

# OVERVIEW

## STRUCTURES OF LIFE



### GOALS

The Structures of Life Module consists of four sequential investigations dealing with observable characteristics of organisms. Students observe, compare, categorize, and care for a selection of organisms, and in so doing they learn to identify properties of plants and animals and to sort and group organisms on the basis of observable properties. Students investigate structures of the organisms and learn how some of the structures function in growth and survival.

### FOSS EXPECTS STUDENTS TO

- Develop an attitude of respect for life.
- Gain experience with organisms, both plants and animals.
- Observe and compare properties of seeds and fruits.
- Investigate the effect of water on seeds.
- Observe, describe, and record properties of germinated seeds.
- Compare different kinds of germinated seeds.
- Grow plants hydroponically and observe the life cycle of a bean plant.
- Observe and record crayfish and land snail structures and behavior.
- Use knowledge of crayfish and snail life requirements to maintain the organisms in the classroom.
- Organize data about crayfish territorial behavior.
- Develop responsibility for the care of organisms.
- Exercise language, art, social studies, and math skills in the context of life science.
- Use scientific thinking processes to conduct investigations and build explanations: observing, communicating, comparing, and organizing.

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# STRUCTURES OF LIFE MODULE MATRIX

## SYNOPSIS

## SCIENCE CONTENT

## THINKING PROCESSES

### 1. ORIGIN OF SEEDS

Students conduct a seed hunt by opening fresh fruit and locating the seeds. They describe and compare seed properties. Students examine and sort a selection of seeds—bean, pea, sunflower, and corn. They investigate the effect water has on the seeds by setting up seed sprouters and observing and recording changes over a week. Students systemically find out how much water lima beans soak up in a day.

- Seeds are found in the plant part called a fruit.
- Different kinds of fruits have different kinds and numbers of seeds.
- Seeds have a variety of properties.
- Seeds undergo changes in the presence of water.
- A seed is an organism, a living thing.
- A seed contains the embryo plant and stores food and water.

- Describe and sort seeds in terms of properties.
- Estimate numbers of seeds.
- Compare and record the number and properties of seeds from a variety of fruits.
- Sort and compare seeds.
- Observe changes over time.

### 2. GROWING FURTHER

Students examine germinated seeds to determine similarities and differences in the way the organisms grow. They set up a hydroponic garden to observe the life cycle of a bean plant.

- Germination is the onset of a seed's growth.
- Plants need water, light, and nutrients to grow.
- The life cycle is the process of a seed growing into a mature plant, which in turn produces seeds.
- The fruit of the plant develops from the flower.

- Observe changes over time.
- Record information systematically for later analysis.
- Observe and sort seedlings by properties of germination.
- Compare germination in different types of seeds.

### 3. MEET THE CRAYFISH

Students observe and record some of the structures of a crustacean, the crayfish. They establish a feeding and maintenance schedule for the organisms. Students investigate crayfish behavior by creating an enriched crayfish habitat. They map where the crayfish spend their time within their habitat. Students investigate crayfish territorial behavior.

- Crayfish have observable structures such as legs, pincers, antennae, eyes, swimmerets, tail, and mouth parts.
- Crayfish have certain requirements for life, including clean, cool water; food; and shelter.
- Habitat is where an animal lives.
- Behavior is what an animal does.
- Some animals claim a territory that they protect from other animals.

- Compare and record observations about structures of an organism.
- Observe and compare behaviors of an organism.
- Record systematically over time.

### 4. MEET THE LAND SNAIL OR 5. BESS BEETLES

Students become familiar with snail or beetle structures and behaviors and set up an appropriate habitat for the animals. They compare the structures and behaviors of the snail (a gastropod) or the beetle (an insect) to the crayfish (a crustacean). They investigate the pulling power of the organisms. Students plan and conduct their own projects to find out more about the structure and function of animals.

- Land snails have a coiled shell, a large foot on which they glide, and a body with a variety of structures.
- Beetles have a hard outer covering, six walking legs, three body parts, antennae, and mandibles for chewing wood.
- An organism's structures have functions that help it survive in its habitat.
- The structures found on different kinds of organisms show some similarities and some differences.

- Compare and record observations about structures of organisms.
- Observe and compare behaviors of organisms.
- Conduct a systematic investigation.

**Language Extension**

- Think about plant idioms.

**Math Extensions**

- Problem of the week.
- Estimate the mass of multiple seeds.

**Social Studies and Art Extensions**

- Research fruits in grocery stores.
- Make seed art.

**Science Extensions**

- Research seed dispersal.
- Plant seeds in soil.
- Hold a sprout taste test.

See the Science Stories folio.

- *Seeds Are Everywhere*
- *The Most Important Seed*
- *Barbara McClintock*

www.fossweb.com

Check the FOSS website for interactive simulations, to write questions to a scientist, for teaching tips, and to talk with other classes using FOSS.

Home/School Connection: Students look for seeds at home. They draw or collect and describe the seeds, identifying their similarities and differences.

**Language Extensions**

- Keep journals of the growth of plants.
- Play Concentration with life-cycle pictures.

**Math Extension**

- Problem of the week.

**Social Studies Extension**

- Research staple crops around the world.

**Science Extensions**

- Take home hydroponics.
- Explore other conditions for plant growth.
- Compare flower structures.
- Compare plants grown in soil.

See the Science Stories folio.

- *Hydro-growing*
- *Seeding Space*

Home/School Connection: Students look around their neighborhood for plants and observe the different plant structures.

**Language Extensions**

- Prepare oral presentations on crayfish.
- Invent and tell crayfish territorial stories.
- Label crayfish structures.
- Write about a day in the life of a crayfish.

**Math Extensions**

- Problem of the week.
- Compare the masses of crayfish.
- Measure the *Elodea* a crayfish eats.

**Science Extensions**

- Investigate crayfish food preferences.
- Investigate crayfish territory.

See the Science Stories folio.

- *Answering Kids' Questions: Crayfish, Crawfish, Crawdaddy*
- *Life Cycle of a Crayfish*
- *Life on Earth*
- *A Change in the Environment*

Home/School Connection: Students compare the structures of the crayfish at school with those of an insect they find. They discuss how various structures help the animal survive.

**Language Extension**

- Read *The Life of Bess Beetles*.
- Prepare a short oral presentation.

**Math Extension**

- Problem of the week.

**Art Extension**

- Design effective presentation posters.

**Science Extensions**

- Shine some light on snails.
- Set up a snail terrarium.
- Find out what a snail will eat.
- Investigate surfaces for snail travel.

See the Science Stories folio.

- *A Snail's Journey*
- *Crayfish, Snails, and Kids*
- *The Food Web*
- *A Chance Encounter*
- *Life in Los Angeles*

Home/School Connection: Students will need some extra time at home to work on their projects and get them ready to present to the class.

## **FOSS AND NATIONAL STANDARDS**

The **Structures of Life Module** emphasizes the development of observation and description skills and building explanations based on experience. This module supports the following National Science Education Standards.

### **SCIENCE AS INQUIRY**

Develop students' abilities to do and understand scientific inquiry.

- Ask and answer questions.
- Plan and conduct simple investigations.
- Employ tools to gather data.
- Use data to construct reasonable explanations.
- Communicate investigations and explanations.
- Understand that scientists use different kinds of investigations and tools to develop explanations using evidence and knowledge.

### **CONTENT: LIFE SCIENCE**

Develop students' understanding of characteristics of organisms and life cycles of organisms.

- Organisms have basic needs and can survive only in environments in which their needs can be met.
- Each plant and animal has different structures that serve different functions in growth, survival, and reproduction.
- Plants and animals have life cycles. The details of this cycle are different for different organisms.
- Plants and animals closely resemble their parents, and many characteristics of an organism are inherited from the parents.

### **SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES**

Develop students' decision-making skills.

- People continue inventing new ways of doing things and solving problems.

### **HISTORY OF SCIENCE**

Develop an understanding of science as a human endeavor.

- Science and technology have been practiced by people for a long time.