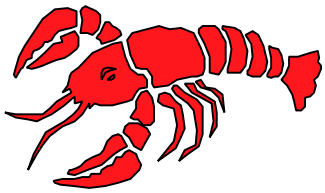


Welcome to Seafood Surgery!

This “Seafood Surgery” activity was developed for the **Science Connections** program at the Science Museum of Virginia. **Science Connections** is a program that combines formal and informal science delivery for a unique, intensive educational experience targeted to underserved inner-city elementary students.

This activity document is formatted for use by educators in a classroom or workshop setting, but don’t miss TryScience’s terrific on-line version.

“Seafood Surgery” online at TryScience!

http://www.tryscience.org/experiments/experiments_begin.html?surgery

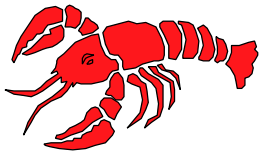
Do you have guts?
Find out — dissect a perch and crayfish online!

First, be a 'surgeon' and choose your tools,
where to cut and what to remove in each dissection.
Then test your parts smarts
with the Mix and Match Challenge."

TryScience.org brings you the excitement of contemporary science and technology through online — and offline — interactivity with science and technology centers worldwide. Science is exciting, and it's for everyone! That's why TryScience and over 400 science centers worldwide (including the Science Museum of Virginia) invite you to investigate, discover and try science yourself.

TryScience is brought to you through a partnership between IBM Corporation, the New York Hall of Science (NYHOS), the Association of Science-Technology Centers (ASTC), and science centers worldwide. You can explore other TryScience activities and adventures at www.tryscience.org.

Science Connections is made possible by generous donations from numerous businesses, foundations and individuals. We would like to acknowledge our special appreciation of Capital One for their continued, substantial support of the Science Connections program and the Science Museum of Virginia.



Seafood Surgery
A Science Connections Activity

In this activity for elementary school students, the students become “surgeons.” They examine “patients” and take a look at the patients’ “x-rays.” They scrub up, put on masks, surgical gowns and gloves, and operate on their patients: a crayfish and a perch.

Time Required: 1.5 hours

Purpose: This activity, developed for the Science Museum of Virginia’s Science Connections program, has several goals. Students will learn about physical characteristics and how scientists can use structure to classify animals. In the crayfish (an invertebrate), students will observe and describe an exoskeleton, walking legs and gills. In the perch (a vertebrate), students will observe and describe a backbone, a swim bladder and gills. This fun activity also helps the students realize that they really could become surgeons or scientists!

1995 Virginia Science SOLs: 3.4, 3.5, 4.5, 5.5

Materials:

Per Class
an extra uncut perch for viewing
dissected crayfish as a reference for students
dissected perch as a reference for students

Per Student
1 surgical gown
1 dust or surgical mask
surgical gloves
1 Seafood Surgery: Operation Crayfish Student Activity Handout
1 Seafood Surgery: Operation Perch Student Activity Handout
1 pencil

Per Group
1 preserved crayfish
1 preserved perch (precut – see teacher preparation instructions)
2 dissecting trays
1 dissecting probe, 1 pair of forceps and 1 pair of dissecting scissors
1 transparency of Crayfish Anatomy Chart
1 transparency of Perch Anatomy Chart
metric ruler and magnifying glass

Preserved crayfish and perch (packed in odorless Carosafe® or in damp-packed Caropak®) are available from:

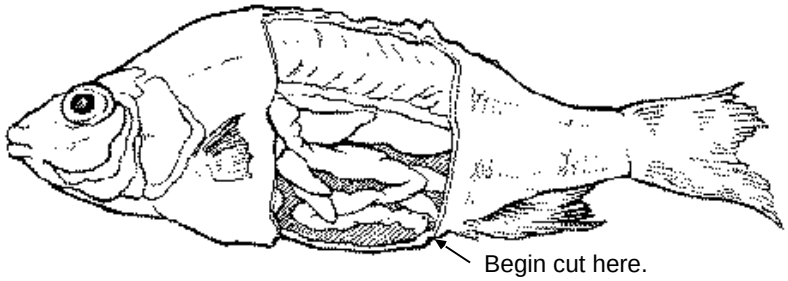
Carolina Biological Supply Company
P.O. Box 6010
Burlington, NC 272216-6010

Phone: 1-800-227-1150; or e-mail: carolina@carolina.com

Teacher Preparation:

The crayfish shell is relatively easy for the children to cut, so the preparation for this part of the activity is easy — just place one crayfish per group in a dissecting tray, along with the forceps, dissecting probe and scissors.

The perch's tough skin is much more difficult to cut. You will need to remove one side of each preserved perch so that the swim bladder of each fish is clearly visible and the backbone is easily accessible. Beginning at the posterior edge of the anal fin, remove the section of skin as indicated on the diagram below. You may want to trim the fins (dorsal fins and pectoral fin) on the student specimens as well. These spiny fins can be quite sharp for little fingers. (Be sure to keep one specimen intact so the students can examine the exterior anatomy of the perch.)



Once the skin is removed, cut away the body wall and discard it as well. Do this carefully so that you do not injure the internal organs. The swim bladder should be visible after you have finished this process. The operculum is more difficult to trim away than the crayfish shell, but most of the students should be able to manage this part of the activity. The students should also be able to probe through the soft internal organs to find the backbone after they have found and examined the swim bladder. Place each prepared perch in a dissecting tray. For this activity, the students may use the same forceps, dissecting probes and dissecting scissors that you placed in the crayfish-dissecting tray.

Finally, decorate the classroom to resemble a surgery. Place white tablecloths on the tables and put a sign up for each group that reads OR-1, OR-2, etc. You will also need to make transparencies of the anatomy charts. (The transparencies will represent X-rays in the classroom activity. If possible, bring in examples of real x-rays to show the class.)

Prerequisite Skills and Knowledge: The students will benefit more from this activity if they are familiar with the vocabulary listed below and know a little bit about how scientists categorize living organisms. A suggested introduction for introducing these new terms is also provided.

Vocabulary: Here are some great words that biologists use a lot! Doctors use some of them too. All of these words come from Latin roots. A long time ago, around the time that many of the sciences we study today were becoming professional careers, Latin was a kind of universal language that lots of people understood. Science and medicine still use many of these words today. If you can learn a few of these words, you will have a head start in your science career. It will also help you when you talk to your doctor, or when you watch medical shows on TV!

anatomy – The structure of the body of a plant or an animal.

anterior – Located on or near the front of lower animals like the fish and crayfish. If you can remember that the Latin prefix ***ante*** means "before," you'll have a head start in history too! For example, "antebellum" means "before the war."

cephalic – Located on or near the head.

chela – A pincerlike claw of a crustacean such as a crayfish or lobster.

dorsal – Having to do with the back. On a fish, the dorsal fins are at the top of the fish. "Dorsal" comes from the Latin word ***dorsum***, which means "back."

exoskeleton – A hard outer covering that provides protection or support for an organism.

invertebrate – An animal without a backbone. This group includes most of the species of animals.

lateral – Having to do with the side. This word is especially good to know, because it's used in FOOTBALL! When a quarterback makes a "lateral pass," he is throwing the ball sideways.

operculum – A lid or flap covering an opening, such as the gill cover in many fishes.

posterior – Located near the tail or hind parts of an animal. The Latin prefix ***post*** means "behind."

thorax – The middle region of an arthropod between the head and the abdomen. This word can also be used to refer to the part of the human body between the neck and the diaphragm. "Thorax" comes from the Latin word ***thorax***, which can mean "chest" or "breastplate."

ventral – Having to do with the abdomen or lower surface or belly of an animal. This word comes from the Latin word ***venter***, which means "belly." Because the breath seems to come from the belly, this word is related to many words having to do with wind or blowing. These words include vent and ventilate.

vertebrate – An animal with a backbone. There are five major groups of vertebrates: fish, amphibians, reptiles, birds and mammals.

How Biologists Categorize Plants and Animals:

As early scientists (or natural philosophers), including Aristotle, began to study the world around them, they began to sort things into groups. For example, they divided living things into plants and animals. These groups helped them study and talk about the organisms they observed. Gradually these early categories developed into the classification systems that scientists use today.

Living things are now divided (by many scientists) into five groups called "kingdoms," which include plants; animals; protists (one-celled organisms with nuclei, such as amoebas); monera (one-celled organisms without nuclei, such as bacteria and blue-green algae, which aren't plants, but bacteria that can photosynthesize); and fungi (many-celled organisms that cannot photosynthesize).

Each of these kingdoms is, in turn, divided into smaller groups that share certain characteristics. The animal kingdom, for example, is divided into phyla. (The word "phylum," the singular form of phyla, comes from the Greek word ***phulon***, which means "tribe.") Phyla are divided into classes. Classes are divided into orders. Orders are divided into families. Families are divided into genera (singular genus), which are divided into species. Each of these major divisions can also contain within them various smaller groupings. For example, a phylum often contains sub-phyla.

Animals are living organisms that have many cells and that get food by eating other living things. Animals and other living things are organized into smaller groups based on characteristics that they have in common. These characteristics can be things that they do, which are called "behavioral characteristics," or how they are made, which are called "structural characteristics."

One of the main structural characteristics that scientists study is the presence or absence of a backbone. Animals with backbones are called “vertebrates” and animals without backbones are called “invertebrates.” In this activity, we’re going to examine one example of each of these groups — a crayfish, which is an invertebrate, and a perch, which is a vertebrate.

Getting Started:

Today we are going to perform seafood surgery!

What do you think seafood surgery is?

What happens when someone has surgery?

When someone has surgery, often something is being removed or repaired.

What do we call people who perform surgery?

People who perform surgery are called “surgeons.”

How does a surgeon know what is wrong with the patient and what needs to be removed during surgery?

Doctors perform a lot of medical tests to see what is wrong with a patient. Doctors usually look at x-rays as well.

What is an x-ray? How do x-rays help doctors and surgeons?

X-ray***s allow doctors to see inside their patients. X-rays are often pictures of bones and organs.***

Today all of you are going to be surgeons! Your patients will be seafood.

Let’s name some types of seafood! What kinds of seafood do you like?

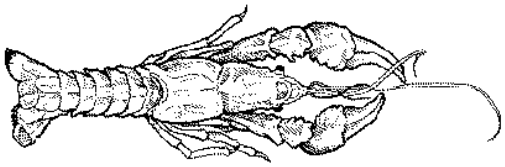
Some of the animals that people eat as seafood have backbones and some do not have backbones. Animals that have backbones are called “**vertebrates**.” Animals that do not have backbones are called “**invertebrates**.”

Let’s find our backbones. Feel the middle part of your back with your finger. The hard bone that you feel is your spine, or backbone. Are we vertebrates or invertebrates?

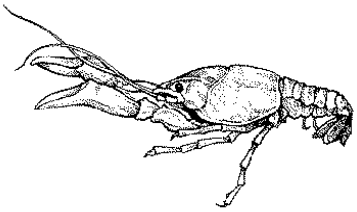
Humans are vertebrates.

Teacher Instructions for Crayfish Dissection:

1. Ask the students to wash their hands thoroughly before beginning this activity. Discuss the importance of having clean hands before performing surgery. Once the students have clean hands, they should put on their surgical gowns, gloves and masks. Give each student a Seafood Surgery: Operation Crayfish Activity Handout.
2. Divide the class into groups of two to four students. Assign each group to a dissecting tray with the crayfish and dissecting tools. As the students follow the instructions in their handouts, they will examine the specimens, which will look like the drawing below. (You may want to explain to the class that each specimen is an individual. The crayfish — or perch — that each group dissects may not look exactly like the ones in the pictures.) (Steps 1–4)

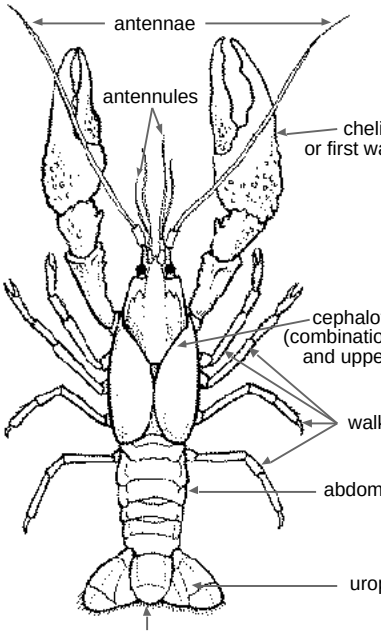


Dorsal View of Crayfish

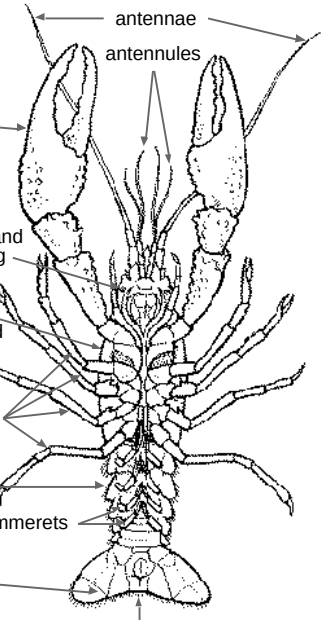


Lateral View of Crayfish

3. The students will locate the cephalothorax, abdomen, exoskeleton, antennae, antennules, walking legs and swimmerets by comparing their specimens with diagrams and drawings similar to those pictured below and on the next page: (Steps 5–10)



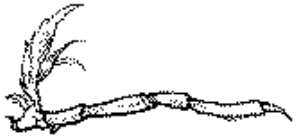
Crayfish Dorsal View



Crayfish Ventral View

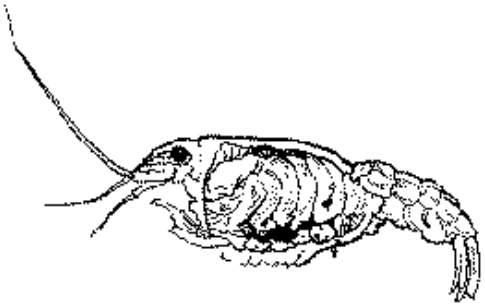
4. Next, ask the students to remove the first walking leg, which is also called a “cheliped,” and one of the other walking legs. They should then examine the attached gills. (Steps 11–12)

First Walking Leg (Cheliped)



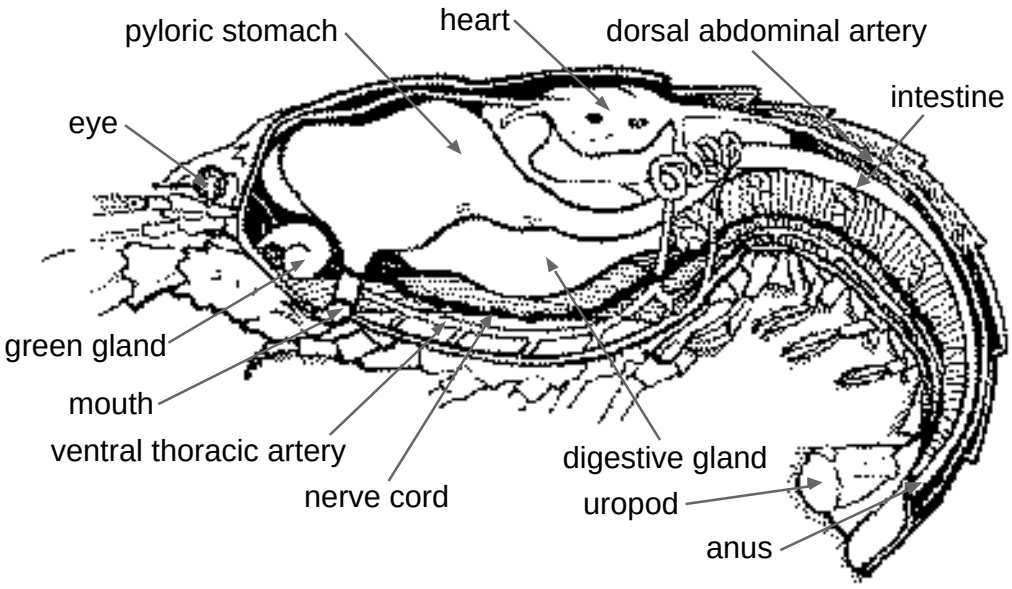
Walking Leg

5. After removing the outer shells from the right and left sides of the crayfish, they should examine and remove the remaining gills. (Steps 13–15)



Crayfish with Exposed Gills

6. Finally, they will use the remaining time to examine the internal structure of the crayfish. (Step 16)



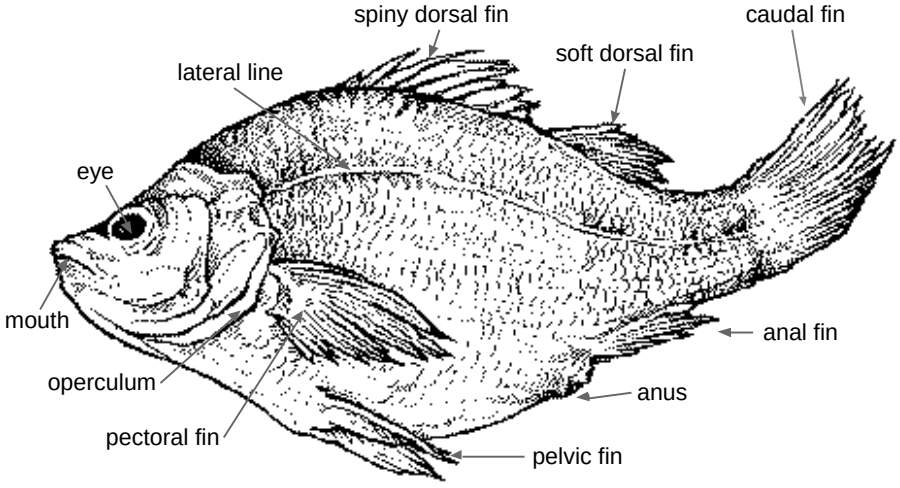
Dissected Crayfish: Internal View

Teacher Instructions for Perch Dissection:

1. Begin the activity by letting the students examine the exterior anatomy of the uncut perch. Point out the mouth, the operculum, the fins, the lateral line and the scales.

   Discuss how the fish use their fins. Point out the streamlined shape of the perch's body. Ask the students to remove a scale from their fish and examine it under the magnifying glass. Scales are adaptations that protect the fish and help it move through the water. Each scale is covered with a thin skin that produces a mucus that helps the fish slide through the water and escape from predators.

   The students should be able to see the lateral line clearly. This long thin line is equipped with sensitive nerve cells that respond to changes in water pressure and temperature. Students may also notice that the lower half of the perch is lighter in color than the upper half. This is an adaptation that helps the perch hide from predators. From above, the perch blends in with the darker color of the streambed; from below, it blends in with the light that comes from the sky. (Steps 1–2)



Yellow Perch

2. Ask the students to work in teams for the rest of the activity. Each group should find the gills by following the directions on the Seafood Surgery: Operation Perch Student Activity Handout. The gills are located under the operculum.

3. Once they have found the gills, the students should examine and describe them on their activity sheets. You may want to explain that the oxygen is actually removed from the water in the gill filaments. The gill rakers protect the gill filaments by straining out food particles and other impurities from the water that reaches the filaments. (Step 3)

4. Next, students should find the swim bladder and describe it on their activity sheets. (Step 4)

5. They should locate the backbone and describe it on their activity sheets. Each group should then measure and record the length of their fish and answer the questions on their activity sheets. (Steps 5–8)

6. Finally, take up the worksheets and use the conclusion questions and quiz provided to assess student teams on their seafood surgery knowledge. The quiz should be given orally. Keep score!

Conclusions:

What is a vertebrate? Name some examples.

A vertebrate is an animal that has a backbone. (Examples will vary.)

What is an invertebrate? Name some examples.

An invertebrate is an animal that does not have a backbone. (Examples will vary.)

Are bony fishes like the perch vertebrates or invertebrates?

Bony fishes are vertebrates.

How do fish breathe?

Fish use their gills to get oxygen from the water.

What is the purpose of a fish's swim bladder? Explain how the swim bladder works.

The swim bladder allows a fish to float in the water. As the swim bladder fills with air, the fish moves upward in the water because air is lighter than the surrounding water. As the swim bladder is emptied of air, the fish moves down in the water because a fish's body is heavier than the surrounding water.

Is a crayfish a vertebrate or an invertebrate?

Crayfish are invertebrates because they do not have a backbone.

How do crayfish breathe?

Crayfish use their gills to get oxygen from the water.

Can you think of some other invertebrates that we eat as seafood?

Shrimp, crabs, mussels, scallops and oysters are all invertebrates.

Seafood Surgery: Student Quiz

1. What is a vertebrate?
   A. An organism that has a brake in it.
   B. An organism that has a backbone.
   C. An organism that has gills.
   D. An organism that floats.

2. Where are a fish's gills located?
   A. Under the skin.
   B. Under the mouth.
   C. Under the operculum.
   D. Under the eyes.

3. A fish breathes with which organs?
   A. Lungs
   B. Gills
   C. Air tubes
   D. Snorkel

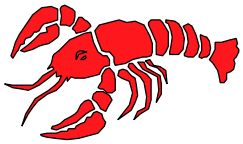
4. What keeps a fish from sinking?
   A. Lungs
   B. Intestines
   C. Inner tubes
   D. Swim bladder

5. Invertebrate is the opposite of vertebrate. What does invertebrate mean?
   A. Not having a backbone.
   B. Having a backbone.

6. Which organs help the fish take oxygen out of the water? ***Gills.***

7. Which parts of the crayfish are flexible?
   The crayfish is flexible at all of its joints, including the walking legs, swimmerets and segmented tail. However the cephalothorax is not flexible. The crayfish's body isn't flexible like the perch's body.

8. Which parts of the fish are flexible?
   Most of the fish's body is quite flexible because the backbone is made of tiny segments that allow the fish to move its body back and forth. Even the scales are made so that the fish is very flexible. The only part of the fish that is not quite so flexible is the area around the head, which has bones that protect the brain and sensory organs.



Seafood Surgery

Operation Crayfish Student Activity Handout

As a surgeon, your job is to fill out your patient's medical chart (this activity handout) and then successfully remove all of the gills and all of the walking legs with gills.

Participating Surgeon's Name:

_____

Assisting Surgeons' Names:

_____

_____

_____

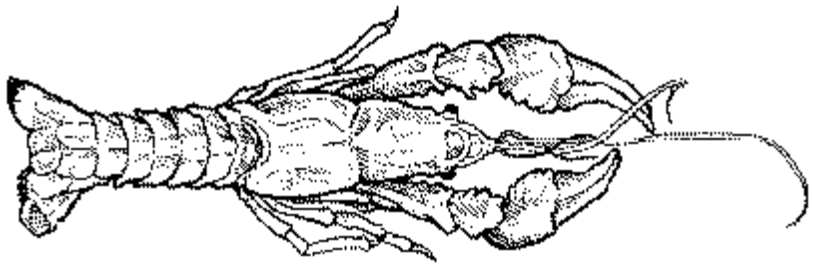
My favorite seafood to eat is

_____

Draw a picture of your favorite seafood in the box below!

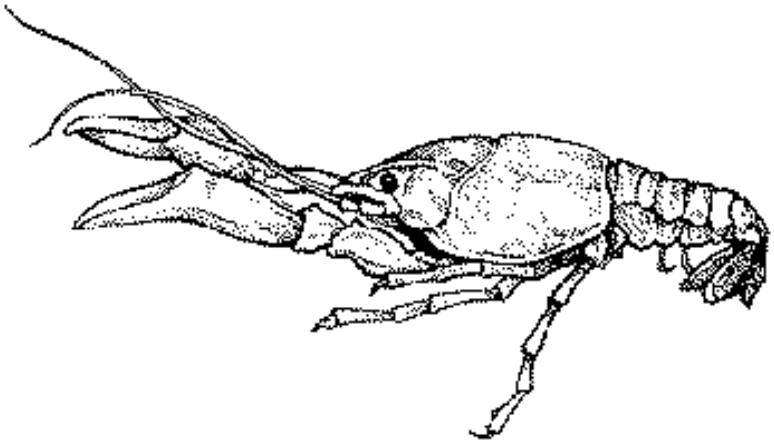
1. Your group should find your crayfish already in the dissecting tray. Please take turns examining its outer and inner structure.

2. Your crayfish will probably look a lot like the one pictured below. This is a dorsal view of the crayfish. Dorsal means “back” in Latin, so this is a view of the crayfish’s back. Notice that because the specimen has been packed tightly, you can’t see all of its legs from this view.



Dorsal View of Crayfish

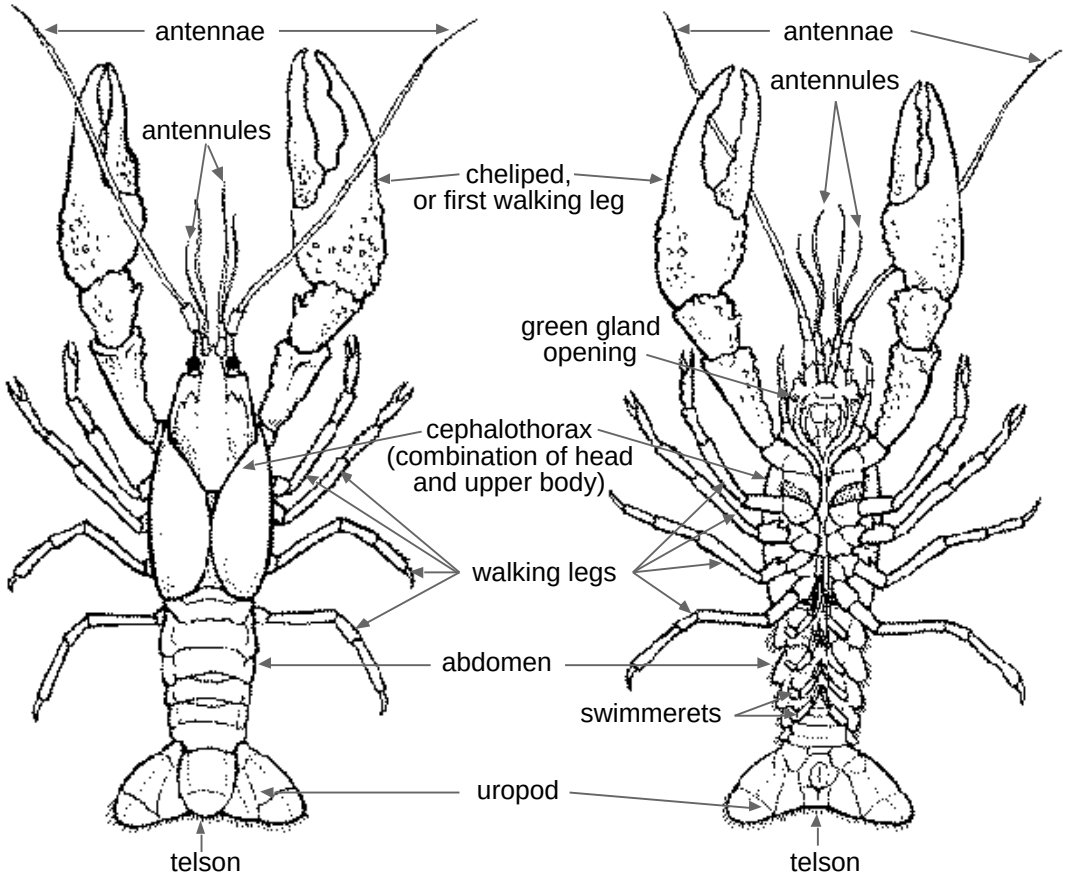
3. Next shift the crayfish onto its side. This is called a lateral view.



Lateral View of Crayfish

4. You may still have some trouble seeing all of the legs. Try spreading the legs apart very carefully. Observe the crayfish’s structure using the Crayfish Anatomy Diagram on the next page.

Crayfish Anatomy Diagram



Crayfish Dorsal View **Crayfish Ventral View**

5. Find the cephalothorax. The word “cephalothorax” is a combination of the word “cephalic,” which refers to the head and the word “thorax,” which refers to the upper body or chest.

6. Find the abdomen. Notice that the abdomen is made of sections that allow the crayfish to move its tail. This helps the crayfish move through the water.

7. Touch the covering on the crayfish with your gloved finger. This hard covering is called an “exoskeleton.” What words would you use to describe this covering?

_____

Can you think of some things about this covering that might help the crayfish survive?

_____

_____

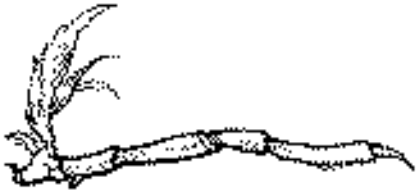
8. Find the antennae. (Notice that the short ones are called antennules.)

9. Locate all five walking legs. Notice that the large one with the claw can also be called a “cheliped.” Think about how the crayfish might use these legs.

10. Turn the crayfish over and examine the underneath side. This is called the “ventral view.” Notice the tiny swimmerets. These appendages, which can also be called “pleopods,” are used to push currents of water over the gills and, in females, to hold the eggs and the young crayfish.

11. Pick up your forceps (tweezers) and grasp one of the walking legs firmly — and as close to the crayfish as possible. Gently move the legs back and forth so that the legs come off with the gills still attached. The legs should look like the ones pictured below.

First Walking Leg (Cheliped)



Walking Leg

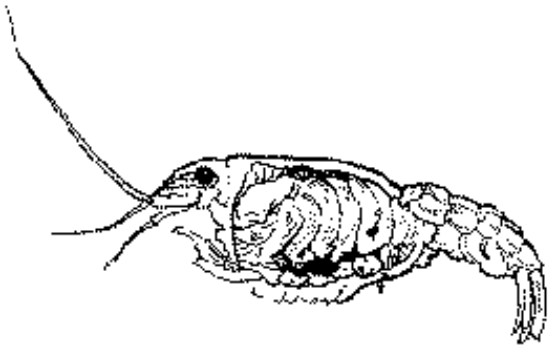
12. The attached gills have a feathery appearance. Take turns so that each surgeon gets a chance to remove a leg.

    Note: If the leg breaks off without any gills attached, you probably didn’t have your forceps close enough to the body. Try again, gently easing the leg away from the crayfish body.

13. To remove the remaining gills, you must remove the outer shell from the left and right sides of the crayfish. Flip the crayfish so that the ventral (bottom) side is down and the dorsal (top/back) side is up.

14. Locate the cephalothorax. One surgeon should use a dissecting probe to carefully lift up the left thorax shell. While the first surgeon is holding up the shell, a second surgeon should use the dissecting scissors to carefully cut away the shell. As you cut, make sure that you are not cutting any of the crayfish's tissue! If some of the tissue gets in the way, push it back with the dissecting probe.

15. Now, cut away the right thorax shell to remove the gills. Make sure everyone gets a chance to operate!



Crayfish with Gills Exposed

Examine (look at) the gills.

What words would you use to describe the gills?

_____

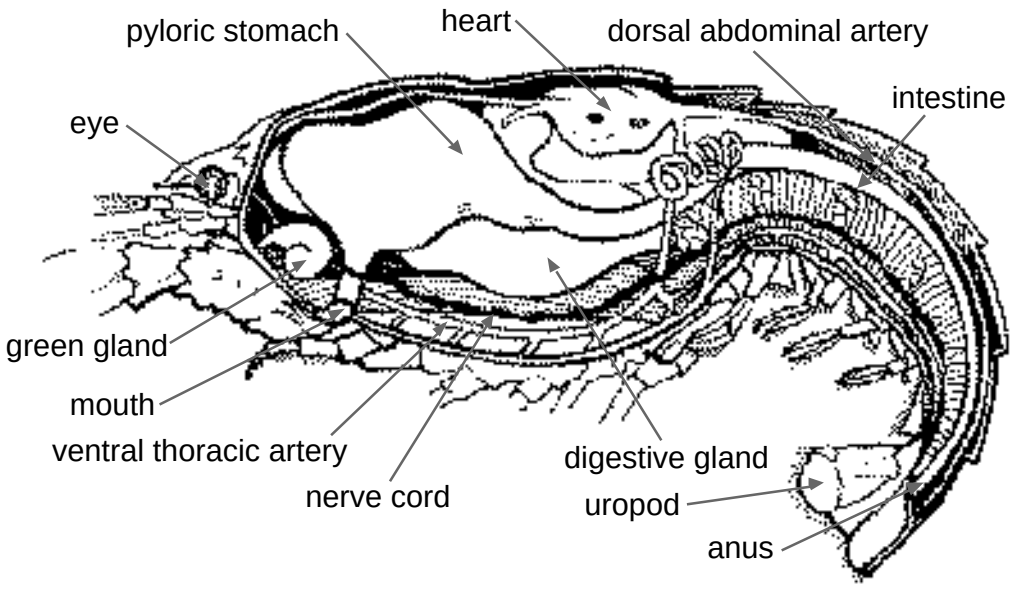
_____

How do the gills help the crayfish survive in its environment?

_____

_____

16. If time allows, clean away the gills and try to identify the rest of the crayfish's internal structure using the Crayfish Anatomy Chart or the diagram of the dissected crayfish below.

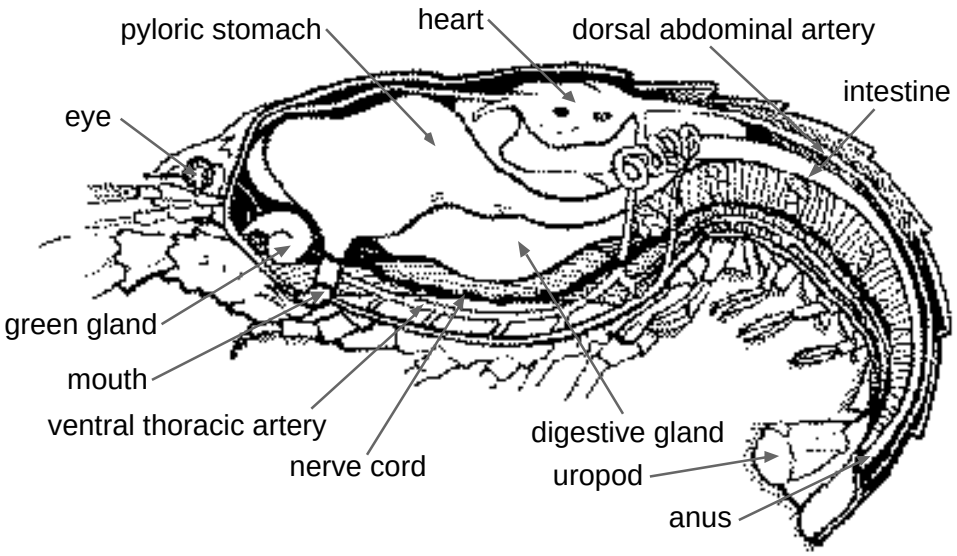


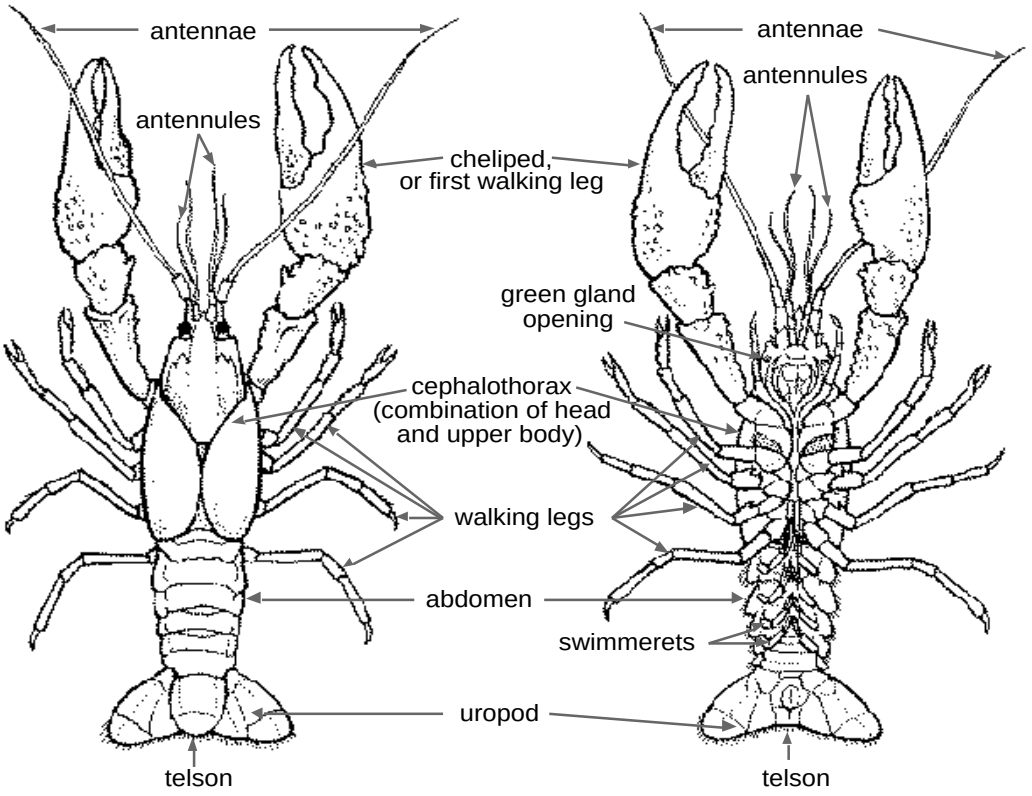
Dissected Crayfish: Internal View

Note: The green gland does not have a green color in a preserved specimen. It will be cream-colored.

Did you find any bones inside the crayfish?

Crayfish Anatomy Chart





Crayfish Dorsal View **Crayfish Ventral View**

Crayfish Fact Sheet

Crayfish, which can also be called “crawfish,” or “crawdads” are closely related to lobsters and shrimp. There are over 500 different kinds — or species — of crayfish, most of which live in freshwater. They are found mainly in North America, but can also live in other places around the world.

Crayfish have a joined head and thorax, which is called a “cephalothorax,” and a segmented abdomen. Crayfish come in a wide variety of colors, including dark brown, green, white, pink and sand-colored. They have two pairs of antennae, which they use to sense their surroundings, and a pair of eyes on moveable stalks. They have five pairs of walking legs attached to the thorax, including one pair at the front that ends in claws, or pincers. These pincers are used for defense and attack, but are also very useful for cutting and capturing food. In addition to the walking legs, the crayfish has several pairs of food-handling appendages, bailers that cycle water over the gills, and five pairs of swimmerets under their abdomens. Crayfish can regrow any of these special “legs” if they are broken off.

Crayfish have a hard outside covering called an “exoskeleton,” which protects the crayfish. This covering can’t grow along with the crayfish, though, so the crayfish sheds, or molts, its exoskeleton from time to time. In the first year of a crayfish’s life when it is growing fairly quickly, it molts six to ten times. For a few days following each molt, the crayfish’s shell is still soft and it is more likely to be eaten by a predator. If they manage to hide from predators, most crayfish live to be about two years old.

Crayfish like to live under rocks and logs in streams and lakes. They are omnivores and their diet includes algae and other water plants, snails, insect larvae, worms, tadpoles, and salmon eggs. Crayfish, in turn, are eaten by alligators, certain kinds of fish, turtles and grackles (a kind of bird).

Crayfish Web Sites

If you want to find out more about crayfish, here are some Web sites to visit:

Cornell University's Biology 101–104 site:
http://biog-101-104.bio.cornell.edu/BioG101_104/tutorials/animals/crayfish.html

Crayfish Home Page:
http://bioag.byu.edu/mlbean/crayfish/crayhome.htm

Descriptions of various crayfish species:
http://www.aqualink.com/fresh/z-crayfish2.html

Crayfish World:
http://www.crayfishworld.com/contents.htm



Seafood Surgery

Operation Perch Student Activity Handout

As a surgeon, your job is to fill out your patient's medical chart by successfully locating the operculum, the gills, the swim bladder and the backbone of your perch.

Participating Surgeon's Name:

_____

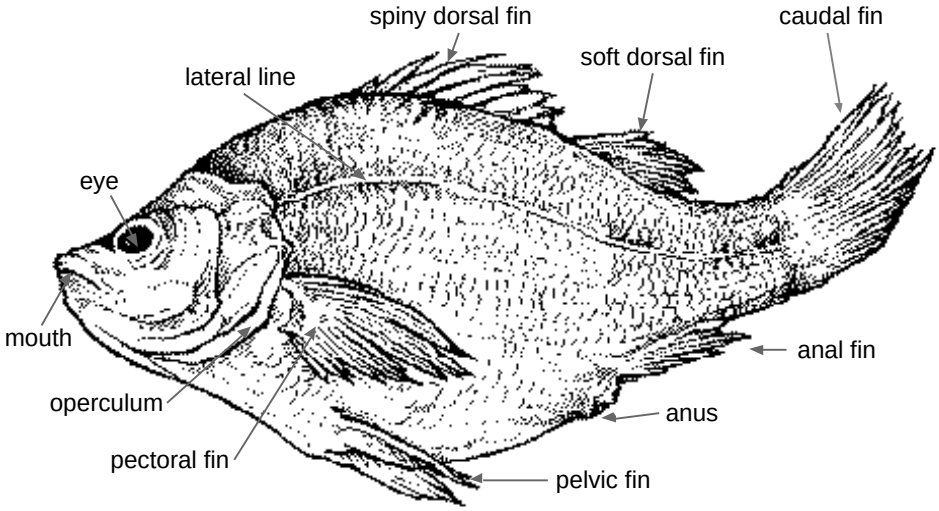
Assisting Surgeons' Names:

_____

_____

_____

1. As a class, examine the complete perch. Notice the structure of the fish's body. Can you think of some ways that the fish is adapted to its environment?



2. Notice the scales that cover your fish's body. Using the forceps, gently grasp one of these scales at the back (posterior) edge of the scale and remove it. Examine it carefully using your magnifying glass. Draw a picture of what you see in the space provided.

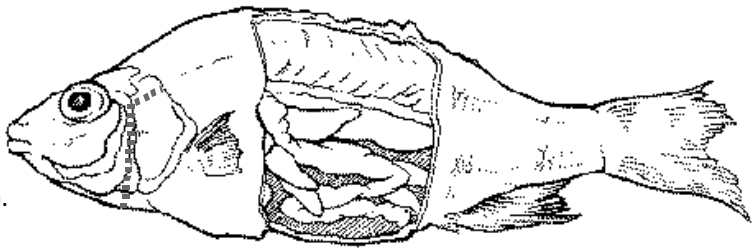
Scale

3. Next, find the operculum. Gills, the organs that fish use for breathing, are located under the operculum. Gills help fish get oxygen from the water.

   How do they work? The fish takes in water through its mouth. The operculum helps move the water over the gills and then out the side of the fish's head.

   Use your probe to carefully lift the operculum so that you can see the gills. Next, use your dissecting scissors to remove the operculum.

Cut the operculum as indicated by the dotted lines on the diagram. You will find the gills underneath the operculum.

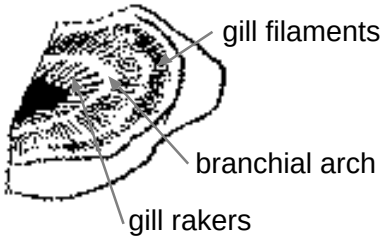


You should see the gills clearly now. What do they look like?

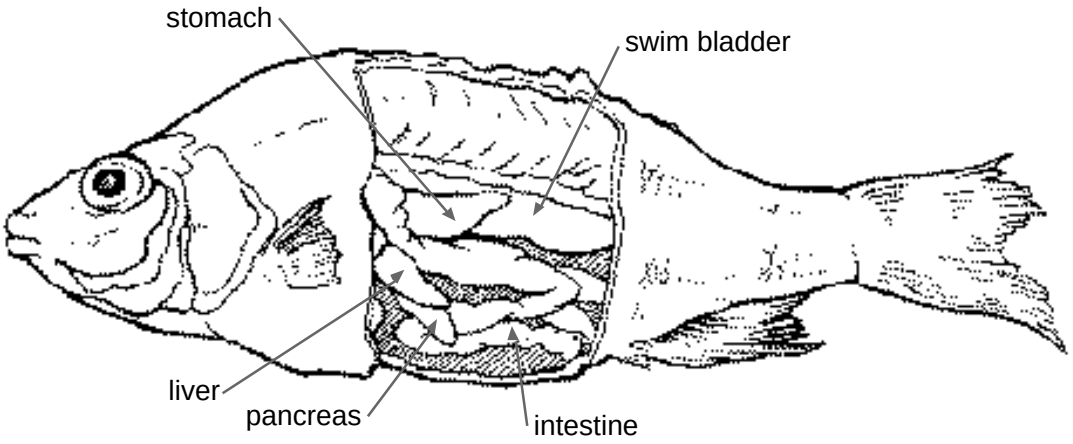
_____

_____

If you examine the gills carefully, you should be able to locate three different areas: the gill filaments, the gill rakers and the branchial arch.



4. The **swim bladder** is an organ that fish use to make their bodies float. As the swim bladder fills with more air, the fish floats higher in the water. As the swim bladder loses air, the fish floats lower in the water.



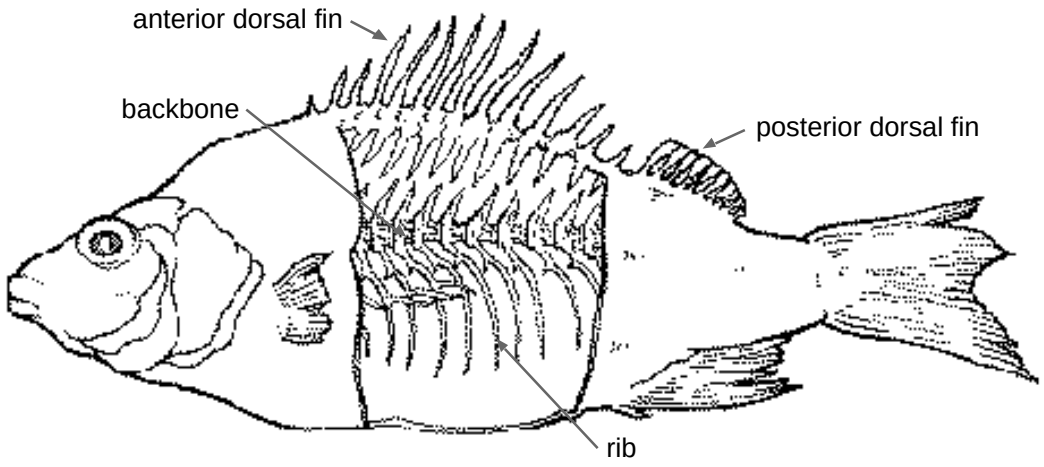
Use your probe to find the swim bladder. What does it look like?

_____

5. The **backbone** gives the fish shape, strength and flexibility (ability to move and bend). What does the backbone look like?

_____

_____



6. How long is your fish? _____

7. How is this fish like the crayfish?

_____

_____

_____

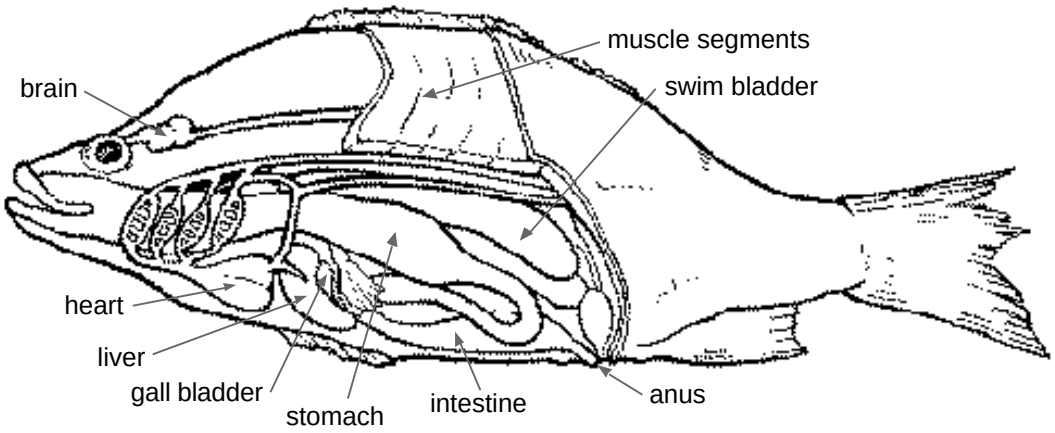
8. How is this fish different from the crayfish?

_____

_____

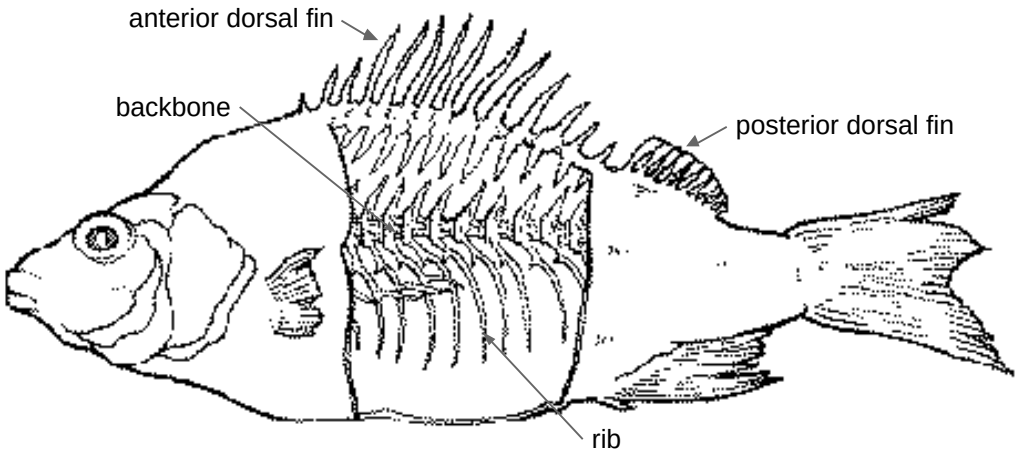
_____

Perch Anatomy Chart



Perch Internal Structure

Ctenoid Scale



Partial View of Perch Skeleton

Perch Fact Sheet

The perch family includes about 130 different species. These fish live in freshwater environments including streams, rivers, lakes and ponds, mostly in the cooler regions of the Northern Hemisphere. The most well known of the perch sub-species is the yellow perch, which is native to North America.

Bony fish, including the perch, have fins, which they use to move themselves through the water. They have long, streamlined bodies, which are covered with small, tough scales. Perch, like other fish, breathe through gills. The gills are found under the fish's operculum, an opening on each side of the fish's head. When a fish gulps water in through its mouth, the water goes over the fish's gills and then comes out of the operculum on the side of the fish's head.

Female perch can lay up to 90,000 eggs at one time, which are protected by long narrow ribbons of jello-like material. If the eggs manage to escape the notice of predators such as walleyes, northern pike and lake trout, the fertilized eggs hatch in about ten days. The young are transparent and very tiny (6mm, which is about 1/4 of an inch long). For the first five days, food is provided by their yolk sacs. After this stage, they form groups, or schools, that move around together. The young perch eat insect larvae and tiny water plants, which makes them omnivores. They grow quickly during the first month of their lives. They usually grow to be about 2–4 inches by the end of the first year, after which growth is slower.

Perch like clear water with rocky or sandy bottoms. Schools of perch usually stay in deep water, hiding among weeds and rocks, during the day, but swim to shallow waters in early morning and at dusk to feed on smaller fish, insects, snails and small crayfish.

Perch Web Sites

If you want to learn more about perch, here are some Web sites to visit:

Carolina Biological: Wildlife of the Alligator River. This site has great illustrations of Yellow Perch anatomy.
http://www.carolina.com/redwolf/animals/perch/perch_internal.htm

Fish of the Great Lakes:
http://www.seagrant.wisc.edu/greatlakesfish/yellowperch.html

Yellow Perch: Perca flavescens:
http://www.science.mcmaster.ca/Biology/Harbour/SPECIES/PERCH/YELLPERC.HTM#Perca

Sources Consulted:

Hickman, Cleveland P. ***Integrated Principles of Zoology (textbook and lab notebook)***. London, Toronto, Santa Clara: Mosby College Publishing, 1988.

Starr and Taggart. ***Transparencies for Starr and Taggart's 'Biology: The Unity and Diversity of Life'***. Belmont, California: Wadsworth Publishing Company, n.d.

Wallace, Robert L. and Taylor, Walter K. ***Invertebrate Biology: A Laboratory Manual***. Upper Saddle River, N.J.: Prentice-Hall, Inc., 1997.

The electronic sources listed in the Web site section as well as several general encyclopedias also provided some of the information in this activity.