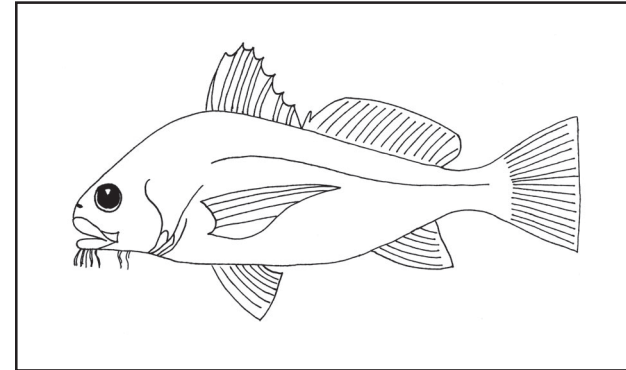


Bony Fish Anatomy Worksheet

Teacher Information

This activity is designed to be team-taught by the classroom and art teacher. Use this guide in conjunction with fish-related art to teach your students the various external parts of a bony fish. Appropriate for grades 2-5.

- Look at the artwork as a group and discuss differences between species. Talk about habitat and how it affects evolutionary development of physical characteristics.
- Explain the difference between bones and cartilage. Use the blank fish diagram to talk about each of the anatomical parts. Alternatively you could draw your own version on the board.
- Hand out the worksheet with the blank boxes and ask your students to fill in the answers. A properly labeled answer guide is provided for you.
- Incorporate a fish-making art activity after the worksheet. Suggestions are included after the answer guide.
- Maine Learning Results achievements are included.



Bony Fish Anatomy Information



Fish are cold-blooded animals that live in water and breathe using gills. Water goes in through the mouth and out through the gills, which take oxygen from the water. Most fish swim by moving their tail (also called the caudal fin) left and right. There are about 22,000 species of fish that began evolving around 480 million years ago.

There are many kinds of fish; some have bones but others, like sharks and rays have no bones, only cartilage. We are going to take a look at the external (outside) anatomy of bony fishes.

Fins

Each fin on a fish is designed to perform a specific function. Fins are appendages (attachments) used by the fish to maintain its position, move, steer, and stop. They are either single fins along the centerline of the fish, such as the dorsal (back) fins, caudal (tail) fin and anal fin, or paired fins, which include the pectoral (chest) and pelvic (hip) fins. Fishes such as catfish have another fleshy lobe behind the dorsal fin, called an adipose (fat) fin that is not illustrated in the following worksheet. The dorsal and anal fins primarily help fish to not roll over onto their sides. The caudal fin is the main fin for propulsion to move the fish forward. The paired fins assist with steering, stopping, and hovering.

Anal Fin

The fin on the lower side of the body near the tail that lends stability in swimming.

Pelvic Fin

Each of the paired fins on the lower side of the body, near the head.

Caudal Fin

In most fish, the Caudal or tail fin is the main propelling fin.

1st Dorsal Fin

The harder fin on the upper side of the body that lends stability in swimming.

Pectoral Fin

Each of the paired fins on either side of the body, near the head that allows side to side movement.

2nd Dorsal Fin

The softer fin on the upper side of the body that lends stability in swimming.

Eyes

Sight organs located on the head. Vision underwater poses many special problems. The most significant is the small amount of light available in all but the uppermost layers of water. Vision under water is limited to a few yards at best and fish do not use this as one of their primary senses.

Operculum (gill cover)

Is a flexible, bony plate that protects the sensitive gills. Gills are fleshy organs that are used for breathing - they are located on the side of the head. Water is "inhaled" through the mouth, passes over the gills and "exhaled" from beneath the operculum.

Lateral Line

A series of sensory pores (small openings) that are located along the sides of fish that sense vibrations in the water. It can easily be seen in fish as a band of darker looking scales running along the side.

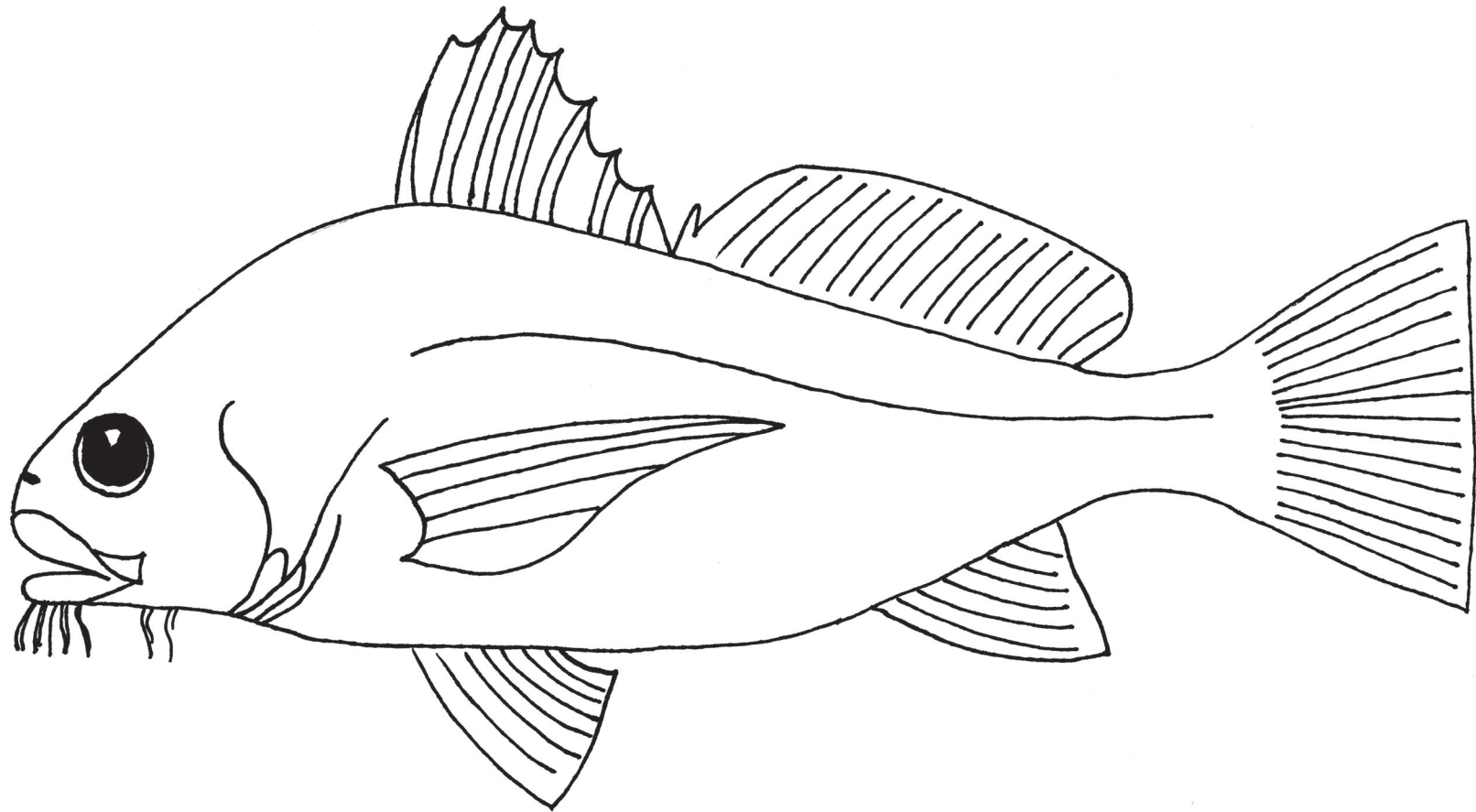
Mouth

The part of the body which the fish uses to catch food - it is located at the front of the body. The mouth's shape is a good clue to what fish eat. The larger it is the bigger the prey it can consume. Fish have a sense of taste and may sample items to taste them before swallowing if they are not obvious prey items. Some fish are omnivorous (eating both plant and animal matter). Some are primarily piscivorous (eating mostly other fish). A few are primarily herbivorous (eating plants). Fish may or may not have teeth depending on the species. Some fish even have teeth in their throat!

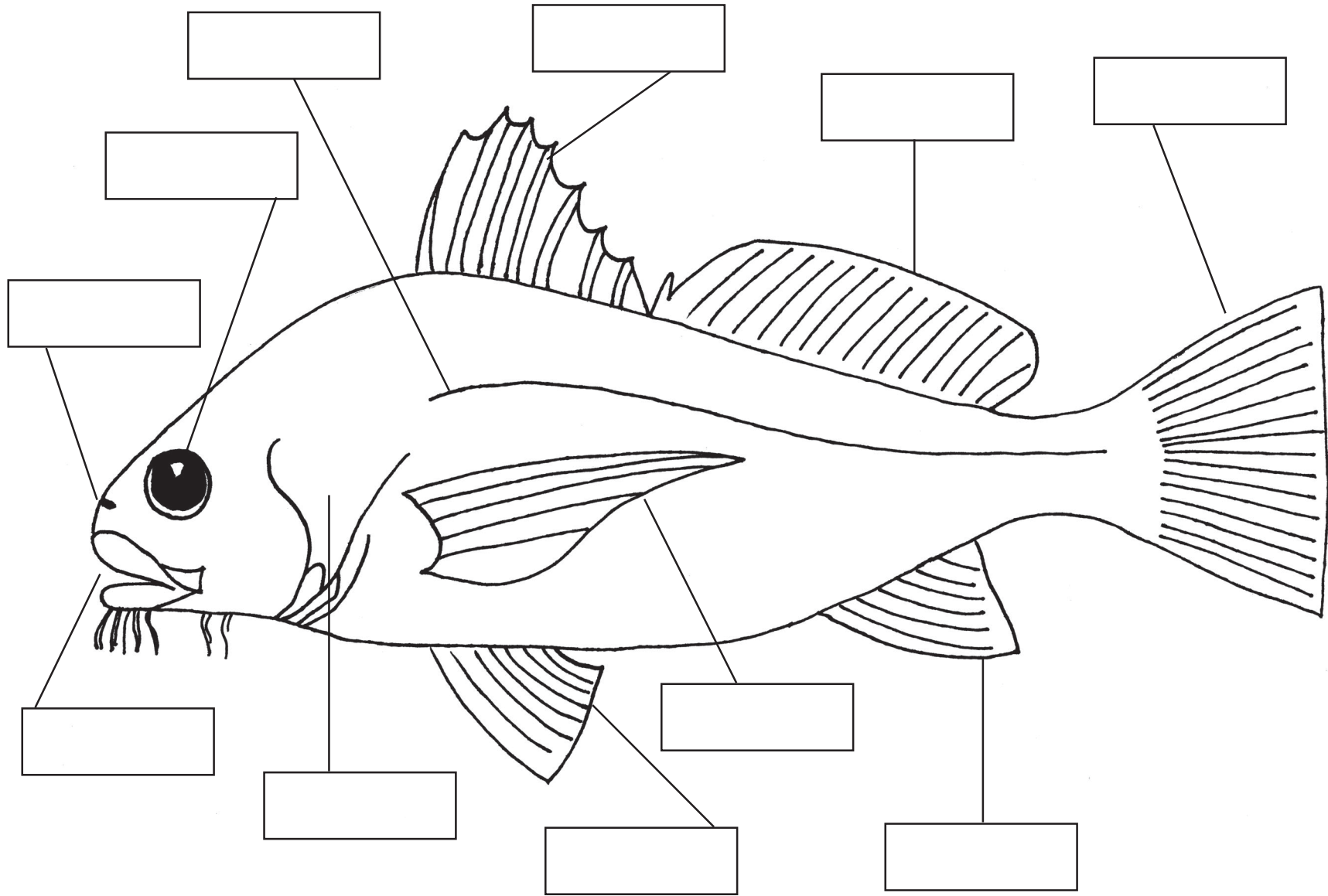
Nostril

Paired nostrils, or *nares*, in fish are used to detect odors in water and can be quite sensitive. In general fish use smell rather than sight to locate food. Eels and catfish have particularly well developed senses of smell.

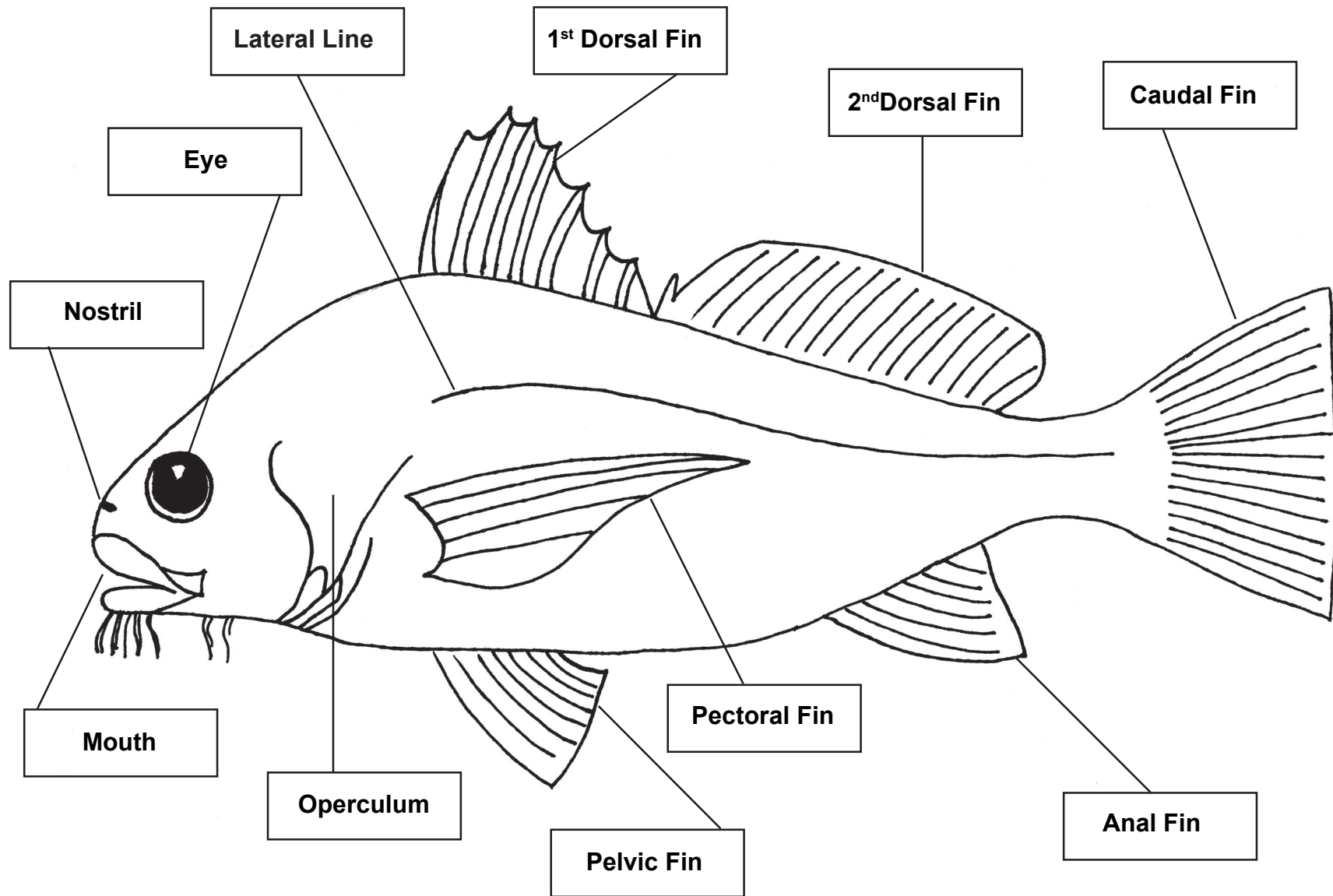




Bony Fish Anatomy



Bony Fish Anatomy



Possible Art Activities

To facilitate imaginative art making, be sure to show the class a variety of fish. Use artistic interpretations, books, photographs, and/or other visual aides. Be sure to discuss how physical attributes are often indicative of habitat. For example, some fish use camouflage to hide from larger predators, some fish are bioluminescent, and some fish are able to “fly.” If students are not already familiar with adaptation, you will need to facilitate additional activities to help establish the concept. Sea Semester at Woods Hole has developed an excellent activity for this purpose. It can be found at:
<http://www.sea.edu/academics/k12.asp?plan=specializedinsea>

Write habitat information on small pieces of paper. Make enough for each student to have at least two. Have them choose that number from a hat and then create a fish that reflects those attributes. They should work out their fish on a sketch and then place in within the appropriate context. For example: “saltwater” and “night feeder” might produce a a fish with a proboscis in a coral reef.

Great lessons about fish can be found at the following websites:

<http://www.dickblick.com/lessonplans>
http://seawifs.gsfc.nasa.gov/OCEAN_PLANET/HTML/search_educational_materials.html
<http://www.geocities.com/Athens/Atrium/5924/underthesea.htm>
<http://artsedge.kennedy-center.org/>

Maine Learning Results: Science and Technology Standards

A. Unifying Themes: Students apply the principles of systems, models, constancy and change, and scale in science and technology.

A1 Systems

Pre-K-2

Students recognize that parts work together, and make up whole man-made and natural objects.

- a. Explain that most man-made and natural objects are made of parts.
- b. Explain that when put together, parts can do things they could not do separately.

3-5

Students explain interactions between parts that make up whole man-made and natural things.

- a. Give examples that show how individual parts of organisms, ecosystems, or man-made structures can influence one another.
- b. Explain ways that things including organisms, ecosystems, or man-made structures may not work as well (or at all) if a part is missing, broken, worn out, mismatched, or misconnected.

A3 Constancy and Change

Pre-K-2

Students observe that in the physical setting, the living environment, and the technological world some things change over time and some things stay the same.

- a. Describe the size, weight, color, or movement of things over varying lengths of time and note qualities that change or remain the same.

3-5

Students identify and represent basic patterns of change in the physical setting, the living environment, and the technological world.

- a. Recognize patterns of change including steady, repetitive, irregular, or apparently unpredictable change.
- b. Make tables or graphs to represent changes.

E. The Living Environment: Students understand that cells are the basic unit of life, that all life as we know it has evolved through genetic transfer and natural selection to create a great diversity of organisms, and that these organisms create interdependent webs through which matter and energy flow. Students understand similarities and differences between humans and other organisms and the interconnections of these interdependent webs.

E1 Biodiversity

Pre-K-2

Students describe similarities and differences in the observable behaviors, features, and needs of plants and animals.

- a. Describe similarities and differences in the way plants and animals look and the things that they do.
- b. Describe some features of plants and animals that help them live in different environments.
- c. Describe how organisms change during their lifetime.

3-5

Students compare living things based on their behaviors, external features, and environmental needs.

- a. Describe how living things can be sorted in many ways, depending on which features or behaviors are used to sort them, and apply this understanding to sort living things.
- b. Describe the changes in external features and behaviors of an organism during its life cycle.

E3 Cells

Pre-K-2

Students describe parts and wholes of living things, their basic needs, and the structures and processes that help them stay alive.

- a. List living things and their parts.
- b. Explain that parts of living are so small we can only see them using magnifiers.
- c. List the basic things that most organisms need to survive.
- d. Identify structures that help organisms do things to stay alive.

3-5

Students describe how living things are made up of one or more cells and the ways cells help organisms meet their basic needs.

- a. Give examples of organisms that consist of a single cell and organisms that are made of a collection of cells.
- b. Compare how needs of living things are met in single-celled and multi-celled organisms.

E5 Evolution

Pre-K-2

Students describe similarities and differences between present day and past organisms that helped the organisms live in their environment.

- a. Describe some organisms' features that allow the organisms to live in places others cannot.

3-5

Students describe the fossil evidence and present explanations that help us understand why there are differences among and between present and past organisms.

- a. Explain advantages and disadvantages gained when some individuals of the same kind are different in their characteristics and behavior.