



A special program for teachers in using science to help students develop observation and literacy skills.

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Taking a Closer Look

It's a typical day at the New England Aquarium. A large group of middle school students on a field trip stop by the Nile crocodile exhibit. Most of them look briefly at the tank, comment on the crocodile, and move on. One or two notice a group of six kindergarten students sitting on the floor in front of the same exhibit tank. Accompanied by a teacher from the Boston Public Schools and an Aquarium staff member, these students are focused on the fish moving around in front of them. They are writing and drawing furiously on their clipboards, and constantly relate their observations to the group. The students ignore the huge crocodile, a distraction if ever there was one, and remain completely engaged in the task at hand. The kindergarten students continue this level of concentration on their work for the entire 20-minute activity.

Teachers as Learners

The group activity described above is part of an Aquarium professional development program for teachers called *A Closer Look* funded by a grant from the Annenberg Challenge Fund for Non-profits. We developed the program in response to both a teacher initiative from the Eliot School and a challenge from principals of the Cluster I schools seeking to use the Aquarium as a resource to support teaching and learning goals. The objectives of the program are:

- To develop tools for teachers that focus student interest during field trips and develop key science and literacy process skills
- To offer pre- and post-visit classroom ideas that develop observation skills and science concepts and promote literacy skills

In the first session, teachers are the students — they do the activities and observations. In subsequent sessions, they observe and assist students in similar activities. Aquarium staff present activities and materials to facilitate observation and recording. Teachers discuss the techniques and tools used and how they would adapt these ideas for their own classroom needs.

Teacher Reflections

“Looking at one fish, I found my power of observation was more intense, and I was able to see more. When I centered on the fish, he became my fish.”



“By focusing on one fish, I felt a sense of responsibility. I took ownership of the fish. I studied the color, shape, how many inches, how it moved. I found the probing questions helpful.

“What are you looking at?” encouraged me to look harder.”



“I really liked the idea of focusing on an exhibit and one fish... This will help children to write, describe and use their observational skills.”

The Techniques and Tools

We developed a variety of activities based on the Massachusetts Curriculum Frameworks. Staff members used techniques derived from their own teaching experiences as well as those suggested by participating teachers. In the most significant feature of the program, Aquarium staff demonstrated the use of questioning and probing to motivate students to draw, write and refine their observations. This section of *Schooling* contains activities that can be used before, during or after an Aquarium visit.

The Results

The pre-visit activities allow students to demonstrate their familiarity with the subject matter, and the follow-up activities show students that they can build on this knowledge. The activities encourage students to relate their own bodies and behavior to characteristics of the animals they see, and provide them with the vocabulary to ask questions.

In comparing the work of students on their first visit and on their second Aquarium visit, the participating teachers noticed the development over two sessions.

“I see a big difference in focus and the results of the activities which introduced concepts and background knowledge.”

“I was impressed with the volume of what they wrote. The drawings were not as stylized and were more detailed.”

Teachers came away with ideas of how they would prepare for and conduct a field trip experience for their students at the Aquarium. Many said that they would like to combine both a survey (looking at all the Aquarium exhibits) and this focused approach (looking closely at one exhibit).

This issue of *Schooling* offers a sampling of the activities that are utilized in the *A Closer Look* program.

For information on how your school can participate in a workshop similar to our *A Closer Look* program, or for additional materials, please call the Teacher Resource Center at (617) 973-6590.

Get to Know a Fish or Another Animal

A Pre-Visit / Visit / Post-Visit Activity

Purpose:

To model the observation and writing skills necessary for developing confidence in science and literacy.

What You Need:

- Fish poster, live fish or other animal in tank
- A poster-size sheet of paper (a Post-it® Easel Pad sheet works well)
- Marker
- Vocabulary words on small Post-it Notes® (see page 3)
- Tape
- Student observation worksheets (see sample)
- Pencils
- Prompting Questions (see page 3)
- Optional: colored pencils

What To Do:

1. Tell your students: "We are going to imagine that we are at the Aquarium. Pretend that the poster is an exhibit at the Aquarium." If you are using live fish or other classroom animals, be sure that students all have a good view by putting students in small groups, each with their own animal to observe.
2. Mark the poster-size sheet of paper so it resembles the student worksheet (see sample).
3. Post the large worksheet model on the wall and post the vocabulary words nearby.
4. Set up the fish or poster where everyone can see it.
5. Show the students the worksheet and tell them that you need their help to draw the fish.
6. Ask what you should draw first: "What's the first thing every living thing has to have?" Wait for most, if not all, hands to be raised before calling on a student to speak. You can lead students to refer to aspects of the fish that need to be mentioned for the drawing to work (like the body) or you can work from the parts, trying to keep them more-or-less in proportion to the drawing space.
7. Continue by asking more questions, such as "What tells you that this is a fish?"
8. As you draw what the students suggest, take the appropriate word card and tape it in the correct location (see fish diagram on page 3). If you aren't using cards, label the parts directly on the fish.
9. Continue until you have drawn the fish.
10. At the Aquarium or with a classroom aquarium, give each student the observation worksheet (you may include vocabulary words on the sheet if you choose) and take a group to one tank. If you are at the Aquarium, it is ideal if you can divide the students among the chaperones and have each group go to a different exhibit. Be sure to prepare the chaperones in advance and give them worksheets so that they understand the purpose of the exercise.
11. Ask students to pick out one fish and watch it carefully. They should draw the fish and write down everything they see or wonder about while they watch the fish.

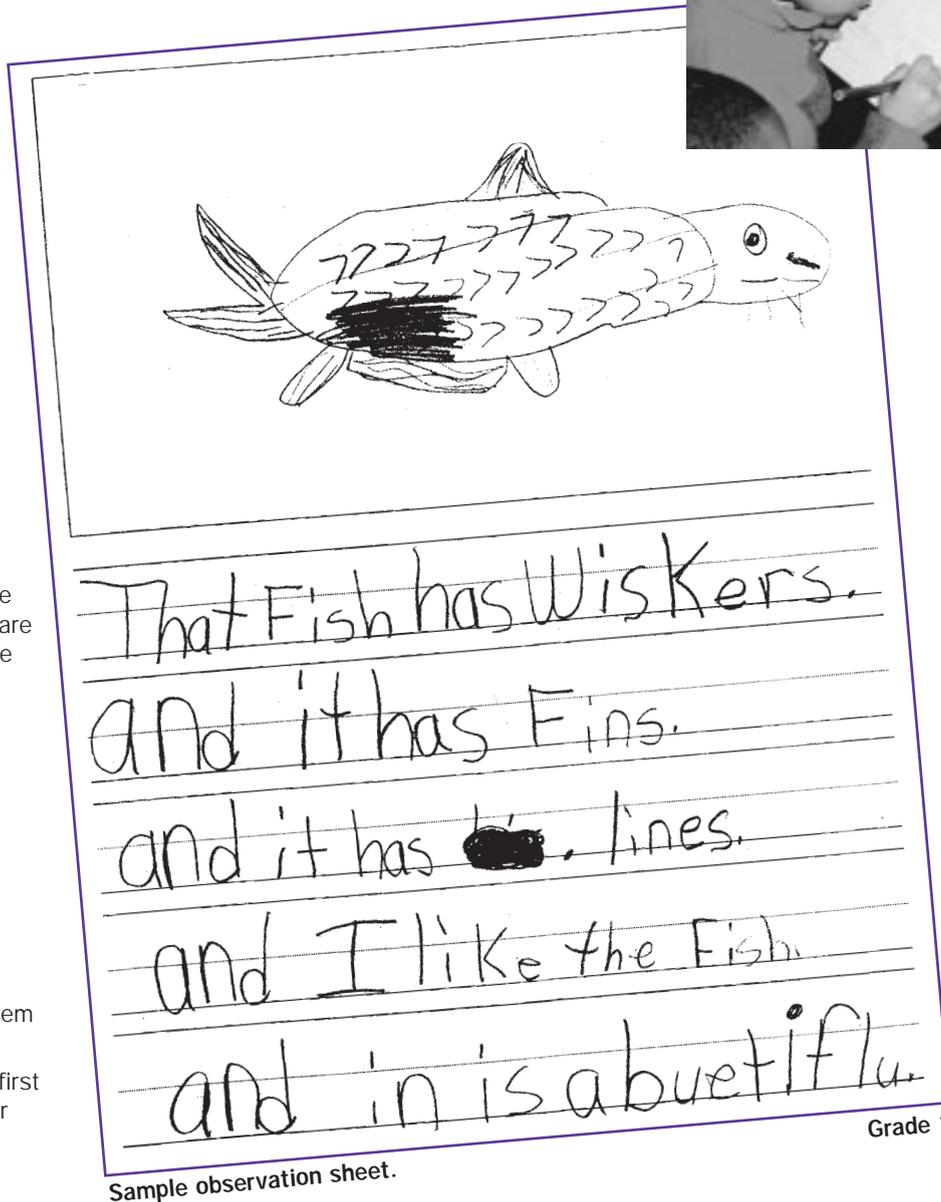


Photo / J. Rubin

Encourage students to talk about what they have noticed and then "get it down on paper" – draw and write their observations.

TIP: In observation lessons, "what", "when", "where" and "how" questions are more useful and more answerable than "why" questions. Avoid questions that prompt one word yes/no responses. Follow the students' observations by encouraging them to offer additional features and details.

Materials and information to support this activity are available at the Teacher Resource Center, (617) 973-6590.

12. Ask the students the prompting questions on page 3 or other similar questions.
13. Upon returning to school or at the end of the activity, ask students to hang their worksheets around the room. Each student should take a turn standing in front of his or her picture to say something about what he or she saw, drew or wrote. Ask what is special about each fish.

Options:

1. Use this activity with different Aquarium animals (e.g. penguins) or in the classroom with videos, posters or classroom pets.
2. Invite chaperones to watch you and the students practice the activity in your classroom.
3. Have each student create his or her own fish in its habitat (research, diorama, story).
4. Set up a classroom fish tank and place a labeled poster above it.
5. Create a word wall/poster for students to use writing a story about their fish.
6. Compare and contrast pictures of different fish.
7. For older students add dorsal, caudal, pectoral, pelvic, anal fins and the lateral line as vocabulary.

Massachusetts Curriculum Frameworks

Life Science

- PreK-2:** Characteristics of Living Things
Living Things and their Environment
Organisms and their Environment
Characteristics of Plants and Animals
- Grade 4-5:** Adaptations of Living Things
- Grade 6-8:** Classification of Organisms
Interactions of Living Things within an Ecosystem

English/Language Arts

- PreK-2:** Language Strand
Literature Strand
Composition Strand

Get to Know a Fish Activity

Fish Vocabulary:

Write each of the following words on index cards. Make two copies of gill slits and eye, and six or more copies of fin depending on the fish.

body	gill slits	mouth
eye	head	scales
fin	lateral line	tail fin

Although most of the above are self-explanatory, definitions of some terms are included below:

Lateral line: The lateral line is a unique sensory system found only in fish. It consists of a series of vibration-sensitive hairs linked to the nervous system, protected within pores that form one or more rows along each side of the fish. It helps a fish avoid obstacles and predators. You can see the lateral line as a faint stripe running along each side of a fish's body.

Fins: Fins help fish move and provide swimming stability. In most fish, paired fins are used for starting and stopping. Medial fins, like the anal and dorsal fins, act like the keel of a boat enhancing stability. In many species, the caudal fin or tail fin provides most forward movement and controls direction. Of course, there are always exceptions. See if you can spot them.

Gills: Fish breathe through gills. Oxygen-rich water enters the mouth, crosses the gills, where oxygen and carbon dioxide are exchanged, and exits the gill slits. Gill covers protect delicate gill filaments.

PROMPTING QUESTIONS:

Pick a fish or other animal. What do you notice?

Describe the animal's appearance and the adaptations that set it apart from all other animals:

- Using your drawing, show me its body.
- What parts does it have? Show where the ___ goes.
- What about that ___? (indicate another part of the animal.)
- What shape is it? How do you think that helps the animal?
- What color is it? Does it have any lines, spots, stripes or other marks?
- Is there a mouth? Are there any teeth or eyes? Show how it is/they are shaped.

Describing its behavior:

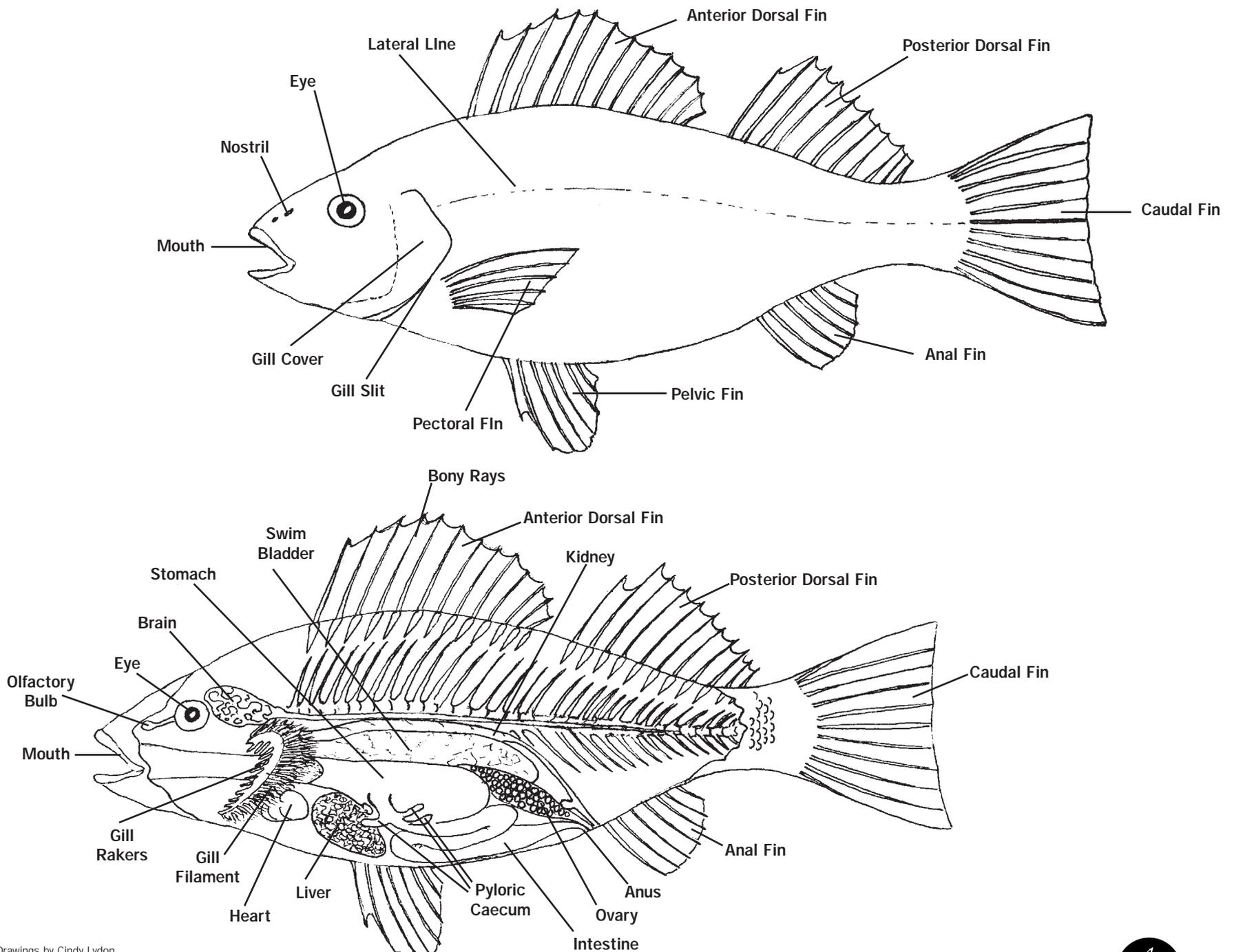
- What is it doing? What (evidence) makes you think so?
- Does it go around or stay in the same place?
- Where is it spending most of its time?
- What happens when it meets another animal?
- How does it move? Write it down.
- What parts are moving? What do they look like? Which parts move in rhythm?
- How does it use its tail and other fins?
- Is it breathing? How can you tell?

Describing the kind of place it lives, its habitat:

- What does its home look like? Show me in your picture.
- Is there anyplace to hide?
- Is there something to hold onto?
- Are there any rocks or sand? Are there any things that were made by people?
- Are there any plants or other living things?

Get it down on paper!

It can be difficult to discover the answers to some kinds of questions (especially "why" questions) during short observations. Be sure to check the signs near the exhibit or ask Aquarium staff if you need further information. You can also send questions to the Aquarium Library. Be sure to include your mailing address so the librarian can reply with the answers.



Drawings by Cindy Lydon.

Let's Learn About Fish

A Pre-Visit / Post-Visit Activity

Purpose:

To acquaint students with vocabulary and concepts and prompt them to record their observations and formulate questions.

What You Need:

- A book about fish, such as *What's It Like To Be A Fish?*
- A poster-size sheet of paper (a Post-it™ Easel Pad sheet works well)
- Marker
- Tape
- Student observation worksheets (see page 2)
- Pencils
- Prompting questions (see page 3)
- Optional: colored pencils

What To Do:

1. Mark the pad sheet into three columns or use three different sheets for the KWL chart as shown.
2. Ask students to sit on the floor around you. Read or paraphrase the book or selected sections. Keep younger students engaged by relating breathing, movement and other aspects of the fish to the students' own bodies.
3. Ask the students to help you fill in the first column of the chart and to tell what they know about fish. Wait for most, if not all, hands to be raised before calling on a student to speak.
4. Write responses in the first column, emphasizing vocabulary words that you would like to reinforce.
5. Now ask the students to help you fill in the second column. Ask them to tell the class what they want to know or learn about fish. Younger students may have difficulty formulating questions. It may help to give them a model for starting their queries such as "I wonder..."; "Why do fish...?"; "How do fish...?"; "What do fish...?" Ask them to think about these questions and ask them to write down any other questions they think of later.
6. Upon entering the Aquarium or prior to looking at a classroom tank, hand out the student observation worksheets and pencils. If you are on a field trip at the Aquarium, it is ideal if you can divide the students among the chaperones and have each group go to a different exhibit. (You can use the map in this issue of *Schooling* to select observation sites.)
7. Encourage chaperones to ask students the Prompting Questions or discussion questions (this page) to elicit student observing, writing, drawing and questioning.
8. After observing fish at the Aquarium or in the classroom, hold a discussion about what the students observed or wrote and drew on their sheets.
9. You may want to have students research their fish and complete the last column in small groups based on their observations and research and have them report to the rest of the class.

KWL Chart

K	W	L
What Do You Know?	What Do You Want to Know?	What You Learned (or Observed)

Optional Activities:

1. Compare two or three types of fish using a Venn diagram (see below).
2. Have students research the answers to the questions in column two on the chart.
3. Have students write a story about their fish or imagine what happens in the exhibit tank at night when visitors and staff go home.

Materials and information to support this activity are available at the Teacher Resource Center, (617) 973-6590.

Discussion:

- Which fish did you observe?
- What did your fish look like?
- What did it do?
- Why do you think it was doing those things?
- Where does it live?
- How does it interact with its environment?

- How does it interact with other fish that are like it?
- How does it interact with other types of fish or animals in the same tank?
- Were there other animals in the same tank?
- What were they?
- What does your fish need to live?

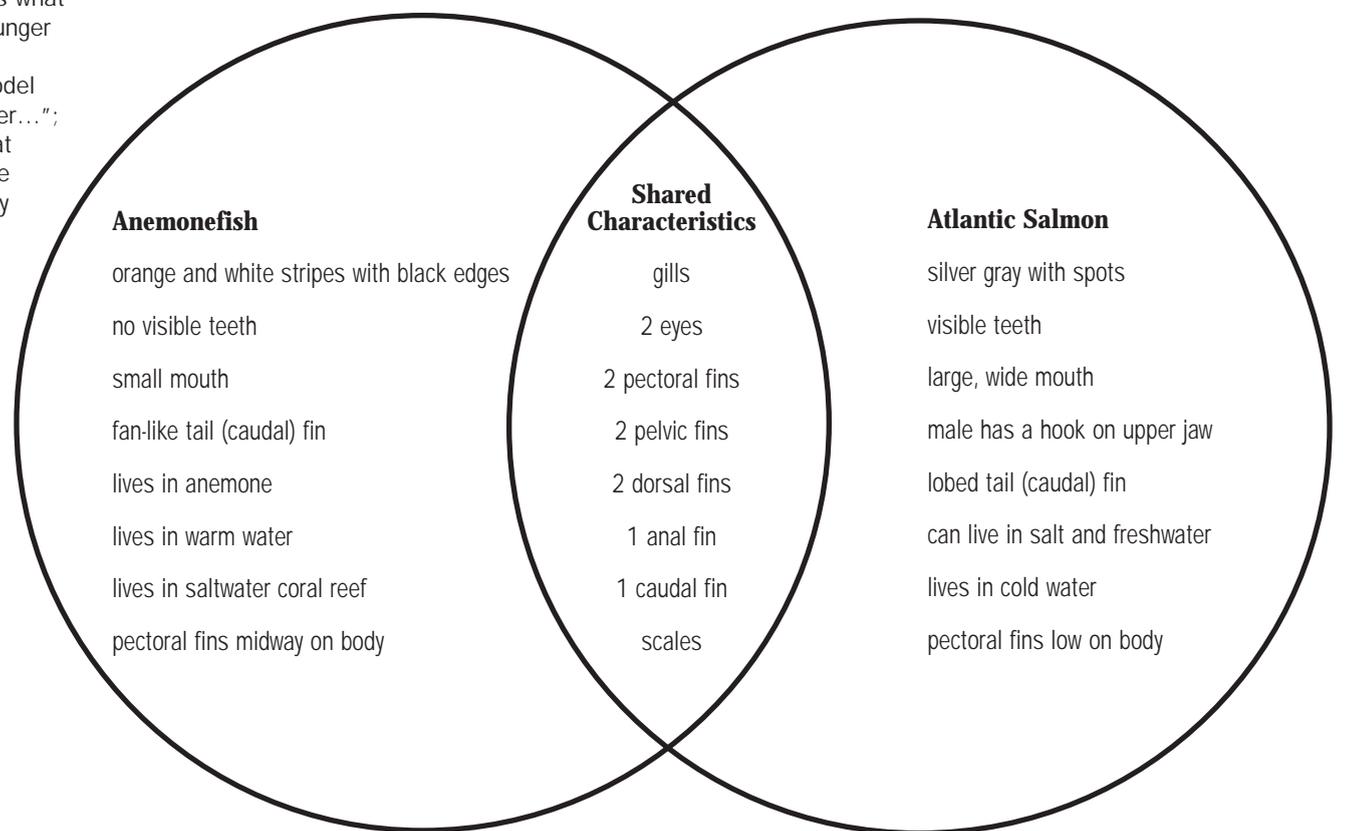
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