



Water

METHYLMERCURY IN AQUATIC FOOD WEBS – ANSWER KEY FOR TEACHERS

Mercury is a silvery metal (like aluminium) that is in a liquid form (like silvery water) at room temperature. If you drop mercury onto a table it will stay in the shape of a ball rather than becoming flat like water. Mercury can some times be seen inside a thermometer. Mercury is a toxin which slowly evaporates. If you spill mercury or keep it somewhere loose (out of a thermometer) it can contaminate the air you breathe. If you throw a mercury thermometer into the garbage, it will end up in our landfills (garbage dumps) where the mercury can escape and end up in the soil or water.

In the lakes and rivers, bacteria change mercury to a more poisonous form called methylmercury. Methylmercury will work its way up the food chain into fish. Once in the food chain the levels of a toxin like methylmercury keep collecting in greater and greater amounts.

Children are more sensitive to mercury poisoning than adults and more likely to be seriously affected from exposure to mercury vapour, (the gas produced from evaporated mercury). Mercury poisoning can affect the brain, spinal cord, kidneys and liver.

More recently, people have become aware of the problems with using mercury and in many cases alternative technologies have been developed. Also, people are making sure to properly dispose of mercury and mercury related products.



Let's say for example that each piece of plant material has one microscopic drop of methylmercury...

- 1)** If one insect needs 25 pieces of plant material to live, how many drops of methylmercury will end up in its body? (Show Work!)

1 insect x 25 pieces of plant = 25 drops of methylmercury

- 2)** If one small fish needs 10 insects to live, how many drops of methylmercury will end up in its body? (Show Work!)

**10 insects x 25 pieces of plant = 250 drops of methylmercury
then... 1 small fish x 250 drops of methylmercury = 250 drops of methylmercury**

- 3)** If a larger fish needs 5 small fish to live, how many drops of methylmercury will end up in its body? (Show Work!)

1 large fish = 1,250 drops of methylmercury

- 4)** If we (humans) eat 1 big fish—3 days in a row—how many drops of methylmercury will end up in our body? (Show Work!)

1,250 x 3 days = 3,750 drops of methylmercury

- 5)** We know that methylmercury makes living things sick. The more methylmercury in the living organism, the more sick it would get. Which organism (from #1-4) would be the most affected by the chemical?

The human

- 6)** This scenario demonstrates something called "BIOMAGNIFICATION". In your own words, what do you think Biomagnification means?



Fish Dissection and Tissue Sampling

Introduction:

In this lab students will work within a group to learn from the dissection of a native fish species. Dissection gives the student the opportunity to observe the location of organs and their relationships to one another. Before beginning the lab each student must perform **pre-lab research** to familiarize themselves with the fish. Pictures and diagrams will aid in the completion of this lab dissection. Be thorough and do not rush through the lab. Read all directions carefully.

Materials:

- Fish specimen
- Hand lens
- Dissecting tray
- Dissecting probe and scissors
- Pre-lab pictures & diagrams

Procedure:

A. External Anatomy:

1. Place the fish specimen on the table. Locate the head region. Examine the eyes and nares (nostrils).
2. Are there any eyelids present? _____.
3. Are there any deformities? _____.
4. Think about the placement of these structures. Are they towards the top of the specimens head or along the side? Why would that be important?



Label the eye on the external view (Figure 1) of the fish.

5. Examine the two flaps located on either side of the head.

6. What is the name of these flaps? _____

7. What is their function? _____

8. Label the flaps on the external view (**Figure 1**) of the fish.

9. Examine the 5 types of fins. In each box below, draw the appropriate fin type.

Dorsal	Caudal	Anal
Pelvic	Pectoral	

10. Label each fin on the external view (Figure 1) of the fish.

11. How many fins?

Caudal ____ Dorsal ____ Anal ____ Pelvic ____ Pectoral ____



12. Each fin has a specific function, what is the purpose of the caudal (tail) fin?
13. Locate the lateral line (vibration sensor). Using the hand lens, look at the line and the surrounding area.
14. Draw the lateral line in the space below (if located on specimen).
15. Label the lateral line on the external view (Figure 1) of the fish.

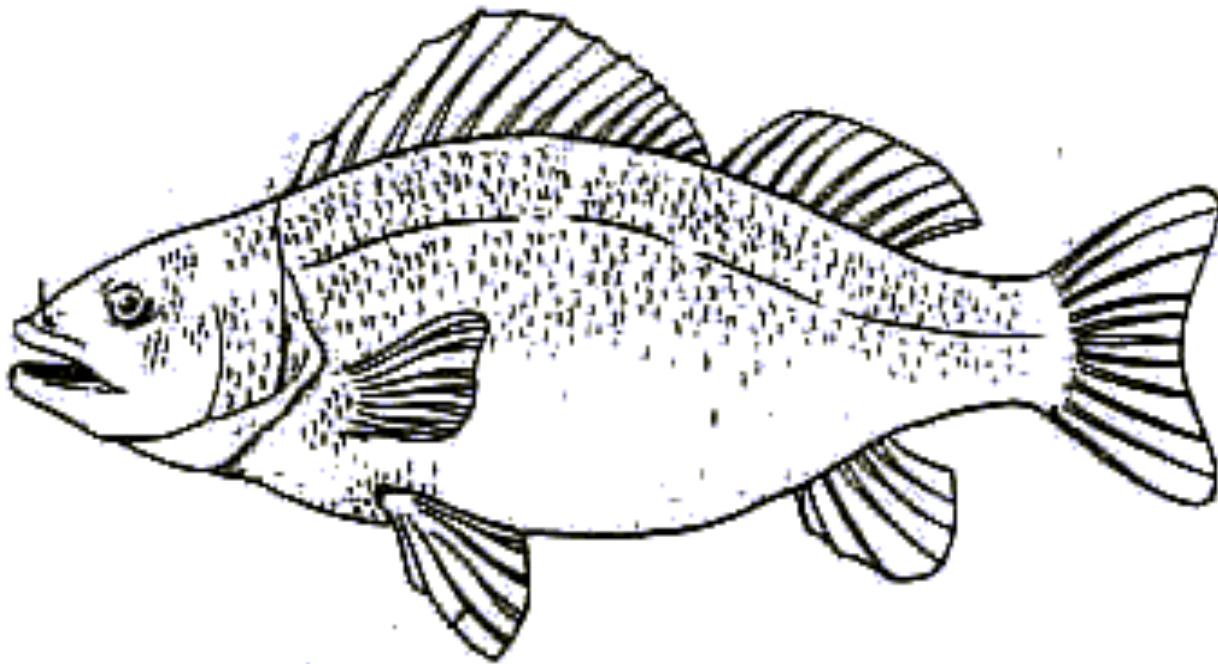


Figure 1.



B. Internal Anatomy: Gill

16. Using your thumb, lift up the edge of the operculum and raise it up as far as possible. Use your scissors to cut the operculum off as close to the eye as possible. This will expose the gills. The gills are layered one on top of another. Use your probe to carefully lift each of these layers.

17. How many layers do you find? _____

18. Use your scissors and remove one of the gill layers. Examine the feathery structure.

19. Draw the gill structure in the space below.

20. To expose the internal organs you will cut away part of its muscular wall. Grasp the fish, holding it with your thumb on one side and fingers on the other. Turn your hand upward to expose the ventral surface. Use your scissors and insert the point into the skin just in front of the anus. Cut forward to the gills. Be careful not to destroy any of the internal organs, as they are concentrated in this area. Place your thumb into the open cut area and lift up, separating the bottom from the top. Use your scissors to cut upward near the anus and the operculum to form a flap of skin and muscle. Finish cutting along the lateral line and remove the flap of tissue.



Figure 2.



21. The fish contains a 2 chambered heart. Locate this organ found just behind and below the gills.
22. Locate the tube-like digestive system. Begin just behind the mouth in the area called the pharynx. This leads into the gullet or the opening of the esophagus. This area is very elastic and can stretch when the fish is alive.
23. The esophagus leads into the stomach. Cut out the stomach and split it open.
24. Locate the swim bladder (if present). It is located near the spine towards the top of the internal cavity.
25. What is the function of the swim bladder? _____
26. Locate the dorsal fin. Use scissors to cut away the spines or rays and remove the fin.
27. Cut a piece of muscle tissue roughly 2"x3" for your mercury sample.
28. Place muscle tissue sample in labeled vial. Be sure everything is properly labeled.

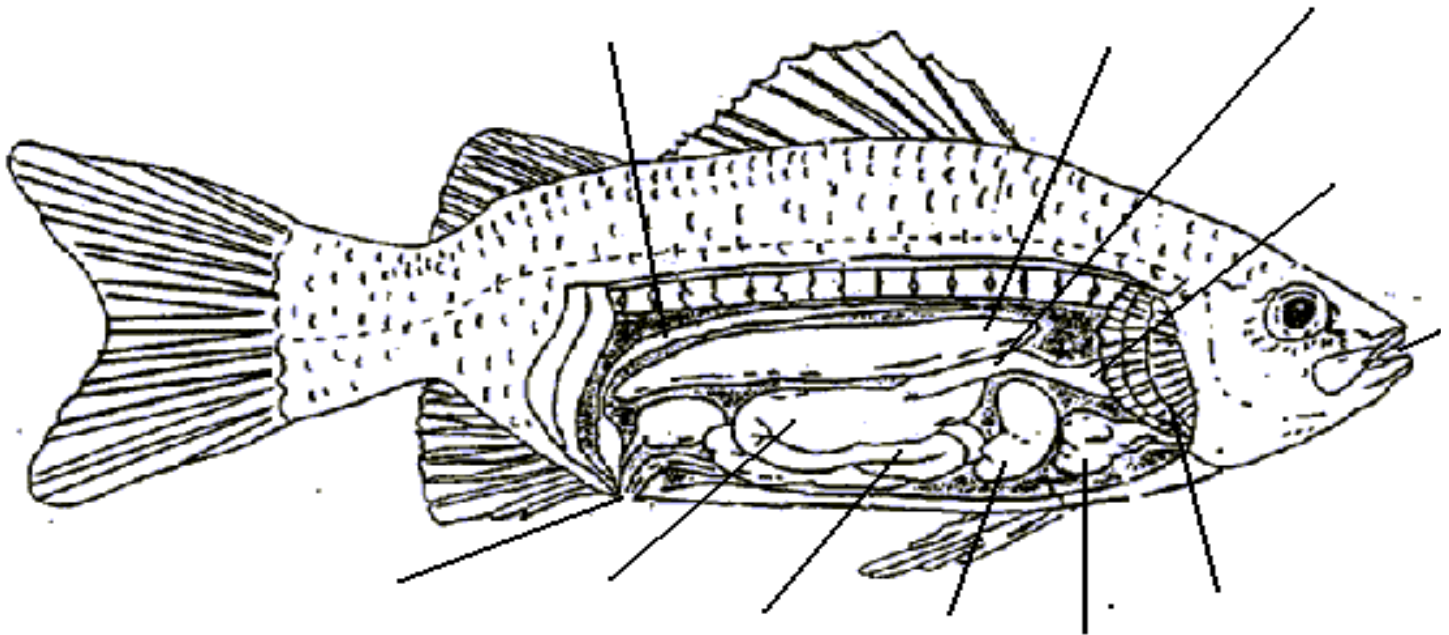


Figure 3. Internal View of Specimen