Fish Formation

Overview

With over 20,000 different kinds of bony fishes, learning about them may seem a very difficult task. But it helps to remember that different fishes share many traits, because they're all adapted to aquatic life. Also, fishes have to perform many of the same tasks we do in order to survive. Those requirements for survival include obtaining food and oxygen and moving through and sensing their habitat in order to avoid danger and reproduce.

In this activity, a student is transformed into a fish to demonstrate the major adaptations of fishes to life in water. Classmates contribute to the dress-up demonstration by suggesting adaptations to solve different aquatic needs for survival (like swimming, turning and feeding). Students discover that different kinds of fishes have many similarities since all are adapted to be survivors in a water habitat.

In Session 1, "What Does It Take to be Survivor?" students participate in a *Thought Swap* to share their prior knowledge about fish features. *In Two on a Pencil,* two students hold onto one pencil and without speaking, together draw an animal. They then describe their creation's adaptations for survival. Pairs of students use a "What it Takes to be a Survivor" worksheet to organize their observations and notes as they watch video footage of a variety of fish. Session 1 ends with the students drawing a fish from memory and labeling all of its features for survival.

Session 2 transforms a student into a fish as the rest of the class suggests adaptations for survival in a water habitat. During the fish dress-up, students add details and new vocabulary to their fish drawing and "What it Takes to be Survivor" worksheet from Session 1. The activity concludes with students creating their own fish based on actual fish adaptations listed on the "Create-a-Fish" worksheet.

Sidebar: Vocabulary for this activity includes adaptation, camouflage, caudal fin, chromatophore, counter shading, gills, lateral line, pectoral fin, pelvic fin, predator, prey. All of this vocabulary is introduced within the context of this activity so don't worry about introducing it before you start.

What You Need

For Session 1:

For the class:

- fish video (See Resources)
- 1 sheet of chart paper or chalk/white board
- colored markers

For pairs of students:

- 2 sheets of blank 8 1/2" x 11" paper
- 2 pencils
- 1 "What It Takes to be a Survivor" student sheet

For Session 2:

For the class:

- Fish body parts (see Getting Ready)
- Fish Formation dress up script
- balloon
- butcher paper (about 8 ft.) or 1/2" foam rubber
- permanent color markers
- elastic (2 ft. of 1/2" width; 2 ft. of 1" width)
- plastic wrap (about 3 ft.)
- red felt or red construction paper
- 2 ft sq. of camouflage-colored construction or butcher paper (See Getting Ready)
- 3 ft x 1 ft ocean blue construction or butcher paper for countershade coloration (See Getting Ready)
- white poster board (railroad board)
- overhead projector
- transparency of pattern sheet
- scissors
- clear plastic tape (lots)
- Key Concept (see Getting ready)

Optional:

- posters of various fish
- camera

For each pair of students:

- 1 sheet 8 1/2" x 11" blank paper
- 2 pencils
- "What It Takes to be Survivor" student sheet and fish drawing (from Session 1)
- 1 "Create-a-Fish" student sheet
- fish books for reference

Getting Ready

Making the Costume

1. Make a transparency of the patterns. Using an overhead projector, adjust the patterns so that they are at the

appropriate size (arms should fit through the holes on the costume's side; feet should be visible just below the tail), then using a colored marker, trace the patterns onto butcher paper.

2. Remember to make two each of the eyes, gills, gill covers, jaws, lateral lines, and tails so that there is one each for both the left and right sides of the costume.

3. You can now use your creativity and make the fish costume with various types of materials. For instance, scale patches can be drawn on any white sheet of paper, gills can be made of red construction paper, felt or posterboard, and dots can be drawn on a cloth or paper ribbon for the lateral line.

4. Make the camouflage square to add to the costume. Use your creativity in the type of camouflage you would like to make, but it often works well to try to match this square to carpeting, bulletin boards or etc. that you have around the room. You can then relate the fishes' camouflage to its habitat (the classroom.)

5. Make the ocean blue strip for countershade coloration to add to the fish costume by laying out one side of the fish skin pattern on ocean blue paper and cutting out just the dorsal or upper half of the pattern.

6. After the costumes' parts are cut out and made, laminating or taping the edges is advised to prevent rips. All parts can be affixed with adhesive tape during the dress-up.

7. Attach elastic bands onto the pectoral fins so that the fins can be slipped on like sleeves.

Sidebar: Feel free to improve on the pattern. Once you've got a design you really like, consider constructing the costume out of 1/2" foam rubber.

The Dress-Up

1. Conceal the parts of the costume in a box or bag until each is needed. Stack the pieces in anticipation of the order in which you'll probably retrieve them.

2. Cut pieces of tape and place them within arms reach so they will be ready and available during the dress-up.

3. You will probably want to have a camera available; the dress-up is a wonderful photo opportunity.

4. Key Concept written in large bold letters with colored markers on chart paper.

Different kinds of fishes have many similarities since all are adapted to be survivors in a water habitat.

Sidebar: This activity is a great way to create interest in thinking and learning about fishes. For this reason, consider surprising your students with the Fish-Formation without much initial discussion. Encourage lively class participation during the dress-up, and students will be stimulated to further discussion and study afterwards.

(Into The Activity)

Session 1: What Does it Take to be a Survivor?

Thought Swap

This activity structure helps students to talk about their related prior knowledge. It emphasizes short discussions with different partners, cooperation, and social skills development. It creates opportunities for students to use language in a non-threatening, but highly relevant setting. In Thought Swap, students build on their active listening skills by learning how to hold short interesting discussions about fish adaptations with a variety of different partners.

1. Tell students that during this introductory activity, they will get a chance to talk with different classmates. They need to cooperate, follow directions, and talk quietly with each of their partners.

During the trial test some teachers were concerned that the Thought Swap activity would take too much time or their students would be too silly – so they decided to skip it. However, many others tried it with their students and told us: "This is a GREAT activity – the kids enjoyed it and it's something I will use from now on." "I was not sure it would work – but it did! It helped them to relate the content to their own experience and it was a good lead- in to fish survival strategies". Use your own judgment since you know your students best, but be aware that many teachers not only said they would use this activity again but also that they planned to adapt it to different subjects.

2. Ask students to recall what a good listener should do [you don't interrupt; you look directly at the person] In Thought Swap both partners will be able to discuss each question or topic. To have a good discussion, each partner should be a good listener and speak clearly when it's her or his turn.

3. Have students stand shoulder to shoulder to form two parallel lines, so each person is facing a partner. Students standing side by side should be at least six inches apart.

4. Tell students you will be asking a question or giving them an idea to talk about with their partner who is facing them. They will have about a minute to talk.

5. Pose the first question for students to discuss from the list which follows #7 below. Walk along the two lines to help shy or resistant partners get started and to "eavesdrop" on their conversations. When you call time, have a few students report something that their partner told them.

6. Before the next question, tell students the line needs to move along. Have *one* of the lines move one position to the left so that everyone is facing a new person; the person at the end of that line walks around to the beginning of the line. Everyone now has a new partner.

7. Repeat steps 5 and 6 until you've asked all the questions below:

- What features or adaptations do people have that help us to live so successfully on land? *(Features that help organisms survive and thrive or be successful in their habitat are called adaptations.)*

- What features do fish have that help them to live so successfully in water? *[fins and a tail for movement, gills, scales, cold-blooded, etc.]*

- Compare fish and people. What adaptations do we all have in common? *[Possible answers: both have a way to breathe, move, get food, have babies, sense the surroundings or habitat, protect themselves from enemies, etc.]*

- How are people adapted to be good predators of fish? What have people invented to help us capture fish?

- Let's say you were fishing one day and caught a really cool fish. If you had the chance to ask an ichthyologist (someone who studies fish) some questions about your fish, what would you ask her? *[Possible answers might include asking about its lifestyle (what it eats, who eats it, if it is a fast or slow swimmer), is it good to eat, etc.]*

- What sort of questions do you think the ichthyologist would like to ask you about the fish you

caught? *[Where did you catch it? What did you use for bait to attract it? Was it hard to catch? Are you going to eat it?]*

- Where do you think the ichthyologist got all of the information she shared with you about the fish? What do you think you could do to find out all you could about a fish that you might catch or buy in the store? *(From books, internet, experiences, ask someone)*

8. Have students sit down at their desks with their last Thought Swap partner and prepare to do the next activity together.

Two on a Pencil

1. Have students work with their last partner from the Thought Swap. Distribute a sheet of blank paper and one pencil to each pair. Have them put the sheet of paper between them and both hold onto the same pencil. Tell the students that they are going to **work together** to draw a picture of an animal – any animal, real or imaginary – **without talking to one another**! Tell them they need to include in their drawing all the features or parts of an animal that they can think of to help it to survive in its habitat.

2. Tell them that after they finish their drawing, they can again speak to one another. Have them discuss with each other and then label all the parts they included and briefly describe in writing why it needs that part to survive in its habitat. [They might suggest some of the following: senses (eyes, ears, nose, taste, touch); fins or legs for movement (to capture food, get exercise, escape predators); teeth (for capturing and eating food or for defense); nose for breathing; scales or fur (for protection or to camouflage.)]

3. Have volunteers share their drawings and descriptions with the class. List the parts on the board as they describe them. Now ask them to help you organize the parts they described into larger categories such as the following:

- breathing
- body covering
- senses
- how they get around
- what they use to eat

4. Write these categories on the board and tell the students that these are the features of animals that help them to survive in their habitat.

Fish Video and "What It Takes to be a Survivor" Student Sheet

1. Distribute one copy of "What It Takes to be a Survivor" student sheet to each pair of students. Tell them they are going to watch a video all about fish and their job is to look carefully for examples of each of the survival categories listed on the board and the worksheet.

2. Turn on the video **(turn down the sound completely)** and encourage partners to quietly discuss what they see with each other. Have them write down and sketch on their worksheet examples of each of the categories they see.

> *The vocabulary used in many videos may be given in a too much, too fast mode, which causes many students to lose interest. More often, students perceive videos as an opportunity to relax and daydream - much like how television is used. We suggest changing this perception by using videos to take the students on a "virtual" field trip. In order to do this you will first need to turn the sound off and give the students directions in what you want them to look for. Students are more observant when they must look for the action and hypothesize about its relevance, instead of just waiting to hear it described. This also gives the teacher the opportunity to direct the students' attention to specific topics, rather than just going where the voice over directs. The teacher can have the students answer or discuss specific questions, sketch what they observe, and /or describe what they think is happening. You may find it helpful to use "white noise" such as an audio tape of ocean sounds, to get the students over the hurdle of "listening" to the silence of the video.*

3. When you feel there have been enough examples of survival categories shown on the video, turn it off and lead a class debrief about what the students observed.

4. Now distribute a blank sheet of paper to each student and ask them to draw a fish from memory. Have them include as many parts of a fish that they can remember from previous experience or the video. Tell them they are required to include all five of the categories listed on the worksheet and to label all the fish parts they include.

Encourage them to be as accurate as possible, but that the labels they use don't have to be the real names of the parts. Tell them to just make sure the labels are descriptive of how the part is used or where it is located on the body.

5. Have students informally share their drawings with the class.

6. Tell the students that in the next session you will be "turning" one of them into a fish. In the process, you will probably need to use some new vocabulary to describe the

fish parts as they appear. During the activity, they will be asked to do the following:

1) add the fish part to their drawing (if it isn't already there)

2) add the new vocabulary to their original label of the body part. Have them keep their original label as well – it may be more descriptive than the "real" name. Tell them that real names are very important however, so that everyone can learn the same name and then more easily communicate with one another.

3) take notes with their partner on their student sheet "What it Takes to be a Survivor" as new information is introduced during the dress-up.

Student Sheet

"What It Takes to be a Survivor"

- breathing

- body covering

- senses

- how they get around

- what they use to eat

(Through The Activity)

Session 2: The Dress-Up

The following script is one of many possible ways the dress-up can go. It can be different each time, depending on student responses to your questions. Be sure to credit all responses, even unexpected ones. The right leading questions help insure usable responses. Use this script as a stimulus to get you started, and "Go with the flow." Enthusiasm and flexibility are the keys to success. Surprise will stimulate extra fun and learning, so be sure to keep the fish parts hidden until needed.

1. Write new terms (in bold type) on the board as they are introduced and remind students to add them to their fish drawing and describe them on their "What it Takes to be a Survivor" worksheet from Session 1.

FISH-FORMATION SCRIPT:

Teacher: Today we're going to get to know fishes better. There are thousands of different kinds of fishes, so it may seem difficult to learn about them. Fortunately, since fishes are all adapted to life in water, they have a lot in common. I'll need an assistant to help us begin our study of fish adaptations. (*Select an eager student, and have them come to the front of the class. Be sure they aren't too big or small for the fish costume.*)

Thank you, Toni, for volunteering to help us learn about fish today. Class, take your last look at Toni, the student. In the next few minutes, we're going to turn Toni into a fish, before your very eyes! Hmm, where should we start? (*The dress-up is most fun if the student starts looking like a fish right away, so we suggest getting the fish body/skin and head on first.*)

Let's think about some adaptations Toni would need if she were going to start living her whole life underwater, like a fish. Have you ever stayed in a pool or the tub too long and gotten all wrinkled? Human skin isn't made for life in water, so maybe the first thing we should give Toni is some waterproof fish skin. (*Pull out the fish body tunic and put it on the student as you would a jacket; then tape the front closed.*)

Now Toni's skin won't wrinkle, and her body shape is smooth and streamlined to move through the water with little resistance. But while this is a very fine human head, it's not really streamlined for easy swimming. Maybe we should give Toni a fish head. *Pull out the fish head and slip it over the student's head as shown in the illustration.*

Let's see. . . How do fishes sense their environment? *(Students will probably respond with "eyes," but fishes have all the other senses we do, plus one extra!)* Toni, you've got beautiful eyes, but I'm afraid bony fishes don't have much use for eyelids and eye lashes—their eyes stay open all the time, and they have a much sharper focus underwater than ours do. So let's give you some fish eyes. *Pull out the fish eyes and tape them to the sides of the head.*

A fish's eyes tell us a lot about its habits. Toni's eyes are quite large, so she's probably a visual predator—one that finds its prey by sight. Others depend mostly on their sense of smell and don't need large eyes. Fishes have pits with nerves that sense different smells. Point to nostrils on snout. Other fishes have long whiskers or barbels with taste receptors to sense their prey - like the catfish. Fishes can even feel nearby movements without actually being touched, so they have one sense that we don't—a sense of "distant touch." The organ providing distant touch is the **lateral line.** (*Pull out the dotted ribbon, and tape it just below the student's arm pit, so it hangs down the side.)*

Have you ever seen the line running down the side of a fish? That's the lateral line. It's made of a series of tiny pits, each with a little hair-like sensor that detects nearby water movement. So Toni, now you can sense a predator's approach, even in murky water. Lateral lines also help schooling fishes stay in touch.

We've seen that Toni-fish has nostrils and that she uses them to smell her environment. What else do we use out nostrils for?

Class: Breathing!

Teacher: Yes, we can bring in air containing oxygen through our nostrils or through our mouth and then the air enters into our lungs where the oxygen is removed and sent to the rest of our body. There is much less oxygen in water than in air, so most fishes have gills instead of lungs. Let's add some gills to Toni-fish. Pull out the gills and show how one side of the gill is long and delicate and the other side is shorter and stouter. The short, stout side of the gill is called the gill raker and this acts as a sieve to keep food in the fishes mouth from swimming out through the delicate gills. *Tape one gill to each side of the body between the fish eye and the student's shoulder.* If these gills are so delicate however, shouldn't they have some sort of protection over them? And they do. It is called the gill cover or operculum. *Tape a gill cover over each of the gills.*

Teacher: Now Toni-fish has a streamlined fish body, smooth fish skin, a way to sense the environment, and a way to breathe, but

what if another fish decides to take a little bite of this nice unprotected skin? Don't fishes often have a kind of armor?

Class: She needs scales!

Teacher: Of course! Most (but not all) fishes have overlapping **scales,** covering most of the body, that protect them from bites and scrapes. *Pull out a patch of scales and tape them to the fish skin.*

Hey, what color should our fish be? *Accept all possibilities, and acknowledge that fishes come in all colors.* The color and pattern of a fish depend on where and how it lives. Fishes near the bottom often are camouflaged to match their surroundings. *Pull out a patch of camouflage pattern, and tape it to one side of the fish's body. Turn the student so the camouflaged side is visible.*

But, what if Toni was an open ocean fish, like a tuna? How do fishes in the open water hide? *Acknowledge various responses.* Did you ever notice that some fishes are dark blue on the back and light on the belly? That's common in open water fishes. *Pull out the blue back strip and tape it on the other side of the fish body. Turn the student so the counter shaded side shows.* When viewed from above, they blend in with the dark water below, and when viewed from below, they blend in with the light from above. This method of camouflage is called **counter-shading.** Shall we have Toni be a bottom dwelling fish, or an open ocean fish? *Turn the student so the appropriate coloring shows.*

Fishes have another protective coating that helps them avoid bacterial infections. If you've ever been fishing or handled a fresh fish, what's that slippery stuff that gets all over your hands?

Class: Slime!

Teacher: Right, you've been slimed by the fish's protective **mucus** coating. *Pull out some saran wrap to represent slime and drape it around the students shoulders like a shawl.* In addition to helping a fish avoid infection, the mucus helps reduce drag as the fish swims, and in some fishes, the mucus is poisonous, so predators avoid them.

So now Toni has a well protected body, but how's she going to swim? These human legs work great on land, but underwater they won't help much. Any ideas?

Class: She needs fins!

Teacher: Fins would sure help Tony move more efficiently through the water. Hmm, what fin do most fishes use as their main power thruster?

Class: The tail fin. *Other answers are OK, since some fishes use other fins for main swimming power.*

Teacher: Ah, the tail fin! It's also called the **caudal fin**. *Pull the rounded tail fin out and show it to the class. Write the words "caudal fin" on the board.* Will she move her tail side to side or up and down to swim? *Fish move their tails side to side; whales move their tails up and down. Demonstrate this as you hold the tail fin, then tape it to the bottom of the fish skin tunic (so it hangs down hiding the student's feet).* This rounded caudal fin is common to slow-swimming fishes that live on or near the seafloor. They often lay still and ambush their prey. Other slow-swimming fishes have squared off tails like this. *Pull out the squared tail to demonstrate.* The fastest swimmers (tuna, etc.) have crescent-shaped tails. *Pull out the crescent shaped tail.* Slowest of all are the long skinny fishes with no caudal fin (e.g. moray eel). Which tail should we give Toni-fish? *Tape on the most popular tail fin.* So now if Tony sees a tasty sardine swim by, she can beat her tail to chase it. But when her tail beats one direction, her body will tend to move in the other. A sail boat has a board in the center of the hull, called a keel, to help keep it going straight. What can we give Toni that would work like a boat's keel?

Class: More fins?

Teacher: Right! Fishes have a fin right on the middle of their back called a **dorsal fin**. *Pull out the dorsal fin and tape it along the back of the costume.* And they have a similar fin on the middle of their underside, called the **anal fin**. *Pull out the anal fin and tape it to the front of the costume just above the tail.* So our Toni-fish has two keels to keep her going straight when her tail beats side to side. But what if the sardine she's chasing turns suddenly, and all she can do is swim in a straight line?

Class: More fins!

Teacher: Right again! Our fish have side fins called **pectoral fins** on each side of their body that help to turn and stop. *Pull out the pectoral fins and attach one to each biceps with the elastic band.* Now, Toni, if the sardine turns left, you can put out your left pectoral fin to turn that way, too. Some fishes swim mainly with their pectoral fins, instead of their caudal fin. Now, to make Toni-fish even more agile, she has two other fins, called **pelvic fins**, that help her turn and stop. The pelvic fins are near the mid-line on the fish's belly. *Take out the pelvic fins and tape them on.* Some fishes use their pelvic fins like legs to walk on the bottom.

Now Toni-fish can find prey and detect predators with her eyes and lateral line. She can chase prey or escape predators with her

caudal fin, turn and stop with her pectoral and pelvic fins. But even if she catches a squid, how's she going to eat it?

Class: Jaws! (or "teeth," or "a mouth")

Teacher: Let me see if we have some fish jaws for Toni. *Get the class to make the suspense-building sound effects from the movie "Jaws" — **da na da na da na da na da da da da!**, as you pull out a set of jaws.* The jaws of a fish can tell us a lot about the food it eats. A fish with a big mouth and very small teeth (like a grouper) probably swallows other fishes whole. *Pull out another set of jaws.* A fish with lots of big sharp teeth (like a barracuda) may slash its prey before swallowing. Which jaws shall we give Toni? *Tape the desired jaws onto the fish's head.*

Teacher: There is another body part we should add so that Toni-fish doesn't have to constantly work to keep from sinking to the bottom or floating to the surface. *Pull out the balloon and have Toni blow it up. Have Toni pull the balloon inside the costume.* Tell the class that this balloon represents the swim or **air bladder** and many fish have this to help them easily stay at one particular depth rather than constantly working to stay there. It is sort of like having an inner tube. The less gas in the air bladder, the deeper they will float and the more gas, the higher they will float.

Teacher: This is a great looking fish! We could add even more really cool parts. How about a lure like a fishing pole extending off her head, glow-in-the-dark bioluminescence, whiskers on her chin or suckers on her belly.? All of these structures help make fish more successful in their individual habitats. For instance, bioluminescence would be a great adaptation to life in the dark-as-night deep sea. What might suckers be an adaptation for? (stay put in rough water) or whiskers (to "see" in murky water.) Toni-fish already looks very cool and well-adapted just as she is though so let's don't mess with what works."

Well, now, let's see if our transformation is complete. *Quickly recap the adaptations that have been added, having the class come up with either the name of the element (e.g. "lateral line"), or the function (e.g. "distant touch").*

Let's give a big hand for Toni-fish for helping us learn all about fish today! *Have the star take a bow, and have another student help to carefully remove the costume parts.*

Create a Fish

1. Distribute one "Create a Fish" student sheet to each pair of students. Have them work together to pick adaptations from each of the following categories and use them to design their own unique fish. Tell them to write down a detailed description for each of the features they choose and describe how it helps the fish to be adapted to its habitat.

- color (camouflaged, countershaded, striped etc.)
- body shape (long, fat, pancake, torpedo etc.)
- tail shape
- mouth size and position (under body like a shark, at end of long snout etc.)
- size and shape of teeth and gill rakers
- special structures (such as lures, bioluminescence, whiskers, suckers)
- size (big, small, huge - be specific)
- speed (fast, slow, speedy in quick bursts)
- behavior (secretive, aggressive, sneaky, timid etc.)

2. Distribute a sheet of blank paper and fine-point colored markers or colored pencils to each pair. Have students make a detailed drawing of their fish in the habitat to which it is well-adapted. Remind them to label all of its features and give their fish a name that suits it based on one or some of its features.

Sidebar: Some students may want to add to or modify their original drawing from Session 1.

3. Have students use a book or other resource to find a similar-looking fish. Have them write down some things their fish and the fish from the book have in common and list some facts about the fish from the book (habitat and range, what it eats, is it a commercially caught species and etc.)

4. Students can then use their drawings and notes to describe their creation and all its adaptations to the class. Have students display their drawings around the room.

5. Hold up the Key Concept and have one or more students read it aloud. Post the concept next to the list of categories to be a survivor.

Different kinds of fishes have many similarities since all are adapted to be survivors in a water habitat.

Student Sheet

"Create a Fish"

Work with a partner to pick an adaptation from each of the following categories. Write down a detailed description for each of the features you choose and how it helps the fish to be adapted to its habitat. Combine them all together and you have designed your own unique fish.

color (what color and pattern? camouflaged, countershaded, striped etc.)

body shape (long, fat, pancake, torpedo etc.)

tail shape

mouth size and position (under body like a shark, at end of long snout etc.)

size and shape of teeth and gill rakers

special structures (such as lures, bioluminescence, whiskers, suckers)

size (big, small, huge - be specific)

speed (fast, slow, speedy in quick bursts)

behavior (secretive, aggressive, sneaky, timid, picky etc.)

(Beyond The Activity)
Going Further

3-D Fish
Have students make their Create a Fish in 3-D using any of the following mediums:
- miscellaneous craft supplies and/or vegetables
- create a costume similar to the one in this activity
- use paper and make the fish into a stuffed pillow by completing two copies of the fish, stapling them together (colored sides out), leaving one small opening and then stuffing with newspaper.

Students can then use their 3-D model or costume to describe their creation and all its adaptations to the class.

Library Research
Have students draw an actual fish taken from books or posters and label its adaptations for a particular habitat and life style (using the new terms they have learned).

Fish Formation Home Activities

FAMILY FIELD TRIP
Visit an aquarium, pet/fish store, fish market or seafood section of your local grocery store. Count and sketch as many different-looking fish as you can find. How many different tail shapes can you find? How many different mouth, body, and fin shapes? Can you find any special structures like whiskers, lures or suckers? Describe all the survival features you can find to your family. (Remember to describe colors and patterns, body and tail shapes, teeth, gills, and lateral lines.)

HOME GOLDFISH BOWL OR AQUARIUM
Ask your parents if you can get a goldfish for a pet. Keep track of its behavior. Does it come to the surface when you enter the room? Does it seem to prefer certain parts of its habitat? How do you know? Can you tell which fins it uses for steering, stopping or moving forward quickly? Tell your family about all the survival features of your fish that you can find. (Remember to describe colors and patterns, body and tail shapes, teeth, gills, and lateral lines.)

FISH FOR DINNER
Does your family have any favorite fish recipes you can try? Look in a recipe book for a recipe that sounds good to you and your family. Help mom or dad shop for and cook your special fish dinner. Write down the recipe and bring it into class to share and exchange with your classmates.

HALLOWEEN COSTUMES
Make a fish costume for Halloween based on the fish you designed in class. Maybe you and your friends would like to become a school of fish and swim around the neighborhood for Halloween.

Background

With over 20,000 different kinds of bony fishes, learning about them may seem a very difficult task. But it helps to remember that different fishes share many traits, because they're all adapted to aquatic life. Also, fishes have to perform many of the same tasks we do in order to survive. Those requirements for survival include obtaining food and oxygen and moving through and sensing their environment in order to avoid danger and reproduce.

Moving through the Water

The water surrounding the fishes is very different than the air around us, so it's not surprising that they look quite different from us. Water is 800 times more dense than air, so most fishes are streamlined to cut down on drag, and have fins to help them swim. Fin and body shape reflect each fishes' lifestyle.

Here are a few examples: Sleek fishes with large eyes and crescent-shaped tails (like tunas) are fast, constant swimmers. Fishes with rounded or squared off fins and stocky bodies (like sculpins) are typically bottom dwellers. Fishes that live in crevices (like moray eels) may have reduced fins and snake-like bodies. Highly maneuverable fishes (like butterfly fishes) have disc-like bodies, that are flattened side-to-side. Fishes, like the flounder, that live on flat sand bottoms are pancake-shaped. The color of fishes also reflects where they live. Fishes living on the bottom often are camouflaged to look like their surroundings.

Escaping Predators and Obtaining Food

Besides being highly maneuverable and swimming fast, using camouflage or able to fit easily into holes and crevices, fishes also have other protective features to keep from being someone's dinner. Most fish are covered at least partially with scales and slime which not only protect against their skin being easily penetrated by the teeth of predators, but also keeps some parasites and bacteria away.

Obtaining Oxygen

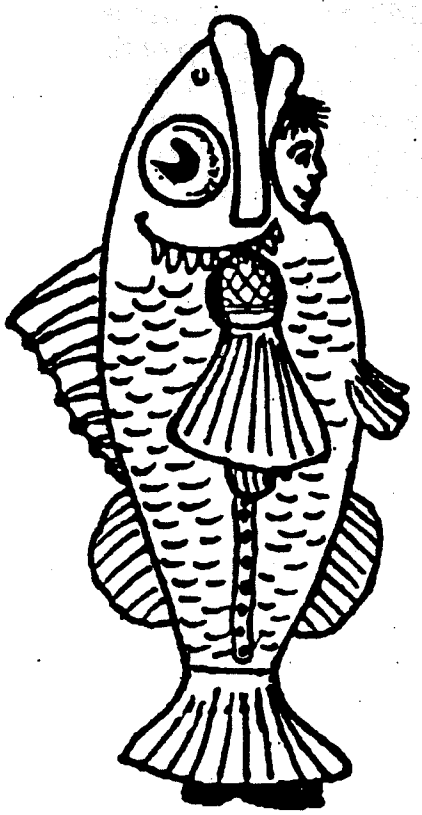
There is far less oxygen in water than in air, so most fishes have gills instead of lungs. The gills have a very high surface area, and are so thin and delicate that the blood running through them is visible, making them bright red. Because the gills are so delicate, bony fishes have a hard gill cover or operculum to protect them.

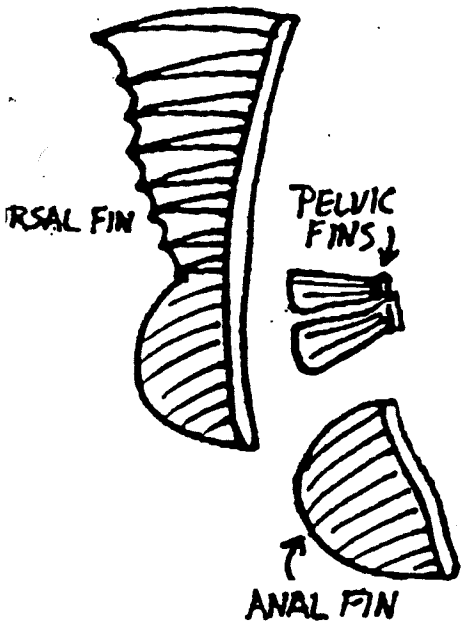
Sensing the Environment

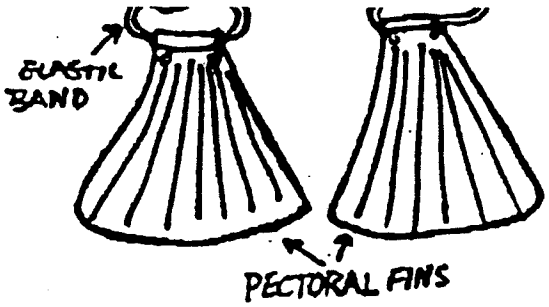
Fishes have all the senses we do: touch, vision, taste, smell, and hearing. But since sound travels much better through water than through air, fishes don't need external ears like we do. Fish also have an additional "sixth" sense that we don't have. Thanks to a lateral line made up of tiny pits with sensory "hairs" and nerves they have a sense of "distant touch," and are able to sense water movement nearby. The lateral line helps schooling fishes to keep together, predators to find prey, and prey to avoid predators.

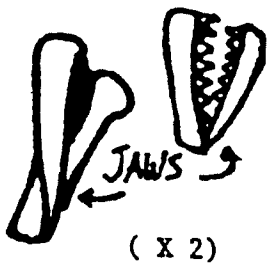
FISH FORMATION

Pattern Sheet









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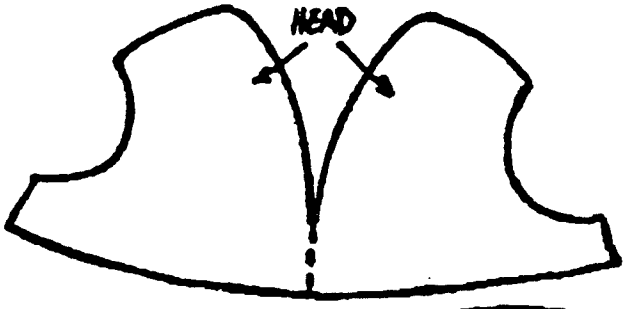

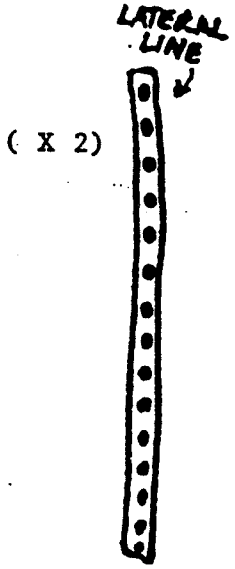

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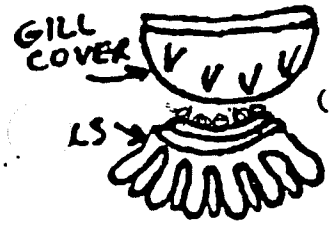

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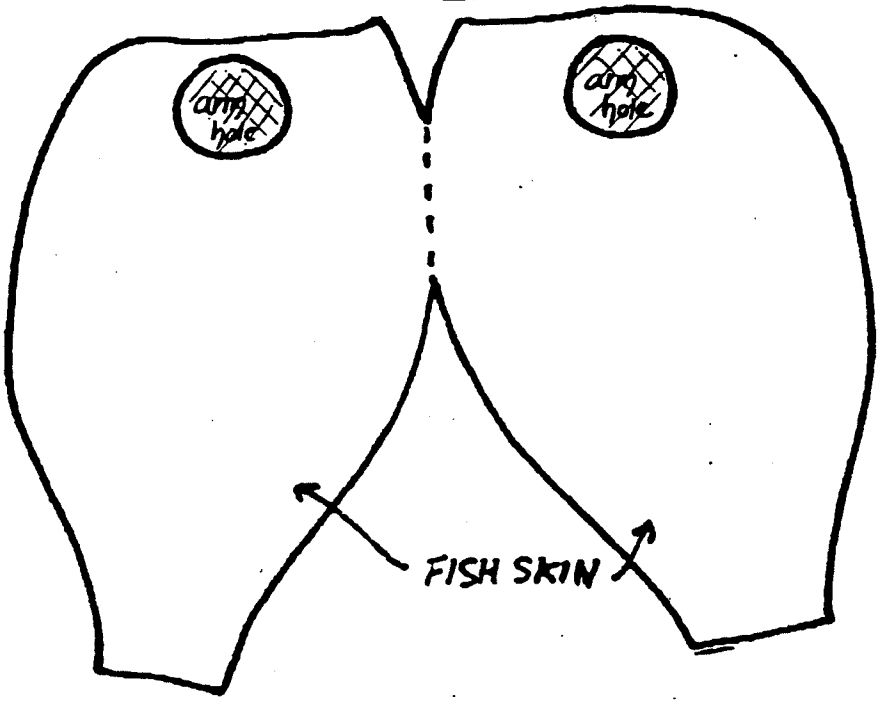

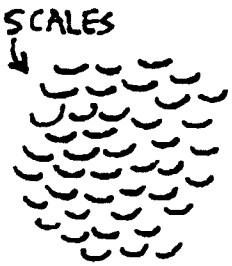

TAILS

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