About **Living Things in Their Environment**

DeltaScienceModules, THIRD EDITION

One of the characteristics of living things is the ability to respond to other living things and to the environment. Students explore these responses in this module. They investigate the feeding relationships among microorganisms in a model pond. They investigate the properties of a selectively permeable membrane and observe how a plant cell makes use of these properties when responding to changes in its external environment. Students confirm that plants make food in the presence of light and chlorophyll and store this food as starch. Students examine plant responses to light, to a deficiency of nitrogen, and to the presence of various pollutants. Then they investigate the response of sowbugs to moist and dry habitats. Finally, students design and conduct experiments that test *Euglena*'s response to various external stimuli. Based on their results, they infer why the organism responded the way it did.

In the Science Reader *Living Things in Their Environment*, students learn about the characteristics of life. They read about the structure and function of cells, the smallest units of life. They learn that some living things are made up of a single cell, while others have bodies made of trillions of cells. However, the cells of both types of organisms share similar characteristics. Next, students learn about cell processes and the role of the cell membrane in some of these processes. They read about energy and compare photosynthesis and cellular respiration. Students are then introduced to the plant kingdom. They learn about plant structure, the movement of fluids in plants, and plant responses to their environment. Finally, students find out about representative members of the protist kingdom.

Overview Chart for Hands-on Activities

Hands-on Activity	Student Objectives
1 **Using a Compound Microscope** *page 15*	• identify the parts of a compound microscope • prepare a wet mount • compare and contrast an object with its magnified image
2 **A Pond Ecosystem** *page 23*	• monitor the appearance of different organisms in a miniature pond ecosystem over time • classify the pond organisms as unicellular or multicellular • classify the pond organisms according to how they get the energy they need for survival • diagram a simple food chain of pond organisms
3 **Plant Cell Structure** *page 37*	• observe an *Elodea* leaf with and without a microscope • identify the major cellular organelles in a plant leaf cell • diagram a representative leaf cell to scale • discuss the function of plant cell organelles
4 **Modeling Osmosis** *page 45*	• construct models of cells to simulate the selectively-permeable nature of the cell membrane • measure the mass of model cells before and after osmosis occurs • conclude that water moves from an area of higher concentration to an area of lower concentration
5 **Osmoregulation in Plant Cells** *page 55*	• observe shrinkage of a plant cell's contents when exposed to salt water • observe that shrinkage due to a salty environment can be reversed • recognize that a cell must sense the conditions in its external environment and regulate the uptake or expulsion of water to maintain homeostasis
6 **Plants and Pollution** *page 63*	• observe the effects of different environmental pollutants on the growth of radish seedlings • compare the mass of seedlings exposed to pollutants with the mass of a control group • construct graphs illustrating the effects of pollution on the growth rate of radish seedlings • conclude that environmental pollutants can influence a plant's growth and development
7 **Food Production in Plants** *page 75*	• test two kinds of plant leaves for the presence of starch (food) • observe that only the areas of a leaf that contain chlorophyll produce food • demonstrate that plant leaves make food in light but not in the dark • conclude that both light energy and chlorophyll are needed for food production in plants
8 **Plants and Nitrogen** *page 89*	• observe differences between plants grown with and without nitrogen • compare the biomass of plants grown with and without nitrogen • construct a graph illustrating the effects of nitrogen deficiency on plant height • identify the role of nitrogen in plant growth and development
9 **Plant Tropisms** *page 101*	• observe the effect of gravity on the growth of plant roots • observe the effect of light on the growth of plant shoots • infer the reasons why different plant parts respond as they do to external stimuli • recognize that the survival of a plant depends on its ability to sense and respond to its external environment
10 **Animal Responses to the Environment** *page 113*	• observe the behavior of sowbugs • determine wet or dry habitat preference in sowbugs • graph the location of sowbugs in wet and in dry habitats over time • recognize that the survival of an animal depends on its ability to sense and respond to its external environment
11 ***Euglena* and Light** *page 121*	• investigate the effect of light on a *Euglena* culture • hypothesize why *Euglena* responds to light • identify *Euglena* as a unicellular organism
12 ***Euglena* and Other Stimuli** *page 131*	• observe a method for testing *Euglena*'s response to a chemical stimulus • formulate a hypothesis about how *Euglena* will respond to an external stimulus • design and carry out an experiment to determine how *Euglena* responds to the stimulus • infer the reason for *Euglena*'s behavioral response
Assessment *page 141*	• See page 141.

Process Skills	Vocabulary	Delta Science Reader
communicate, investigate, observe, compare, use numbers	**focus, image, lens, magnification, micrometer (µm), power, specimen**	
communicate; investigate; observe; compare; classify; conclude; make and use models; collect, record, display, interpret, and analyze data	**consumer, decomposer, ecosystem, food chain, microorganism, multicellular, producer, unicellular**	pages 9, 24, 36–39
communicate, investigate, observe, compare, classify, conclude, define based on observations	**cell, cell membrane, cell wall, central vacuole, chlorophyll, chloroplast, cytoplasm, nucleus, organelle**	pages 5–17, 19, 24, 26, 33
investigate; observe; measure; predict; compare; make and use models	**diffusion, osmosis, selectively permeable, solute, solution, solvent**	pages 13, 19–22
communicate, investigate, observe, compare, predict, conclude, infer	**homeostasis, osmoregulation**	pages 2–4, 13, 17, 19–21, 31, 33
investigate; observe; use numbers; compare; conclude; collect, record, display, interpret, and analyze data; use variables	**acid rain, biomass, control, metabolism, pollutant, pollution**	pages 2–4, 30–33
communicate; investigate; observe; compare; conclude; collect, record, display, interpret, and analyze data; use variables; infer	**chlorophyll, glucose, indicator, photosynthesis, starch**	pages 17, 24–26, 33
investigate; observe; use numbers; compare; classify; conclude; collect, record, display, interpret, and analyze data; use variables	**fertilizer, mineral, nutrient, nitrogen**	pages 2–3, 29–34
communicate; investigate; observe; infer; compare; conclude; collect, record, display, interpret, and analyze data; experiment; define based on observations	**gravitropism, phototropism, stimulus, tropism**	pages 17, 24–26, 29–35
communicate; investigate; observe; use numbers; compare; conclude; collect, record, display, interpret, and analyze data; infer	**habitat, innate behavior, learned behavior**	pages 2–4, 27
investigate; hypothesize; compare; collect, record, display, interpret, and analyze data; use variables	**contractile vacuole, energy, eyespot, flagellum**	pages 17, 24–26, 37, 39
investigate; hypothesize; compare; infer; conclude; collect, record, display, interpret, and analyze data; experiment; use variables	**dependent variable, experiment, hypothesis, independent variable**	pages 37, 39

See the following page for the Science Reader Overview Chart.

ACTIVITY SUMMARY

This Delta Science Module introduces students to the ways living things respond to their environment. Through a series of 12 activities, students discover how organisms interact with their surroundings.

ACTIVITY 1 Students learn the parts of a compound microscope and how to calculate the total magnification. They prepare a specimen for viewing and determine how the image observed differs from the real sample.

ACTIVITY 2 Students record the kinds and numbers of microorganisms they observe in a model pond. They identify each organism as a producer, consumer, or decomposer and then draw a food chain.

ACTIVITY 3 Students observe *Elodea* leaf cells with a microscope. They recognize that all cells are surrounded by a cell membrane and that plant cells are also surrounded by a rigid cell wall. Students draw and label a plant cell.

ACTIVITY 4 Students explore osmosis using model cells. Through experimentation, students conclude that water moves across the membrane from an area of greater concentration to an area of lesser concentration.

ACTIVITY 5 Students observe osmoregulation in onion cells. They conclude that the survival of all cells depends on their ability to maintain homeostasis, which includes regulating water balance.

ACTIVITY 6 Students grow radish seedlings in the presence of three different chemical pollutants. Students conclude that chemical pollutants can influence a plant's metabolism to the extent that growth and development are adversely affected.

ACTIVITY 7 Students conduct an experiment with a variegated plant to determine what parts of the leaf make food. Students also investigate whether plants need light to produce food. Students conclude that plants require both light and chlorophyll for food production.

ACTIVITY 8 Students compare the growth of seedlings in a complete fertilizer and a fertilizer that is deficient in nitrogen. Students conclude that plants need nitrogen for healthy growth.

ACTIVITY 9 Students experiment with corn seeds and observe that the root always grows downward. They experiment with radish seeds and observe that the shoot always grows toward light. Students infer the reasons for these plant responses.

ACTIVITY 10 Students investigate habitat preference in sowbugs. They test the animals' preference for a damp or a dry habitat and conclude that animals move toward habitats that provide them with the nutrients and water they need for survival.

ACTIVITY 11 Students experiment with *Euglena* to determine the organisms' habitat preferences. After examining the organism under a microscope, students infer that some structures help the organism find light and that other structures help the organism move toward light.

ACTIVITY 12 Students continue their investigations of stimuli and responses in *Euglena*. First, they discuss the attributes of a well-designed scientific experiment. Then, they design and carry out their own experiment to determine how *Euglena* respond to an external stimulus. Based on their results, they infer why the *Euglena* responded the way they did.