

Festival Activity: Gyotaku

Subject: Science and The Arts

Concept: Combining art and science

Key Vocabulary

- Gyotaku
- Dorsal fin
- Adipose fin
- Caudal fin
- Anal fin
- Pelvic fin
- Pectoral fin

Skills

- Artistic interpretation
- Anatomical identification

Materials

- All materials to make a fish print will be provided by the activity leader
- Teachers need to bring pre-labeled name tags for each student's print. Include school name, teacher name, and student name. Pick up all your prints before leaving the festival.

Share an exciting, cultural, artistic expression similar to the way Japanese fishermen record their day's catch. Your students will capture their Salmon Festival experience through intricate fish prints.

Grade Level Expectations (GLEs) or Evidence of Learning

Science

1.2.6 Understand that organisms can be a single cell or many cells that form parts with different functions.

The Arts

Essential Learning 3. The student makes connections within and across the arts, to other disciplines, life, cultures, and work.

Objectives

Students will: 1) learn how to make a fish rubbing, and 2) use the fish print to apply newly acquired anatomical knowledge.



Background

The art of **Gyotaku** (gyo=fish, taku=rubbing) originated in Japan during the early 1800's and was practiced by fishermen to preserve a record of their catch. A Gyotaku is made when watercolors are painted on the actual fish and then rice paper or fabric is applied and gently rubbed. The result is a mirror image, rich in detail and color, a perfect catch of the Salmon Festival experience.

Suggested Procedure

Salmon Festival staff will guide each student in the creation of a fish print using a variety of rubber fish. Before leaving the festival, teachers will pick up their students works of art and take them home.

Vocabulary Words

Dorsal fin - (balance fin) - to keep fish from tipping over and to communicate or signal with.

Adipose fin - (mystery fin) - fish biologists don't know what its use is. This fin is located just behind the dorsal fin. It is filled with fatty deposits and has no fin rays. It is like an ear lobe. Hatcheries that raise salmon often have their adipose fin removed as a way of marking a fish.

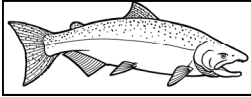
Caudal fin - (power fin) - to push fish forward through the water.

Anal fin - (rudder fin) - to help the fish steer. This fin acts as a keel and has 13 to 19 rays.

Pelvic fin - (braking fin) - to help the fish stop in the water.

Pectoral fin - (turning fin) - to turn the fish from side to side or keep the fish in one place.





Pre-Work: Something's Fishy

Subject: Science

Concepts: External fish anatomy and functional anatomy

Key Vocabulary

- Aquatic

Skills

- Classification
- Cooperative learning
- Comparing and contrasting
- Listing

Materials

- None

What makes a fish a fish? Just because an animal lives in the water, does it make it a fish? Using a list of characteristics, let's see what is a fish and what's not.

Grade Level Expectations (GLEs) or Evidence of Learning

Science

1.2.6 Understand that organisms can be a single cell or many cells that form parts with different functions.

2.2.1 Understand that all scientific observations are reported accurately and honestly even when the observations contradict expectations.

Objectives

Students will classify animals as fish or non-fish.

Suggested Procedure

1. Help your students generate a list on the board of animals that live in the water. Accept a variety of answers, including birds, mammals, fish, amphibians, and all animals that live in rivers, lakes or the sea.
2. Explain that all of these animals are called **aquatic**, which means they live in or on the water for at least part of their lives.
3. Ask your students to review the list. Label which animals are fish and which are not.

Example:

<u>Fish</u>	<u>Not Fish</u>	<u>Not Fish</u>
stingray	tadpole	sea anemone
halibut	frog	turtle
sockeye	lobster	alligator
shark	fly	lizard
bass	snail	otter
steelhead	mayfly	penguin
tuna	water moccasin	dolphin
eel	manatee	periwinkle
char	snake	clams
skate	whale	beaver

4. Ask your students if they can describe “what makes a fish a fish.” Explain to the students that there are at least five characteristics that define a fish.

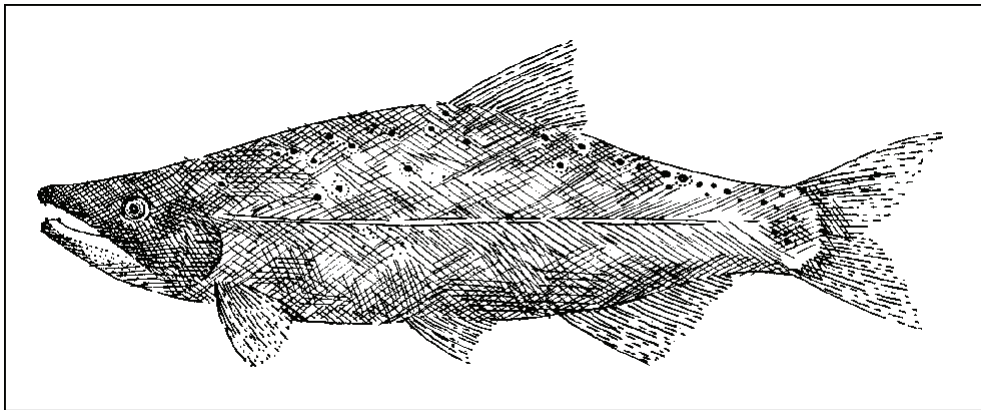
- a. use gills to breathe
- b. cold-blooded
- c. fins, instead of arms and legs
- d. scales
- e. aquatic

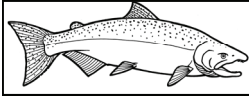
5. Review the list of fish characteristics. Ask the students to name another animal, besides fish, that has one of the five individual characteristics.

Examples:

- a. uses gills to breathe - some salamanders
- b. cold-blooded - reptiles, such as snakes and lizards; amphibians, such as frogs and salamanders
- c. fins, instead of arms and legs - whales, seals and dolphins
- d. scales - reptiles have scales and birds have scales on their feet
- e. aquatic - alligator, beaver, whales, penguins, etc.

6. With this list of fish characteristics, review the list of aquatic animals on the board, and ask students if each animal is a fish or not. Remind students that although some other animals share some fish characteristics, almost all fish have all five characteristics.





Pre-Work: External Fish Anatomy

Subject: Science

Concept: External fish anatomy

Key Vocabulary

- Nares
- Lateral line
- Dorsal fin
- Adipose fin
- Caudal fin
- Anal fin
- Pelvic fin
- Pectoral fin
- Operculum

Skills

- Biological illustration
- Anatomical identification
- Labeling
- Drawing

Materials

- Paper
- Pencil
- Teacher Reference, "External Fish Anatomy"
- Student Worksheet, "External Fish Anatomy"

Fish, like other aquatic animals, are the product of countless adaptations over long periods of time. These adaptations, for the most part, are features that increase the animals likelihood of surviving in their habitat.

Grade Level Expectations (GLEs) or Evidence of Learning

Science

1.2.6 Understand that organisms can be a single cell or many cells that form parts with different functions.

2.2.1 Understand that all scientific observations are reported accurately and honestly even when the observations contradict expectations.

Objective

Students will: 1) name the external features of a fish, and 2) describe functions and adaptations of these external features.

Suggested Procedure (Before class)

1. Create an overhead transparency using Student Worksheet, "External Fish Anatomy."

Suggested Procedure (During Class)

1. Lead a discussion on how humans swim.

Do you know how to swim?

What makes you move through the water?

How do you turn while in the water?

Do you always swim in a straight line?

Is it easier to swim on the surface or underwater?

How do you stop swimming in water?

Is it hard to hold your breath underwater?

How do you switch from swimming on the surface to swimming underwater?

2. Using the transparency " External Fish Anatomy", point to features of the salmon, and ask students if they know what each of those features are called. As a class, label each feature. Continue to next step, even if some features are left unlabeled.

3. Ask students what each feature is and why it is important to the fish. After reviewing a feature, label it with its functional and/or scientific name.

Note: Both scientific and functional names for each anatomical feature have been included on the Teacher Reference, "External Fish Anatomy." Decide to what extent you want to introduce and discuss the scientific terms. It might be surprising how many students are familiar with these words.

4. Distribute clean paper, blank on both sides.

5. Ask students to draw a salmon and label the features of its external anatomy.

Note: Keep student drawings for use after the Festival.

Vocabulary Words

Eye - to see predators, food and other salmon. Fish eyes are constructed much like ours, but they have no eyelids or tear ducts since the water they live in wets and cleans their eyes. Most fish have 360 degree vision. Their eyes can work independently of one another, allowing them to watch what is happening in front as well as behind them. They can see color.

Nares (nostrils) - for smelling. Nostrils are located on the snout and are comparable to a human's nose. Male adult salmon develop a long and slightly curved snout when they are fully mature during spawning.

Lateral line (sensing strip) - for feeling movement in the water. The lateral line is made up of small holes placed in a line along both sides of the fish. It is the fish's ears because through the lateral line the fish can sense certain sounds and movements in the water.

Dorsal fin (balance fin) - to keep fish from tipping over and to communicate or signal with.

Adipose fin (mystery fin) - fish biologists don't know what its use is. This fin is located just behind the dorsal fin. It is filled with fatty deposits and has no fin rays. It is like an ear lobe. Hatcheries that raise salmon often have their adipose fin removed as a way of marking a fish.

Caudal fin (power fin) - to push fish forward through the water.

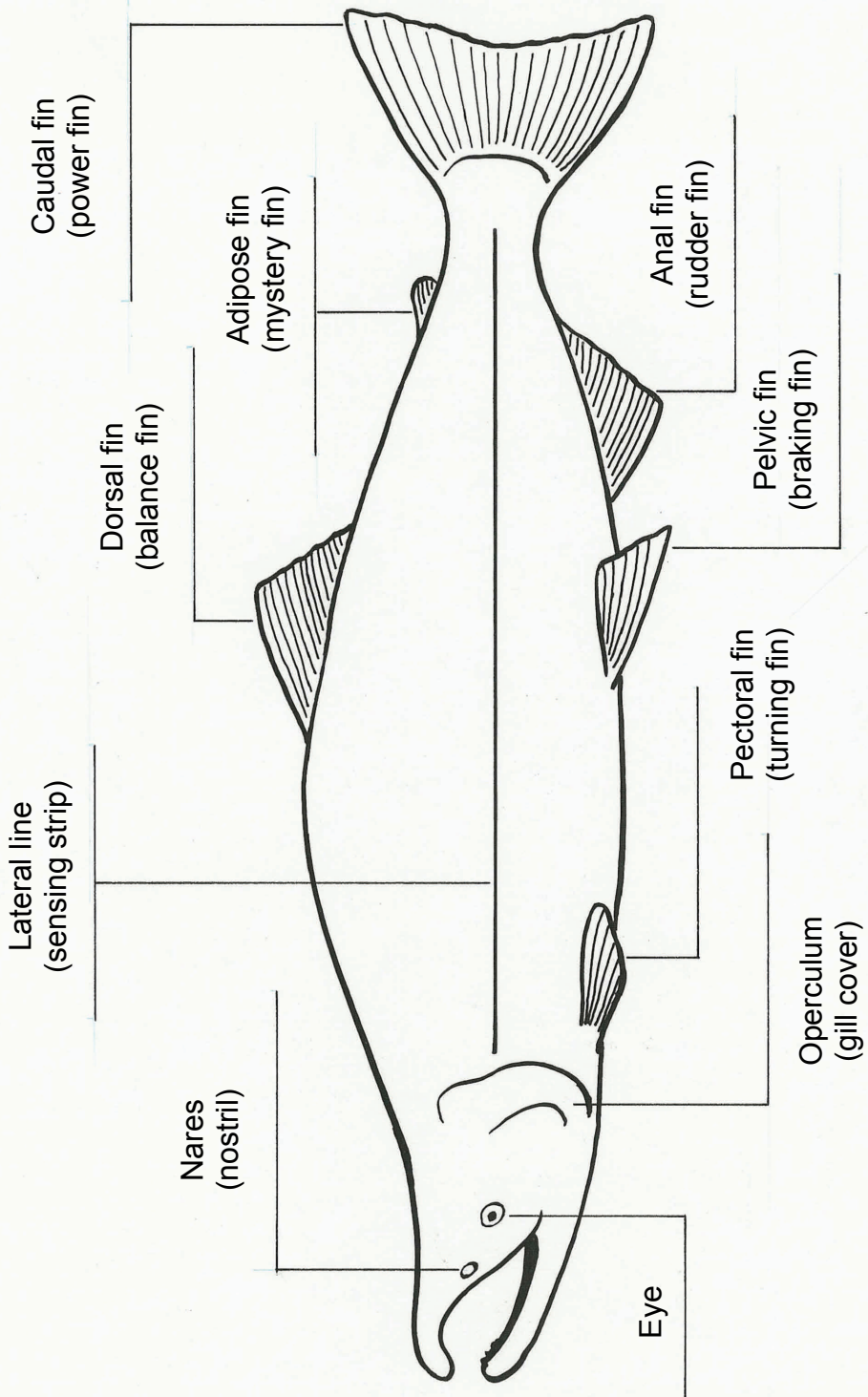
Anal fin (rudder fin) - to help the fish steer. This fin acts as a keel and has 13 to 19 rays.

Pelvic fin (braking fin) - to help the fish stop in the water.

Pectoral fin (turning fin) - to turn the fish from side to side or keep the fish in one place.

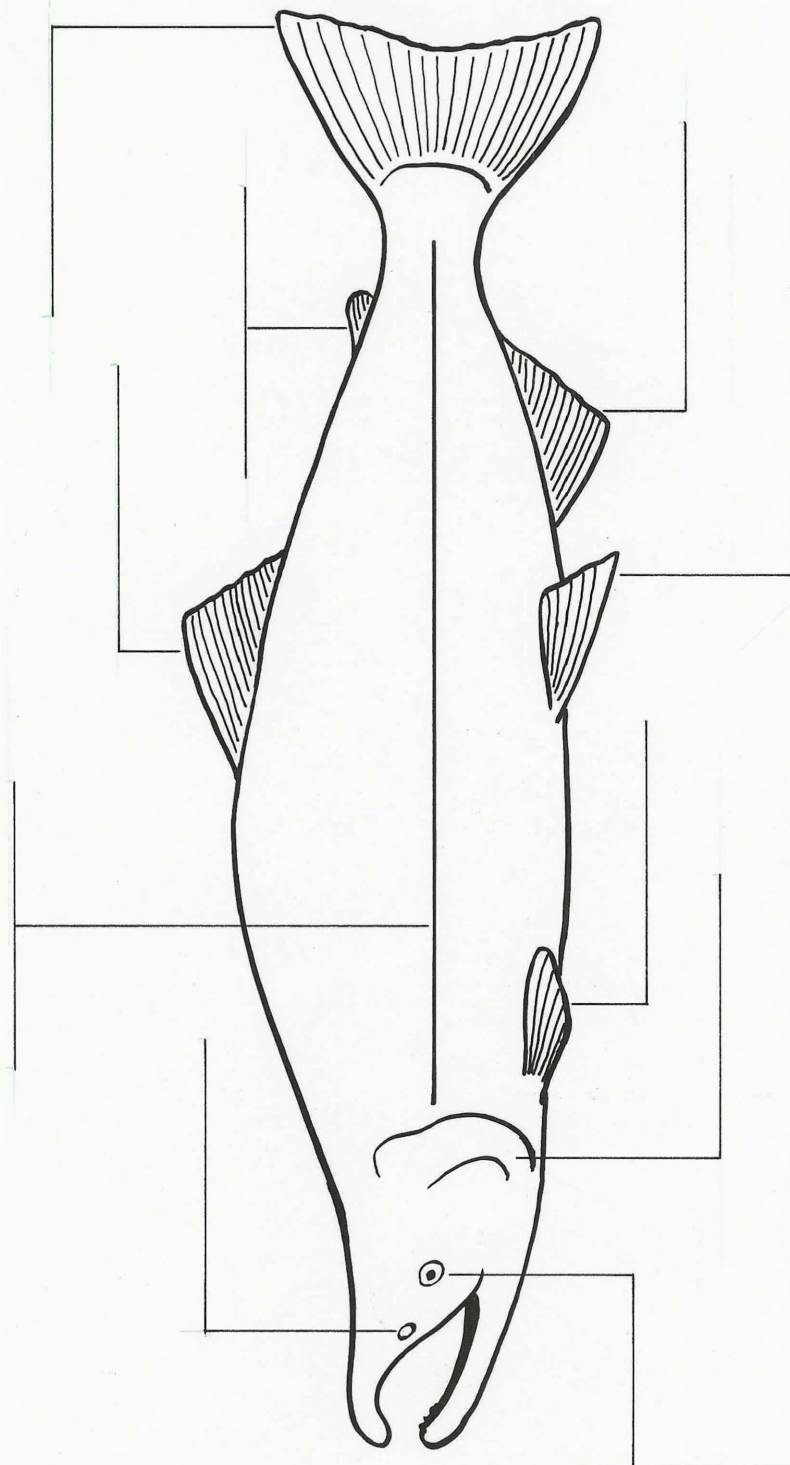
Operculum (gill cover) - this covering over the gills protect the gills from getting hurt.

EXTERNAL FISH ANATOMY



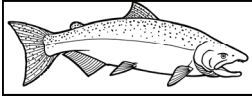
Student Worksheet: External Fish Anatomy

EXTERNAL FISH ANATOMY



Label the salmon. Put these external features on the correct lines.

- 1) Caudal fin
- 2) Dorsal fin
- 3) Nares
- 4) Pectoral fin
- 5) Anal fin
- 6) Operculum
- 7) Eye
- 8) Pelvic fin
- 9) Adipose fin
- 10) Lateral line



Post-Work: Internal Fish Anatomy

Subject: Science

Concepts: Internal fish anatomy and function

Key Vocabulary

- Gill
- Kidney
- Swim bladder
- Intestine
- Vent
- Stomach
- Liver
- Heart

Skills

- Comparing and contrasting
- Biological illustration
- Application
- Labeling

Materials

- Student drawings from Pre-Work, “External Fish Anatomy” procedure #5
- Pencils
- Student Worksheet, “Internal Fish Anatomy”
- Teacher Reference, “Internal Fish Anatomy”

Now that you have learned the external anatomy of a fish, let’s learn the internal anatomy of a fish and its function.

Grade Level Expectations (GLEs) or Evidence of Learning

Science

1.2.6 Understand that organisms can be a single cell or many cells that form parts with different functions.

2.2.1 Understand that all scientific observations are reported accurately and honestly even when the observations contradict expectations.

Objective

Students will learn and identify internal fish anatomy and function.

Suggested Procedure (Before Class)

1. Create an overhead transparency using Student Worksheet, “Internal Fish Anatomy.” It will be used in step 4.

Suggested Procedure (During Class)

1. Ask students to name parts inside their own bodies. Keep a list of these answers on the board. Review each body part on the list with students by asking, “Do fish have this?”

<u>Humans</u>	<u>Fish</u>	<u>Humans</u>	<u>Fish</u>
lungs	no	heart	yes
blood	yes	skin	yes
stomach	yes	brain	yes
eyes	yes	ears	yes
nose	yes	teeth	yes
kidneys	yes	intestine	yes
backbone	yes	muscles	yes

2. Ask students if they can think of any internal body parts that fish have that people do not have. Examples: gills and swim bladder.

3. Using the transparency for “Internal Fish Anatomy”, ask students to help you label the internal organs. Be sure to include all the body parts from the list generated in steps 1 and 2. Refer to Teacher Resource, “Internal Fish Anatomy” if needed.
4. Distribute student drawings from Pre-Work, “External Fish Anatomy.”
5. Ask students to place their drawings face down on their desks and trace the outline of their salmon from the other side of the paper. Students should have a drawing of the external anatomy on one side of the paper and only an outline of a salmon on the other side.
6. Ask students to draw and label the salmon’s internal organs inside the line drawing of the salmon.

Vocabulary Words

Gill - the organ a fish uses to breathe.

Kidney - filters and removes waste.

Swim bladder - an air-filled sac that regulates buoyancy.

Intestine - the portion of the digestive tract between the stomach and vent.

Vent - opening that excretes waste outside of body.

Stomach - organ resembling a sac in which food is mixed and partially digested.

Liver - secretes bile, stores and filters blood.

Heart - muscular organ that pumps blood around the body.

Extensions

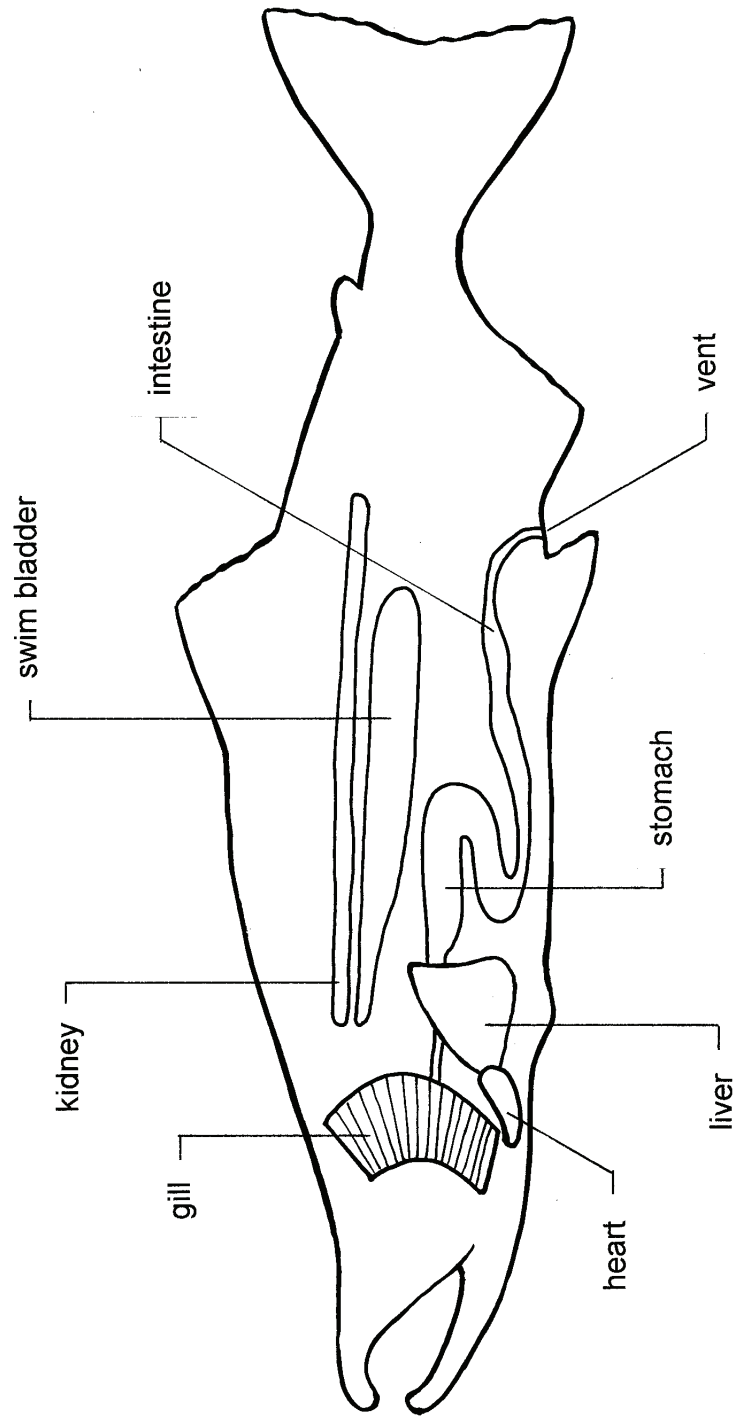
Create a school of salmon in your classroom. Use string or fish line to hang the student drawings from the ceiling. As the drawings move in the air, the pictures will alternate between external and internal anatomy.

Dissect a fish and compare external and internal anatomy using the worksheets.

Website for dissection: <http://www.sf.adfg.state.ak.us/region2/ie/sicc/dissectn.cfm>

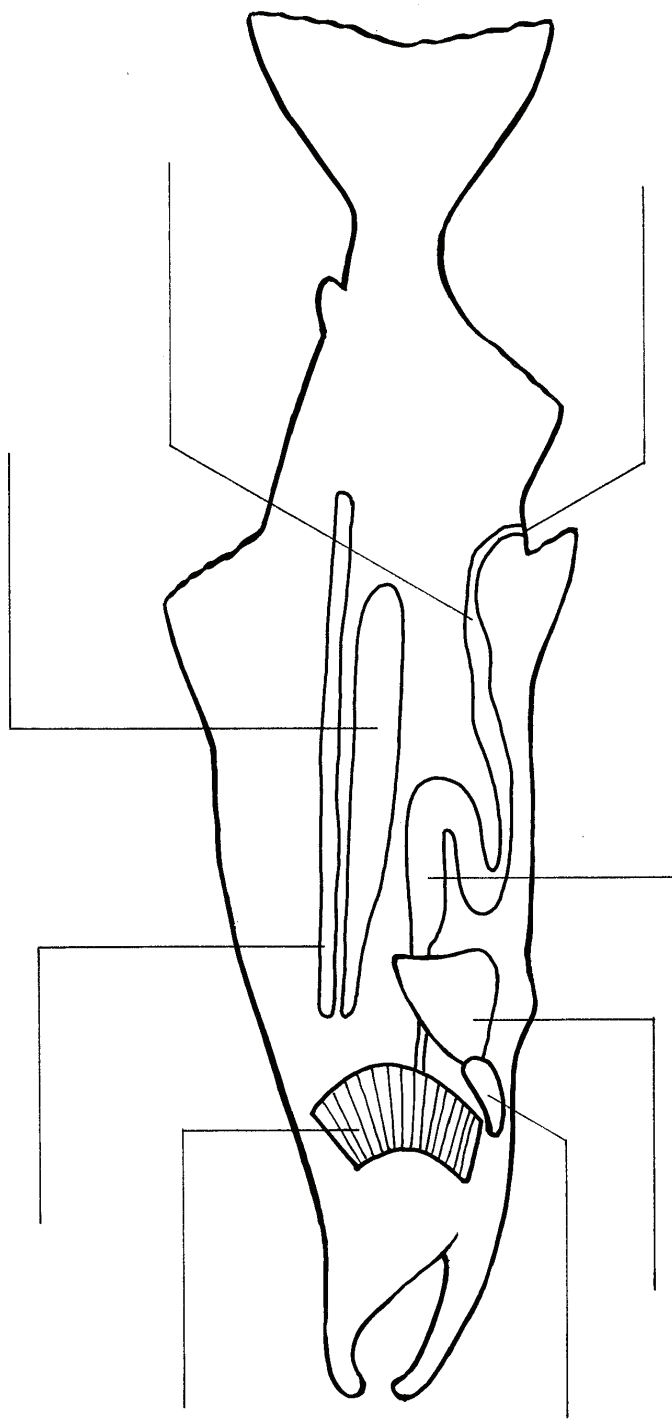


INTERNAL FISH ANATOMY



Student Worksheet: Internal Fish Anatomy

INTERNAL FISH ANATOMY



Put these parts on the correct lines

- 1)Vent 2)Gill 3)Swim Bladder 4)Stomach 5)Heart
- 6)Liver 7)Kidney 8)Intestine