the probe through the mouth and into the **esophagus** to show the beginning of the route. Why is the esophagus so elastic and stretchy? _____

7. Locate your fish's stomach. Does the **stomach** have any food in it? _____
If so, what is it? _____

Make a small incision and observe the prey. The first area of the stomach is called the cardiac stomach; this is where digestion begins. Note the different kinds of tissue that make up the stomach. The pyloric stomach is that portion from which the pyloric caeca project. It begins at the bend below the cardiac stomach, and is made of different tissue. The stomach area is increased by the pyloric caeca. How does this improve the function of the stomach? _____

8. The intestines provide the last chance to extract nutrients from food. Why is the **intestine** so long? _____
Measure your fish's intestine in centimeters. How long is it? _____

Notice the network of blood vessels which are used for nutrient exchange. Follow the intestine to the anal opening where waste products are eliminated.

9. The **spleen** will be seen by lifting the stomach. It is a reddish organ found at the end of the cardiac stomach. What does it do? _____

10. The **liver** is just in front of the stomach. The liver produces bile which is stored in the gallbladder. What does bile digest? _____. The **gallbladder** is a mass of darker tissue on the liver.

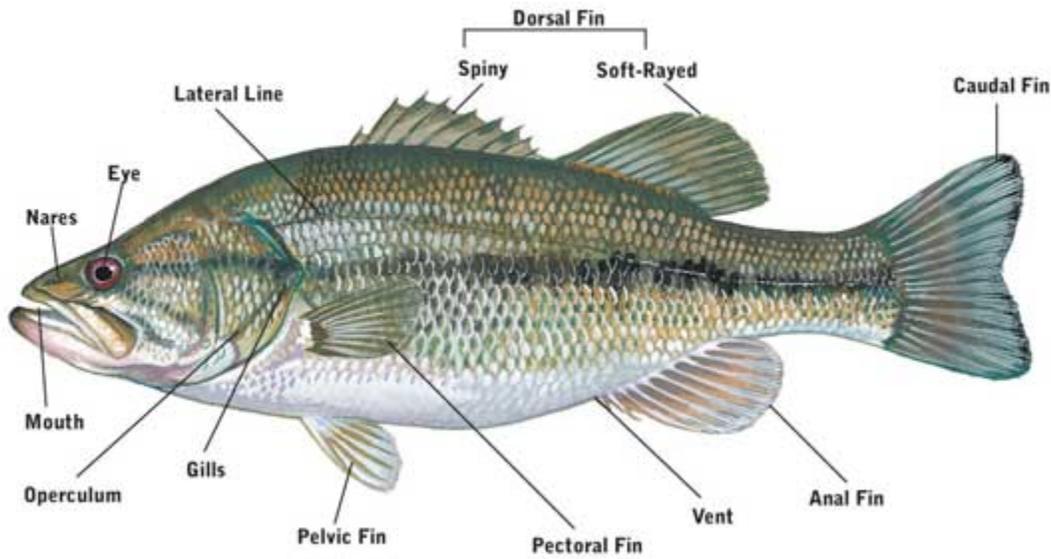
11. A fish's **heart** is between the gills. Identify the atrium and ventricle. How many chambers does a fish heart have? _____

The fact that the gills, heart, and liver are so close together is no coincidence. Blood pressure is best near the pump (heart). Blood is filtered by the liver and absorbs oxygen from the gills; both are vital functions.

12. Cut through the fish to expose the backbone and muscles. Observe arrangement of the muscle masses. (This is the part of the fish we would eat).
13. Observe the growth rings on the **scales**. Remove some of the scales so you can look at the rings with your hand lens. How old do you think your fish might be? _____
14. Explain why the fish has an inefficient heart? _____
15. Dissect the **brain**, look for the different lobes.
16. Dissect the **eye** and take the lens out.

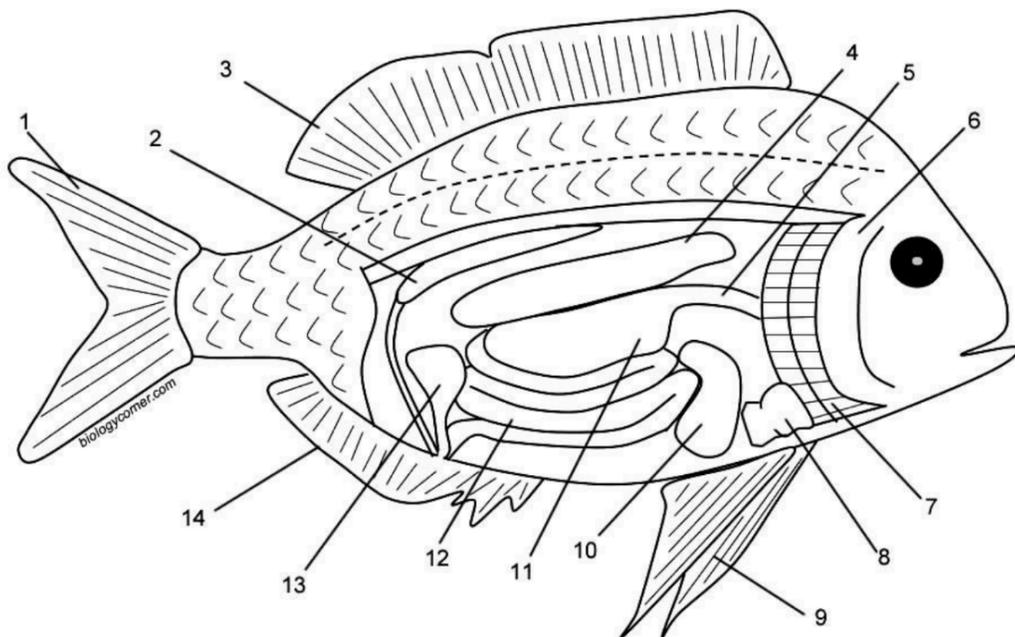
<u>Organ</u>	<u>Function</u>	<u>System</u>
1. Heart	Pumps blood	circulatory
2. kidney	Filters the blood and removes waste	excretory
3. Swim bladder	Allows fish to float at different depths	nervous
4. anus	Opening to remove waste	excretory
5. gonads	Sex organs help produce offspring	reproductive
6. liver	Makes bile that aids in digestion	digestive
7. brain	Controls body activity	nervous
8. ventricle	Pumps blood to gills	circulatory
9. gills	Breathing- oxygen and carbon dioxide exchange	respiratory
10. stomach	Breaks down food	digestive
11. intestine	Breaks down food and absorbs nutrients	digestive
12. Gall bladder	Stores bile	digestive
13. atrium	2 chambers top of heart that pump blood to ventricle	circulatory

14. Spinal cord	Sends and receives messages	nervous
15. vertebrae	Protects spinal cord	skeletal



Label the internal organs and color these systems:

Red-circulatory Blue-Nervous Yellow-Reproductive Green-Digestive
 Pink-Respiratory Brown-Excretory Purple-skeletal



1. Caudal fin 6. Operculum 11. Stomach

- | | | |
|-------------------|-----------------|-----------------|
| 2. __Kidney | 7.___Gills | 12.___Intestine |
| 3. __Dorsal fin | 8.___Heart | 13.___Bladder |
| 4. __Swim bladder | 9.___Pelvic fin | 14.___Anal Fin |
| 5. __Esophagus | 10__Liver | |

