Organisms in Their Environments

Adapted from a submission by Ellie Horowitz, Massachusetts Division of Fisheries and Wildlife

Life Science, Grades 3–5 (this activity can be adapted for other grade levels)

Every year, third-grade teacher Ms. Trestin does a unit on living things called "Life in the Soil." On a trip to a wooded area or in the schoolyard, students look for living and nonliving things. Students often discover plants and animals, including insects, bugs, and other creatures living in and around leaf litter, rotting logs, or even behind plastic or wood in paved areas. As students observe these creatures, Ms. Trestin asks them, "What does it look like, and what is it doing?" She asks the students to identify, classify, catalog, and place in a food web the living organisms that they find. They develop field guides to the creatures of the different microhabitats.

Ms. Trestin extends this unit by examining life in fresh water. Students visit a pond or stream, wade into the shallow water, and slide a dip net along the bottom. The creatures they catch are placed carefully in small containers and observed with a hand lens. The students compare the similarities and differences among the creatures found in water and in soil.

Biodiversity Days, Any Grade Level
As an extension to the study of plants and animals, students at any grade level can participate in Biodiversity Days, which offers the community an opportunity to see how many species they can find in their area. Field guides or lists can be provided for the event. Students, teachers, and community members can investigate their schoolyards or recreation areas, or join a townwide effort. Students make lists of the common plants and animals, and then look closely to find ones that are different. A group of students may compile a list of everything they find, or may focus on a single group like birds, reptiles, amphibians, or animals that live in or around vernal pools. Class members may want to combine their lists into a master list and pass it on as a reference for future observations. All of the information collected can be combined, using digital cameras or a scanner, and computer software, to create a school or townwide electronic field guide. This data can be submitted and included in a statewide database. For more information about Biodiversity Days in Massachusetts, visit http://www.maccweb.org/biodiversity_days.html.

Assessment Strategies

- Clearly state your expectations for the students' work. Outline the expectations for how field guide data should be organized and recorded. It is helpful to have a sample of the level of work expected, such as a high quality field guide developed by previous students.
- Develop a rubric that assesses how accurately the student identifies, classifies, catalogs, and places the organisms in a food web.
- As a culminating activity, invite parents and friends to school and ask students to present their findings. The teacher may wish to ask a community member to help evaluate the students' presentations.

Life Science Learning Standards

Grades 3–5

1. Classify plants and animals according to the physical characteristics that they share.
3. Recognize that plants and animals go through predictable life cycles that include birth, growth, development, reproduction, and death.

Life Science (Biology), Grades 6–8

Learning Standard	Ideas for Developing Investigations and Learning Experiences
Classification of Organisms	
1. Classify organisms into the currently recognized kingdoms according to characteristics that they share. Be familiar with organisms from each kingdom.	
Structure and Function of Cells	
2. Recognize that all organisms are composed of cells, and that many organisms are single-celled (unicellular), e.g., bacteria, yeast. In these single-celled organisms, one cell must carry out all of the basic functions of life.	Observe, describe, record, and compare a variety of unicellular organisms found in aquatic ecosystems.
3. Compare and contrast plant and animal cells, including major organelles (cell membrane, cell wall, nucleus, cytoplasm, chloroplasts, mitochondria, vacuoles).	Observe a range of plant and animal cells to identify the cell wall, cell membrane, chloroplasts, vacuoles, nucleus, and cytoplasm when present.
4. Recognize that within cells, many of the basic functions of organisms (e.g., extracting energy from food and getting rid of waste) are carried out. The way in which cells function is similar in all living organisms.	
Systems in Living Things	
5. Describe the hierarchical organization of multicellular organisms from cells to tissues to organs to systems to organisms.	
6. Identify the general functions of the major systems of the human body (digestion, respiration, reproduction, circulation, excretion, protection from disease, and movement, control, and coordination) and describe ways that these systems interact with each other.	

Learning Standard	Ideas for Developing Investigations and Learning Experiences
Reproduction and Heredity	
7. Recognize that every organism requires a set of instructions that specifies its traits. These instructions are stored in the organism's chromosomes. Heredity is the passage of these instructions from one generation to another.	
8. Recognize that hereditary information is contained in genes located in the chromosomes of each cell. A human cell contains about 30,000 different genes on 23 different chromosomes.	
9. Compare sexual reproduction (offspring inherit half of their genes from each parent) with asexual reproduction (offspring is an identical copy of the parent's cell).	
Evolution and Biodiversity	
10. Give examples of ways in which genetic variation and environmental factors are causes of evolution and the diversity of organisms.	
11. Recognize that evidence drawn from geology, fossils, and comparative anatomy provides the basis of the theory of evolution.	Is the pterodactyl a flying reptile or the ancestor of birds? Discuss both possibilities based on the structural characteristics shown in pterodactyl fossils and those of modern birds and reptiles.
12. Relate the extinction of species to a mismatch of adaptation and the environment.	Relate how numerous species could not adapt to habitat destruction and overkilling by humans, e.g., woolly mammoth, passenger pigeon, great auk.
Living Things and Their Environment	
13. Give examples of ways in which organisms interact and have different functions within an ecosystem that enable the ecosystem to survive.	Study several symbiotic relationships such as oxpecker (bird) with rhinoceros (mammal). Identify specific benefits received by one or both partners.

Learning Standard	Ideas for Developing Investigations and Learning Experiences
Energy and Living Things	
14. Explain the roles and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.	Distribute pictures of various producers, consumers, and decomposers to groups of students. Have each group organize the pictures according to the relationships among the pictured species and write a paragraph that explains the roles and relationships.
15. Explain how dead plants and animals are broken down by other living organisms and how this process contributes to the system as a whole.	Observe decomposer organisms in a compost heap on the school grounds, a compost column in a plastic bottle, or a worm bin. Use compost for starting seeds in the classroom or in a schoolyard garden.
16. Recognize that producers (plants that contain chlorophyll) use the energy from sunlight to make sugars from carbon dioxide and water through a process called photosynthesis. This food can be used immediately, stored for later use, or used by other organisms.	Test for sugars and starch in plant leaves.
Changes in Ecosystems Over Time	
17. Identify ways in which ecosystems have changed throughout geologic time in response to physical conditions, interactions among organisms, and the actions of humans. Describe how changes may be catastrophes such as volcanic eruptions or ice storms.	Study changes in an area of the schoolyard or a local ecosystem over an extended period. Students might even compare their observations to those made by students in previous years.
18. Recognize that biological evolution accounts for the diversity of species developed through gradual processes over many generations.	