

# Delaware Science Coalition



## Grade 2 Insects Unit Template



*Copyright 2008 Delaware Department of Education*

*Preface: This unit has been created as a model for teachers in their designing or redesigning of course curricula. It is by no means intended to be inclusive; rather it is meant to be a springboard for teacher thought and creativity. The information we have included represents one possibility for developing a unit based on the Delaware content standards and the Understanding by Design framework and philosophy.*

## **Unit Summary**

This unit provides investigations that expand student awareness of insects and their diversity. A structured comparison of life cycles and stages of metamorphosis allow students to identify similarities in structures, growth, survival and reproduction among different insects. Additionally, students provide for the needs of the insects generally and specifically and acquire the necessary vocabulary associated with insect life.

### **Stage 1: Desired Results** **Delaware Science Content Standards**

#### **Delaware Content Standards**

**This course focuses on the Delaware Science Content Standards and Grade Level Expectations in Standards 1, 3, 5, and 8 found on the following web site: [http://www.doe.k12.de.us/programs/ci/content\\_areas/science.shtml](http://www.doe.k12.de.us/programs/ci/content_areas/science.shtml)**

#### **Standard 1- Nature and Application of Science and Technology**

Understanding and Abilities of Scientific Inquiry

Students should know and be able to:

1. Understand that: Scientific investigations, whether conducted by students or scientists, involve asking a question about the natural world.
  - Be able to: Generate questions and predictions using observations and exploration about the natural world.
3. Understand that: The purpose of accurate observations and data collection is to provide evidence. Scientists use tools to enhance their senses in order to obtain more evidence.
  - Be able to: Collect data using observations, simple tools and equipment. Record data in tables, charts, and bar graphs. Compare data with others to examine and question results.
4. Understand that: Scientists use observations from investigations and knowledge that is already known to develop an explanation.
  - Be able to: Construct a simple explanation by analyzing observational data. Revise the explanation when given new evidence or information gained from other resources or from further investigation.
5. Understand that: The purpose of communicating with others is to share evidence and conclusions. Scientists communicate the results of their investigations to others.

- Be able to: Share simple plans, data, and explanations with an audience and justify the results using the evidence from the investigation.
6. Understand that: The use of mathematics, reading, writing, and technology are important in conducting scientific inquiries.
- Be able to: Use mathematics, reading, writing, and technology when conducting an investigation and communicating the results.

### **Standard 6: Life Processes**

#### Structure/Function Relationship

Students should know that:

1. Plants and animals are similar to and different from each other in observable structures and behavior. These characteristics distinguish them from each other and from nonliving things.

Students should be able to:

- Identify and describe the structures of insects and various other organisms that enable them to function in their environment.

2. Each plant or animal has different structures that serve different functions in growth, survival and reproduction.

Students should be able to:

- Compare and contrast the structures on different kinds of insects at different stages of development.
- Given several pictures of adult organisms, identify and explain which organisms are insects and which are not.
- Observe common structures of different insects (e.g., mouth parts or legs). Describe the similarities and differences among the structures. Recognize that the structure is related to the function it performs (e.g., a caterpillar mouth for chomping leaves differs from a butterfly proboscis for obtaining nectar).

#### Matter and Energy Transformations

Students should know that:

1. Plants and animals are living things. All living things have basic needs for survival including air, water, food (nutrients), space, shelter, and light.

Students should be able to:

- Identify the basic needs of all insects for survival. These include food, water, air, space, light, and shelter. Recognize that insects also have specific needs according to their kind, (i.e., specific food such as nectar or mulberry leaves).

2. In addition to basic needs for survival, living things have needs specific to the organism such as temperature range and food requirements.

Students should be able to:

- Observe a variety of plants and animals. Compare specific needs that are common to plants or animals of the same group (i.e., all fish need water but some fish need cold water to live and some need warm water to live, all plants need water but some

need a humid environment and some need a dry environment).

- Conduct simple investigations to determine and describe how insects and various other organisms respond to different kinds of stimuli, (e.g., light versus dark environment).

#### Life Processes and Technology Application

Students should know that:

3. The ability of an organism to meet its needs for survival is dependent upon its environment. Manipulation of the environment can positively or negatively affect the well being of various organisms that live there.

Students should be able to:

- Investigate and evaluate how plant growth is affected by varying amounts of different soil components.
- Conduct simple investigations using artificial habitats to describe how the survival of insects is affected by the environment.

#### **Standard 7: Diversity and Continuity of Life**

##### Reproduction, Heredity, and Development

Students should know that:

1. The offspring of some plants and animals resemble the parents (i.e., a tree seedling resembles a mature tree).
2. The offspring of some plants and animals do not resemble the parents. Similarities between parents and their offspring become more apparent as their life cycle continues (i.e., caterpillars become butterflies).
3. All plants and animals go through a life cycle of birth, growth, development, reproduction, and death. This cycle is predictable and describable, but differs from organism to organism.

Students should be able to:

- Observe the life cycle of a selected organism (e.g., plant, butterfly, frog, etc.) and recognize that the stages of the life cycle are predictable and describable.
- Identify the stages in a life cycle of an organism that goes through complete metamorphosis (e.g., butterfly, mealworm). Describe the similarities and differences in the structures and behaviors of the egg, larvae, pupae, and adult insect.
- Identify the stages in the life cycle of an organism that goes through simple (incomplete) metamorphosis (e.g., grasshopper, cricket). Describe the similarities and differences in the structures and behaviors of the egg, nymph, and adult insect.

##### Diversity and Evolution

Students should know that:

1. Many different kinds of plants and animals live throughout the world. These plants and animals can be grouped according to the characteristics they share.

Students should be able to:

- Recognize that there are many different kinds of animals in the world, of which insects are one grouping. Sort insects from animals that are not insects. Identify the characteristics used to sort the insects (i.e., three body parts, six legs).

#### Technology Applications

Students should know that:

1. People use the variety of plants and animals found throughout the world for food, clothing, and shelter (e.g., silk for clothing, wood for building shelters).

Students should be able to:

- Recognize that some insects are considered harmful to humans, plants, and other animals while other insects can be beneficial. Technology allows us to help control the harmful insects (i.e., control of mosquitoes, termites, ticks, etc.).

#### **Standard 8: Ecology**

##### Interactions within the Environment

Students should know that:

2. Plants and animals need enough space and resources to survive. Overcrowding leads to an increased need for resources.

Students should be able to:

- Describe the effects that result from plants, insects, and other animals changing the environment in which they live (e.g., worms make tunnels in the earth, crickets eat the grass).
- Observe the plants and animals living in an environment. Identify ways in which plants and animals benefit from each other (e.g., animals use plants for food and shelter, and plants need insects to spread pollen).
- Observe and describe the effects of plant and animal overcrowding in a given space (i.e., many guppies in an aquarium, many beetles in a habitat). Recognize that this overcrowding results in an increased need for basic resources.

#### **Big Ideas**

**Observation and Evidence:** to observe various insect life cycles and gathering evidence that life cycles are similar among several diverse organisms.

**Structure and Function:** to compare similar structures in different organisms and identify the functions performed by each.

**Interactions:** of living things with their environments and one another.

**Cycles:** to observe the cyclic nature of life (birth, growth, reproduction, death)

Behavior/Regulation: of organisms as they react to their environment and each other.

Change over time: as students observe the structural and behavioral changes that occur during the life cycles of various insects.

### **Unit Enduring Understandings**

*Students will understand that...*

Living things have predictable and observable stages in their life cycles.

All living things need shelter, food, water, light, and air.

Specific insects have specific needs at different times in their life cycle.

Physical structures, functions and needs of living things change throughout their life cycles.

### **Unit Essential Question(s)**

1. What are some similarities and differences in the larvae, pupae, and adults of insects that go through metamorphosis (complete or incomplete)?
2. What are the behaviors of insects at different stages of their life cycle?
3. How do specific structures aid in the survival of insects throughout their life cycle?
4. How are insect life cycles related to the life cycles of other living organisms?

### **Knowledge & Skills**

Knowledge:

- All insects have three body parts—head, thorax and abdomen.
- All living things need air, food, water, and space to survive. Specific insects have specific needs.
- The structures of some insects change as the insects grow.

- All insects have structures that are similar to one another and that carry out similar functions throughout their life cycles.

**Skill:**

- Generate questions and predictions using observations and exploration about the natural world.
- Generate and follow simple plans using systematic observations to explore questions and predictions.
- Collect data using observations, simple tools and equipment. Record data in tables, charts, and bar graphs. Compare data with others to examine and question results.
- Construct a simple explanation by analyzing observational data. Revise the explanation when given new evidence or information gained from other resources or from further investigation.
- Share simple plans, data, and explanations with an audience and justify the results using the evidence from the investigation.
- Use mathematics, reading, writing, and technology when conducting an investigation and communicating the results.
- Identify the basic needs of all insects for survival.
- Conduct simple investigations to determine and describe how insects and various other organisms respond to different kinds of stimuli.
- Conduct simple investigations using artificial habitats to describe how the survival of insects is affected by the environment.
- Identify and describe the structures of insects and various other organisms that enable them to function in their environment.
- Compare and contrast the structures on different kinds of insects at different stages of development.
- Observe common structures of different insects. Describe the similarities and differences among the structures. Recognize that the structure is related to the function it performs.

## Stage 2: Assessment Evidence

### Suggested Performance Task(s)

Life cycles assessment for Grade Two can be found at:

[http://www.doe.k12.de.us/programs/sci\\_assess/default.shtml](http://www.doe.k12.de.us/programs/sci_assess/default.shtml)

### Key Transfer Ideas:

- Identify the needs of living things such as air, food, water, and space.
- Compare and contrast the life cycles of a variety of living things.
- Explain how the structure of living organisms relates to the function of the organism's parts.

- Describe the needs, structures, and interactions of how living organisms change over time.
- Compare the parent and their offspring. Describe their similarities and differences.

**Students are expected to:**

- Classify things as living or non-living.
- Recognize that the structure of body parts affects the part's function.
- State the characteristics of an insect.
- Evaluate habitats for meeting basic needs.
- Compare life cycles of insects and describe similarities and differences.
- Read and analyze a graph.
- Predict life cycle stages.
- Compare the stages in the life cycle of a tree.
- Describe change over time of a living organism.

**Rubrics/checklists for Performance Tasks**

Life cycles rubrics for Grade Two can be found at:

[http://www.doe.k12.de.us/programs/sci\\_assess/default.shtml](http://www.doe.k12.de.us/programs/sci_assess/default.shtml)

**Other Evidence**

**Formative Assessment:**

**After Investigation 3:** Have students complete questions 1 and 2 on the End of Module Assessment from the Teacher's Manual.

**After Investigation 6:** Have students complete questions 12 and 13 on the End of Module Assessment from the Teacher's Manual.

**After Investigation 5:** Have students complete a Venn diagram comparing and contrasting a Mealworm vs. Butterfly. Also, have students create a list of at least four things that insects need for survival (air, water, food, shelter, space, light, etc.).

### Stage 3: Learning Plan

(Design Learning Activities To Align with Goals and Assessments)

#### Key learning events needed to achieve unit goals

#### Resource: FOSS *Insects*

#### Investigation One: Mealworms

In this investigation, students observe mealworms as the change from larvae to pupae to adults. While making their observations, students describe larval segments, legs, and other structures of mealworms and they record changes in mealworm structure and behavior over time.

#### Investigation Two: Waxworms

Students continue their observations of insects by comparing waxworm larvae to mealworm larvae. Changes in physical and behavioral characteristics are recorded over time.

#### Investigation Three: Milkweed Bugs

In this investigation, students receive vials of milkweed bug eggs. Each group prepares a habitat for the bugs and observes structure, pattern, and behavior as the insects advance through simple metamorphosis.

#### Investigation Four: Silkworms

Students are given silkworm eggs and observe the birth, growth and changes to larvae, pupae and adults who produce eggs. While making their observations, students continue to compare all of the insects as they go through their life processes.

#### Investigation Five: Butterflies

In this investigation, the class observes painted lady larvae as they grow, pupate, and emerge as adults. Students experience the stages of complete metamorphosis and compare the behaviors of moths and butterflies.

#### Investigation Six: Other insects

Students set up habitats and observe the structures and behaviors of house crickets, ants and aquatic insects. All insects are observed and similarities and differences are discussed and recorded.

**Resources & Teaching Tips**

- So Many Kinds, So Many Places (Investigation 1, part 2)
- Insect Shapes and Colors (Investigation 3, part 3)
- What Makes an Insect an Insect? (Investigation 4, part 5)
- Insect Life Cycles (Investigation 5, part 3)
- Same But Different