

INTRODUCTION:

Kingdom: Animalia

Phylum: Chordata

Class: Osteichthyes

Fish come in almost every size and shape imaginable. They vary from the 10-mm long Philippine goby to records of Russian sturgeon over 28 feet long and weighing

3,000 pounds. Obviously, dissecting only one fish will not tell us much about the great many different kinds, but the perch does portray the basic characteristics and structures that are found in most bony fish. Its dissection will introduce us to these characteristics and structures.

The first major group of vertebrates to evolve were fish. Fish are confined to living in water. They possess gills for respiration, fins and tails for swimming, and scales to protect their bodies. Fish also have a unique sensory system enabling them to detect changes in pressure and water currents. A perch is a fresh water fish that is ideal for anatomical studies. It represents the typical body structure of fish.

Fish are coldblooded aquatic vertebrates whose streamlined bodies aid in swimming. They have hearts with only two chambers. The skeleton of some fish, such as sharks, is made of cartilage. This is the same tough material that gives shape to the human nose and ears. In more advanced types of fish, the skeleton is made of bone. Bony fish are covered with scales, which help water flow smoothly over their bodies. In this lab, you will dissect a bony fish.

Fishes of the class Osteichthyes have bony skeletons. Bony fishes can be divided into the ray-finned fishes, the lobe-finned fishes, and the lungfishes. The perch, a typical ray-finned fish, has fins with spiny rays of cartilage and bone. Fins enable the perch to move quickly through water without rolling. The streamlined shape of the perch is also an adaptation for movement in an aquatic environment.

All ray-finned fishes have a swim bladder. In the perch, the swim bladder gives the fish buoyancy and regulates the concentration of gases in the fish's blood. The perch also possesses powerful jaws and strong teeth for catching and eating prey.

Tell what is meant by "Fish are coldblooded..." _____

"...aquatic..." _____ "...vertebrates..." _____

Tell what the skeleton of a shark is made of: _____ Name two places in the human body this material is found. _____, _____

Name the class that includes the bony fishes: _____

Name the phylum to which the fish belong: _____

Name the three types of bony fishes: _____, _____, _____

Put a star by the group above that includes the perch.

Tell what fins do for a fish: _____

Name the two things a swim bladder does: _____ and _____

The yellow perch (*Perca flavescens*) is a very common freshwater fish which can be considered a typical example of the higher bony fishes (Class-Osteichthyes). Members of this class are the true fishes so common in our lakes, streams, and oceans. They possess bony skeletons and their gills are covered with a thin bony cover, the operculum. Their bodies are covered by large overlapping scales arranged like the shingles on a house. These fish are highly successful and are found in practically all bodies of fresh and salt water. They show great diversification in form and habitat.

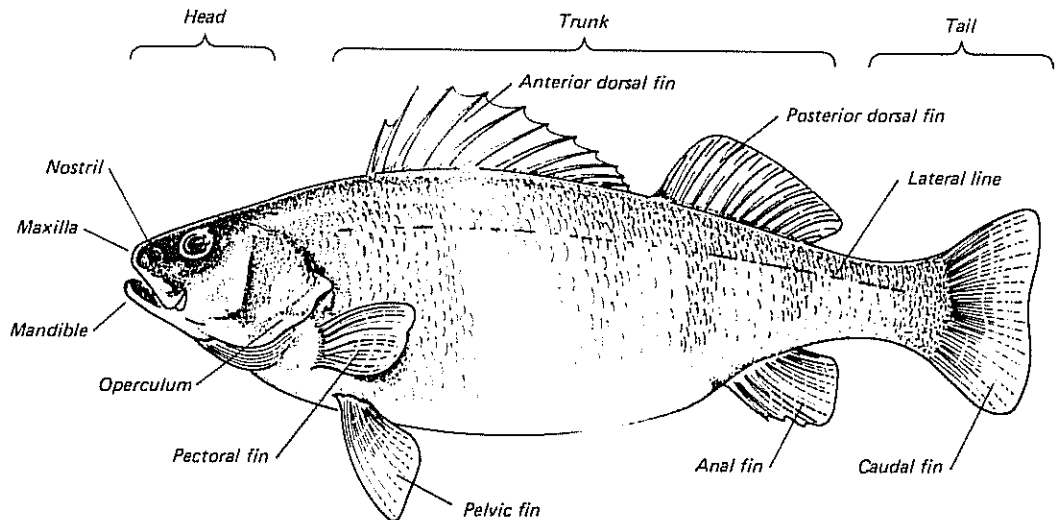
Give the common name of the perch: _____, the scientific name: _____

PROCEDURE

Obtain a perch. If you have a preserved specimen, rinse the fish in water. Place the fish in the dissecting pan on a layer of newsprint.

External Anatomy

The main body regions of the perch are the head, trunk, and tail (caudal fin). The head extends from the tip of the snout to the hind edge of the operculum, the trunk from this point to the anus, and the remainder is the tail.



Examine the head and observe the large mouth which has distinct upper and lower jaws. The upper jaw is the maxilla and the lower jaw is the mandible. Dorsally on the snout are two, double, external nares (nostrils) which are the openings to the olfactory sacs. These sacs are highly sensitive to dissolved chemicals in the water. There is no external ear, but each internal ear contains semicircular canals, which are balancing organs that enable the fish to maintain the proper position in the water. The lateral eyes are without lids. Behind each eye is the bony operculum which provides a protective covering for the four comb-like respiratory gills.

The entire body of the fish is covered by a soft mucus-producing epidermis that facilitates easy movement of the fish in water and is a protection against entry of disease organisms.

How is each of the following characteristics an adaptation for living in water?

--General body shape: _____

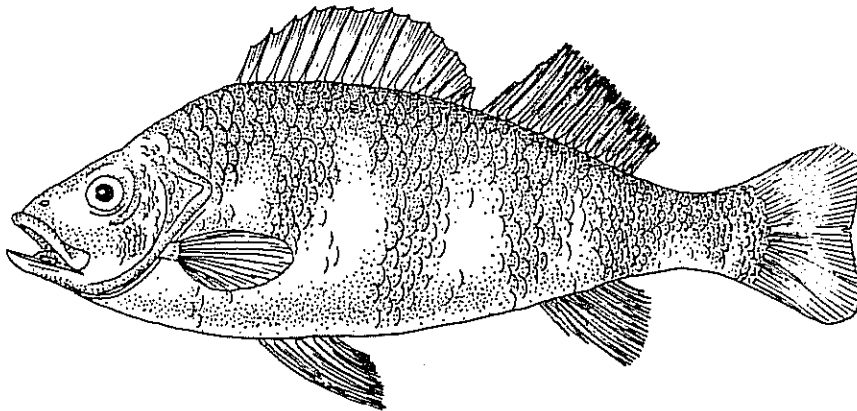
--Overlapping scales: _____

--Secretion of mucous by the skin: _____

Tell what nares are: _____

Tell what happens in olfactory sacs: _____

Locate the three body regions on the diagram below. Label the head, trunk, and tail



Open the mouth of the perch to observe the well-developed bony jaws. Label the maxilla, or upper jaw, and the mandible, or lower jaw, on the diagram above.

Are both jaws equally movable? _____ Explain your answer. _____

How does the shape of the mouth relate to the feeding habits of the fish? _____

For further study the mouth of the fish it may be necessary to slit the corners of the mouth first.

Describe the teeth of the perch. _____

Explain how the teeth are adapted to their function. _____

Describe the size of the tongue and its point of attachment. _____

Place your index finger into the mouth cavity, and observe the size, firmness, and position of the teeth. Examine the tongue, observing its size and attachment point in the mouth. Open the mouth wider, and insert a probe into the pharynx. Probe deeper until the probe reaches the gill chamber.

Locate the nostrils, and label these structures on the figure above. Insert the probe into one of the nostrils to determine where the passageway leads.

Do they open to the mouth cavity? _____

How is the nostril function more limited than that in mammals? _____

Observe the position and features of the eye. Label the eye on the diagram above.

Find the operculum, and label it on the diagram above. Lift the operculum with the probe, and examine the several large, flat, scalelike bones supporting the operculum.

Tag the following: maxilla, mandible, nares, operculum

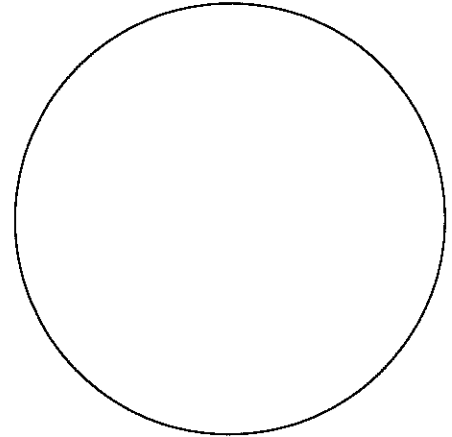
Completed _____

Use scissors to cut away the operculum. Examine the gills and identify the gill slits, or spaces between the gills.

Carefully cut away one gill. Place the gill in a watch glass. Examine the gill under a stereomicroscope. Observe the gill arch, a cartilage support, and the soft gill filaments that make up each gill. Sketch and label the gill parts in Figure to the right.

Completed _____

Magnification _____



The projections on the gill arch, called gill rakers, should be visible. What function do they serve?

When a fish is stationary in the water, it appears to constantly gulp water. What is actually happening?

Examine the gill remaining on the specimen. Try to locate the gill rakers on the inner margin of the gill. Each gill is filled with many capillaries carrying blood from the heart. The gills are the site of gas exchange.

How does each of the following make gas exchange more efficient?

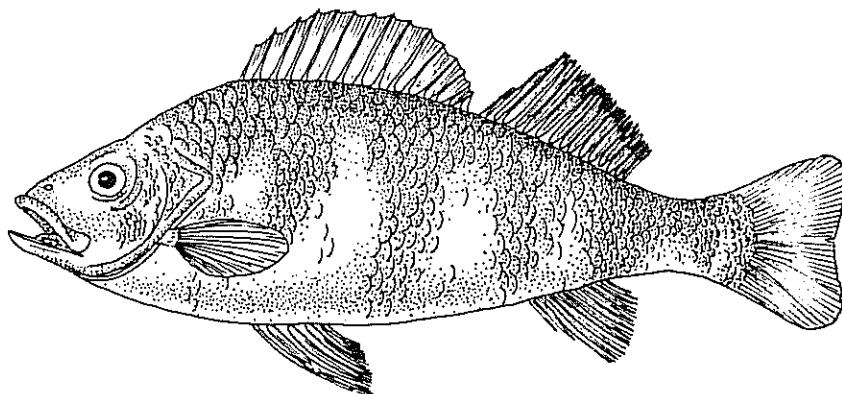
Large number of capillaries: _____

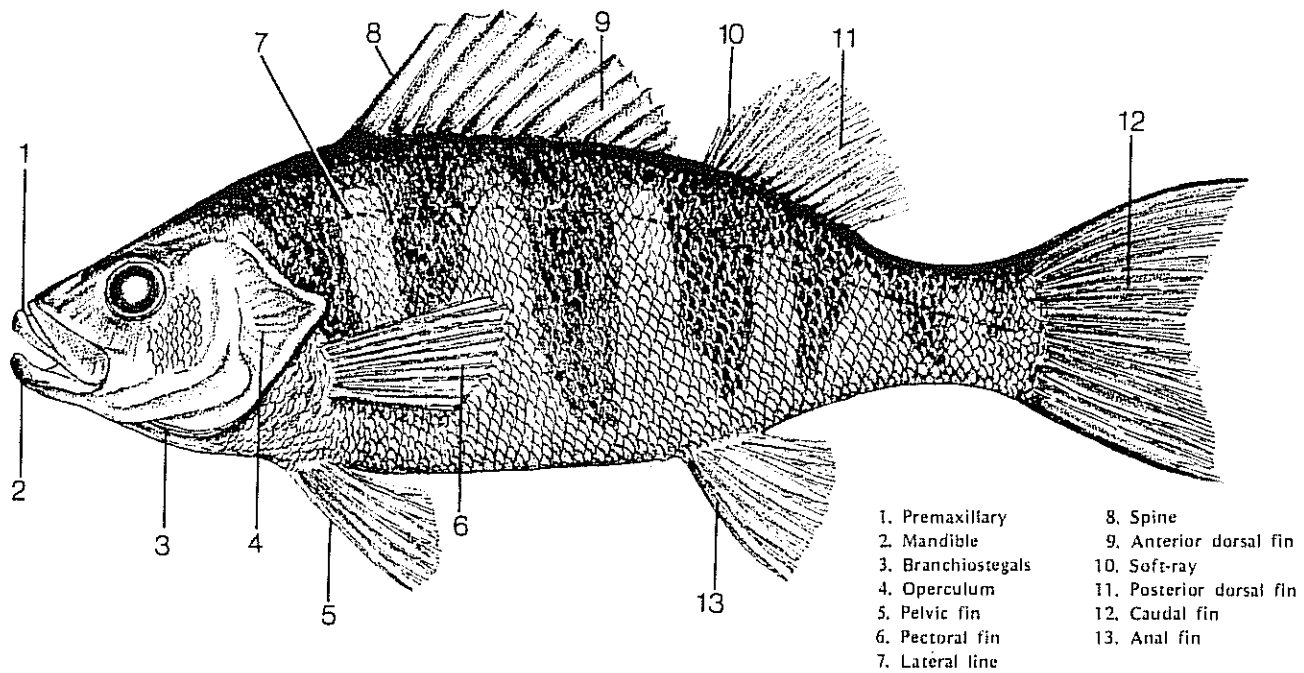
Thin, feathery structure of the gills: _____

The spaces between the gills are called gill slits or gill clefts. Attached to the lower edge of the operculum is the branchiostegal membrane supported by rays of cartilage. This membrane serves as a one-way valve which allows water to pass out the opercular opening but prevents its return.

Along the side of the fish's body, from the operculum to the tail, is a light line called the lateral line. This line is composed of a series of small pores which are connected by a canal. Water enters this canal in such a way that change in water pressure, or movement in the water, stimulates nerves in the canal. Its function, then, is one of a sense of touch for the fish. The system therefore functions as a sensitive "listening" device to detect water turbulence and to discriminate between different kinds of turbulence.

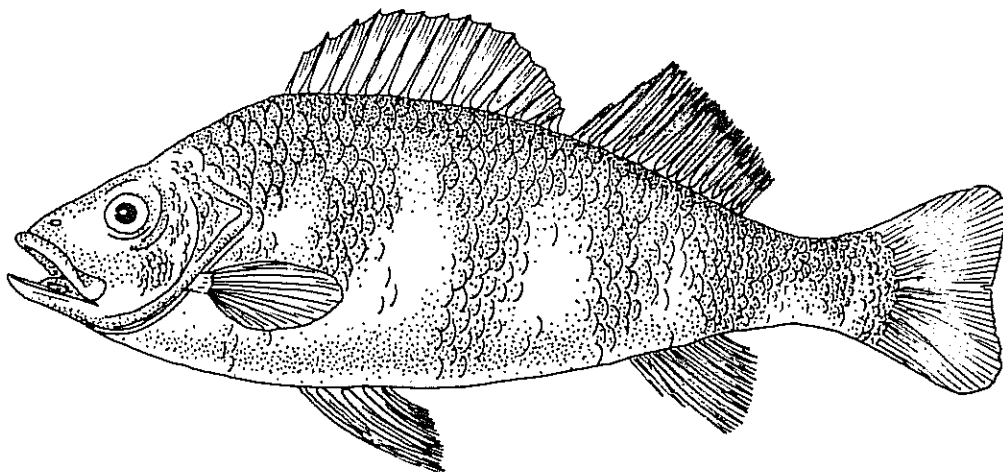
Sketch in and label the lateral line on the drawing below.





On the back of the perch are two separate dorsal fins; on the end of the tail is a caudal fin, and ventrally on the tail is the anal fin. Just anterior to the anal fin is the anus and the urogenital opening. The lateral or paired fins are the pectoral fins behind the opercula, and the ventral or pelvic fins are just below these. The fins are membranous extensions of the integument supported by fin rays. All of the fins except the first dorsal fin are flexible, being supported by soft rays. The first dorsal fin has 13 to 15 solid calcified spines, and there are one or two similar rigid spines in the anterior edge of the other fins. The fins are used in swimming, steering, and maintenance of equilibrium.

Observe the different fins on the perch. Find the pectoral, dorsal, pelvic, anal, and caudal fins, and label them on the figure below. Also note the spines on some of the fins.



Complete the table below by supplying the information relating to each of the fins:

Name of fin	Number	Location	Function

Locate the anus on the perch. The anus is anterior to the anal fin. In the female, the anus is in front of the genital pore, and the urinary pore is located behind the genital pore. The male has only one pore behind the anus, the urogenital pore.

Tag each of the following: lateral line, anterior dorsal fin, posterior dorsal fin, caudal fin, anal fin, pelvic fin, pectoral fin, anus.

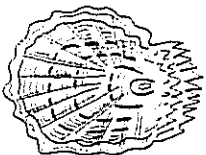
Completed _____

Which of the fins is the largest? _____

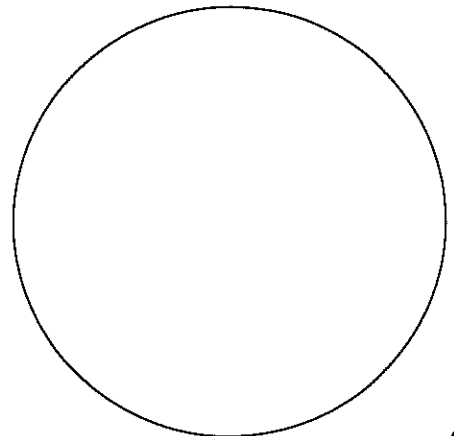
In each of the boxes below, draw one of the fish's six types of fin. Draw the anterior dorsal fin in box 1 and proceed clockwise around the fish. Label each fin.

Which of the fins are paired (identical fins on each side of the body)? _____

Using the hand lens, examine the arrangement of the scales on the trunk and tail of your specimen. With the forceps, carefully remove a scale and prepare a wet mount slide. Examine the wet mount of the scale under the low power of the compound microscope. In the space to the right, draw the scale. Determine the age of the fish by counting the closely spaced growth rings on the scale, each of which equals one year.



Magnification _____



Completed _____