An Environmental Education Lesson Plan

Developed by Airlie Gardens and the Cape Fear Audubon Society

2008
Environmental Education Lesson Plan
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This lesson plan is available online at www.capefearaudubon.org

Please do not mark on this document.
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Introduction to Airlie Gardens

Designed in the early 1900s, Airlie Gardens is a valuable social and ecological piece of Southern and North Carolina history.

Pembroke and Sarah Jones originally bought the property where Airlie stands in 1884.

The 1920s saw the height of Airlie’s botanical collections, with 5,000 camellias and a half-million azaleas in bloom, as well as a collection of exotic plants.

Area businessman W. Albert Corbett and his wife Bertha Barefoot bought Airlie in 1948 and the family maintained it until 1999 when they sold it to New Hanover County.

A major grant from the NC Clean Water Management Trust Fund and the support of the residents of New Hanover County made possible the purchase and restoration of the remaining 67 acres of Airlie Gardens to become a local, state, and national treasure.

Airlie Gardens as an Outdoor Classroom

The mission of Airlie Gardens is to be a historic public garden with cultural and environmental education programs that serve the residents and visitors of New Hanover County.

Airlie is a rich resource for environmental education. It is one of the last undeveloped tracts along Bradley Creek and provides us with the opportunity to teach firsthand about tidal creek ecosystems and North Carolina’s horticulture.

Airlie has created a native butterfly house (opening in Summer 2008), which emphasizes the beauty and biology of native butterflies in New Hanover County.

This wonderful, hands-on teaching setting will captivate students who visit Airlie for butterfly-focused field trips. Students will learn about the importance of creating habitat in their own backyards by learning what components are essential for creating a butterfly garden.

Groups are encouraged to schedule a field trip, making use of our Environmental Education Lesson Plan. See page 25 for scheduling a trip.

Field trips include a guided tour of two of our outdoor teaching areas with hands-on science education experiences.

The program is correlated to the fourth grade science curriculum in the Standard Course of Study for North Carolina and focuses on the life cycle, adaptations, and survival traits of native butterflies.
Scheduling a Trip

At least two weeks’ notice is required to make a reservation. Call Airlie’s Environmental Education Program at (910) 798-7564.

Photocopy and complete the scheduling worksheet found on page 25 and return to Airlie Gardens as soon as possible.

Before the Trip

Complete the pre-visit activities provided.

Discuss behavior expectations with students and chaperones. Airlie Gardens is not responsible for disciplining students who misbehave.

Divide each classroom into two groups prior to arrival. Each group must have adult chaperones. Airlie recommends a 1:10 ratio between chaperone and students.

Make sure the students dress appropriately for the weather. Comfortable closed-toe shoes are required.

The group leader must obtain a parental permission slip for each student, including medical concerns. The leader may photocopy and use the sample form on page 26.

If you are going to be late or need to cancel, notify Airlie Gardens as soon as possible at 910-798-7564.

While at Airlie

1. When on hikes, students should walk behind the guide at all times. Running is not permitted.

2. All of the plants and animals are protected and should not be touched or removed unless a guide gives permission.

3. Please use the trash and recycling receptacles. Do not litter.

4. In an emergency, contact garden staff immediately.

After the trip

Post-visit activities are designed to complement your field trip experience and are created for classroom use.

Encourage students to seek answers to any questions they may have after visiting the gardens.

If appropriate, give evaluations or tests to find out if the students gained the desired information.

Please copy, complete and send the written evaluation on page 27 to the garden office. This is an important step that allows us to make sure your experience is the best it can be.

Airlie Contact Info:
Airlie Gardens
300 Airlie Road
Wilmington, NC  28403

Main Office: (910) 798-7700
Education Office: (910) 798-7564
Fax: (910) 256-5367
Website: www.airliegardens.org

Office Hours
8:00 am – 5:00 pm
Monday – Friday

Regular Season Garden Hours
9:00 am – 5:00 pm
Sunday – Saturday
“Flower Powered!” was created to provide hands-on environmental education activities for an on-site visit to Airlie Gardens as well as in the classroom.

The kit provided includes pre-visit, on-site, and post-visit activities. All of the activities are designed specifically for the fourth grade to meet the established curriculum objectives of the North Carolina Department of Public Instruction’s Standard Course of Study.

An Airlie staff member or education volunteer will conduct the on-site activities at Airlie Gardens. The pre- and post-visit activities are designed for use in the classroom.

We encourage the use of the pre-visit activities before the field trip so that the students are prepared with the necessary background information.

We have developed the post-visit activities to reinforce the concepts and skills learned during the field trip.

The major concepts students will encounter are as follows:
- The butterfly life cycle
- Identification of native butterflies
- The diversity of butterfly adaptations, especially for survival
- Butterfly behavior

A list of vocabulary words is on pp. 22-23. Also included is a list of references used in creating this lesson plan, which may also be helpful in the classroom.
Major Concepts
- Butterflies have 4 stages in their life cycle (i.e., complete metamorphosis).
- Different species meet survival needs in different ways.
- Caterpillars have developed body structures and coloration to help them survive.

Objectives
- Become familiar with butterflies and their life cycle, especially the larval stage.
- Understand the importance of caterpillars and their behavior and effect on the environment.
- Learn about the diversity of caterpillars around the world.

Instructions
- Have students read the Student Information sheet provided in the curriculum (pp. 10-11).
- Have students read aloud as a class, *Face to Face with Caterpillars*.
- Discuss with your students the following questions:
  - What is a butterfly?
  - What is a caterpillar?
  - Where do they live?
  - What does the caterpillar eat?
  - What does the butterfly eat?
  - When do you see butterflies?
  - What do you know about the butterfly life cycle?
  - How do butterflies and caterpillars use adaptations to survive?
- An optional activity on p. 27 of *Face to Face with Caterpillars* relates to observation of caterpillar behavior. It is a great activity for conducting investigations.
**Pre-Visit Activity 2**  
**Life-Cycle Flipbook**

**Major Concepts**
- Butterflies have 4 stages in their life cycle.
- Each stage has different habitat needs (food, water, shelter, space).
- Different species meet survival needs in different ways.

**Objectives**
- Become familiar with butterflies and their life cycle.
- Understand the importance of butterflies, their behavior and how they interact with their environment.
- Learn to identify five local butterflies. Understand their major characteristics and differences.

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**Curriculum Links**

**Grade 4**

**Science**

**Competency Goal 1:** The learner will make observations and conduct investigations to build an understanding of animal behavior and adaptation.

1. **01** Observe and describe how all living and nonliving things affect the life of a particular animal including:
   - Other animals
   - Plants
   - Weather
   - Climate

1. **02** Observe and record how animals of the same kind differ in some of their characteristics and discuss possible advantages and disadvantages of this variation.

1. **03** Observe and discuss how behaviors and body structures help animals survive in a particular habitat.

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**Location**

Classroom

**Group Size**

30 students  
(entire class)

**Estimated Time**

Approx. 1 hour

**Materials Needed**

- Crayons, markers or colored pencils, scissors
- Computer Projector/ELMO Presenter
- Handout template (pp. 12-13 in this curriculum) for copying
- Copies of this template on cardstock or plain computer paper
- *Your Local Five: A Butterfly Guide* (included in kit)
**Educator’s Information**

In this activity, students will learn the life cycle of butterflies and their basic needs. They will learn to identify five locally common butterflies, how they are alike and how they differ.

**Instructions**

- Students should have already read the Student Information sheet used in pre-visit activity 1.
- Divide the class in 5 groups and assign each group one of the 5 species of butterflies featured in *Your Local Five: A Butterfly Guide*.
- Give each student 4 black-and-white flipbook pages (pp. 12-13).
- Each page of the flipbook comes with a blank picture area where the student draws the different life stages of the butterfly. The student can use colored pencils, crayons, or markers. Students can determine the appropriate colors by using books, posters, or *Your Local Five: A Butterfly Guide* included in the kit.
- Each page of the flipbook also comes with questions and space to provide written answers. Students will find the answers to these questions in the resources found in this kit, but they can look for these answers using online resources, library books, or other appropriate reference material.
- Have the students cut out each page of the flipbook along the dashed lines.
- Assemble each page of the butterfly life cycle in the appropriate order, resulting in a simple flipbook of the butterfly life cycle.
- Using cardstock paper will make it easier to manipulate. Students should make a cover page too, with the common and scientific name of their butterfly species.
- **Extension activity:** Have each group read about their species and share with the class any notable traits, focusing on unique adaptations and behaviors. Using the Student Information sheet on pp. 10-11 as a guide, lead a class discussion on the ways in which these variations help species survive.
Metamorphosis

It is nature’s Cinderella story; an earthbound caterpillar turns into a winged butterfly. The surprising change, from egg to larva (caterpillar) to pupa to adult (butterfly), is called complete metamorphosis.

It starts with an egg laid by a female butterfly after mating. She will lay her eggs only on the right host plants for her species. This keeps different species from competing for the same host plants. Monarchs, for example, only lay eggs on milkweed plants while the Giant Swallowtail lays its eggs on Toothache Trees. Eggs can be laid singly, in groups or in stacks.

A caterpillar (larva) hatches from each egg and begins life by eating its egg case. It spends the rest of its days munching on plants. As it eats, it produces a waste called frass – little black dots like poppy seeds.

To grow, a caterpillar sheds its skin (molts) several times. Each new skin is bigger than the last. The stage between moltings is called an instar. Most caterpillars have four to five instars.

When it is ready to become a pupa, it stops eating, finds a safe place, and begins making silk. It attaches itself to a stem with the silk and molts one last time. This final skin hardens, completing the change into a pupa, or chrysalis.

Inside its chrysalis, the pupa becomes a thick paste. Its body cells rearrange themselves into a butterfly. Instead of a chewing mouth to eat leaves, it gains a proboscis, like a straw, to sip nectar. Instead of 16 legs (6 true legs for walking and 10 prolegs for holding on), it will keep only the 6 true legs. After days or weeks, the chrysalis cracks open and a butterfly emerges. For a while, it clings to its chrysalis. Its abdomen slowly pumps blood into the veins of its wings to stretch and stiffen them. The new butterfly then flutters off to find food and a mate. The cycle begins again.

Adaptations

Like all insects, a butterfly has six legs and three main body parts: head, thorax, and abdomen. But what we notice are the paper-thin wings, which in some species are beautifully patterned and colored.

Millions of tiny scales cover a butterfly’s wings. If touched, they brush off like dust. These scales give butterflies their scientific name, Lepidoptera, which is Greek for “scaly-winged.”

Wing colors help butterflies recognize potential mates. Butterflies have compound eyes that can see color, brightness, and fast movement. They also see ultraviolet patterns on the wings that we cannot see. Attached to the exoskeleton are thousands of tiny hairs called setae that help them sense what they touch. Special scales on their wings make scents called pheromones to attract mates.

Bright patterns also help break up a butterfly’s shape, making it hard for predators to spot. Some butterfly wings have bold "eyespots” to startle an enemy and give them time to escape. The bright colors even warn predators. A Monarch butterfly, for example, eats milkweed as a caterpillar, making it poisonous too. Its bold orange-and-black wings warn that it is dangerous.
Butterflies also have evolved to escape being eaten as caterpillars. A Giant Swallowtail caterpillar looks like a bird dropping. If a predator tries to eat it, the caterpillar thrusts out a pair of red horns that make a horrid stink! The Spicebush Swallowtail has two bold eyespots on the back of its head. When threatened, it rears up, swaying back and forth like a snake, and scaring away any predators.

Caterpillars use other strategies too. The Red Admiral hides in a tent of folded leaves as it eats. A Spring Azure produces sweet honeydew for ants to drink. The ants then guard it from wasps and other predators. Many caterpillars have brown or green colors to blend in with the leaves (camouflage).

Another defensive strategy is mimicry. Mimicry is when butterfly species look alike. For example, the Viceroy butterfly looks so much like the poisonous Monarch that predators avoid it.

Behavior
Butterflies are solar-powered. They need the sun to warm their bodies to 60 degrees F to fly. That is why they sit on rocks basking, or catching the sun’s rays.

When they are warm enough, they seek out flowers with nectar, a sweet liquid that gives adults the energy they need to survive.

Butterflies often gather in a group called a swarm. Some gather around damp soil (puddling) to collect minerals and salts. They may also gather on the top of a sunny hill (hill topping) to find a mate.

Butterflies cannot fly or find food when it is cold. In winter, some migrate to a warmer location. Other species overwinter, staying in a resting state until spring.

Space to Live
North Carolina has 171 species of butterflies from the mountains to the coast. Each is an important part of its habitat.

Like every form of life, butterflies are a food source. Birds, lizards, spiders, and other animals eat butterflies at every stage of their life cycle.

Butterflies are also important pollinators. Without them, many prairie wildflowers cannot make seeds. Plants and butterflies need each other to survive.

Unfortunately, butterfly habitat is being destroyed. Bulldozing fields and woods for new houses, malls, and athletic fields destroys the plants that butterflies need. To help them survive, we can plant butterfly flowers in our yards. They also need host plants for their caterpillars. These are often native plants that grow in wild places. We hurt butterflies by growing invasive plants, like honeysuckle and wisteria, which crowd out native plants.

Pesticides sprayed on lawns, golf courses and farms kill butterflies. By “weeding” our yards with poisons, we often kill the same plants butterflies need for food.

If we think of our yards and parks as habitats and carefully plan for the needs of other animals, including butterflies, they will remain part of our life on the coast of North Carolina.
Flipbook Template (2 of 2)

Chrysalis / Pupa

Chrysalis Color: ____________

Chrysalis support method (circle): suspended  girdled  unattached

How is the chrysalis camouflaged?

________________________

Other notes: ______________

________________________

________________________

________________________

Adult / Imago

Adult Color: ______________

Difference in color between male and female?

________________________

How does your species overwinter?

________________________

Other notes: ______________

________________________

________________________

________________________
On-Site Activities

Airlie Gardens

Curriculum Links

Grade 4

Science

Competency Goal 1
The learner will make observations and conduct investigations to build an understanding of animal behavior and adaptation.

1.01 Observe and describe how all living and nonliving things affect the life of a particular animal including:
- Other animals
- Plants
- Weather
- Climate

1.02 Observe and record how animals of the same kind differ in some of their characteristics and discuss possible advantages and disadvantages of this variation.

1.03 Observe and discuss how behaviors and body structures help animals survive in a particular habitat.

1.04 Explain and discuss how humans and other animals can adapt their behavior to live in changing habitats.

1.05 Recognize that humans can understand themselves better by learning about other animals.

Competency Goal 4
The learner will conduct investigations and use appropriate technology to build an understanding of how food provides energy and materials for growth and repair of the body.

4.01 Explain why organisms require energy to live and grow.

4.03 Discuss how foods provide both energy and nutrients for living organisms.

Location
Airlie Gardens

Group size
Two classes

Estimated time
45 minutes

Materials needed
(All materials provided by Airlie)

Major Concepts

- The dependence of butterflies on the plants in their habitat.
- An understanding of how different species of butterflies use available habitat in different ways to minimize competition between species.

Objectives

- Observe and identify habitat needs of butterflies.
- Understand the difference between larval food plants and nectar sources.
- Observe and identify the 5 targeted species.
- Identify the distinguishing characteristics and major body parts of butterflies.
- Observe and explain complete metamorphosis.
- Describe specific and general adaptations of native butterflies.
**Educator’s Information**

Students will learn about butterflies, caterpillars, nectar plants and larval plants. They will gain an understanding of the relationship between predation and the evolution of defense mechanisms. They will also learn to identify and assess butterfly habitat.

**Prior to your visit,** distribute copies of the Student Information Sheet (pp. 10-11) so your class is familiar with the subject.

**Instructions**

An Airlie representative will greet the students and give them a brief orientation of what they will be doing on their visit. Each class will be divided into groups, and each group will be assigned an Airlie instructor. The instructor will take them through each of the activities listed below.

**Activity #1**

**Scavenger Hunt**

Students will learn about butterfly habitat by observing and assessing habitat in different locations of the garden. They will pretend to be a predator for larvae on larval food plants. They will observe that the larvae of different butterfly species are eating different plants. Students will be shown butterfly habitat - where it is and how to recognize it. They will discuss habitat changes, whether increasing, decreasing or stable. Butterfly gardening will also be introduced.

**Activity #2**

**Tour of Butterfly House**

The instructor will lead the students to Airlie’s Butterfly House where they will observe butterfly behavior and adaptations. Students will learn about butterfly gardening and habitat needs. Topics covered will include biodiversity, the effects of seasonal change and climate change, and butterflies’ dependency on the bloom time of nectar plants. We will explore what butterflies teach us about humans.

**Activity #3**

**Minnie Evans Sculpture Garden**

On a walk through the Minnie Evans Sculpture Garden, the instructor will point out the butterfly wall with compound eyes, proboscis, color, and warning “eyes.” Students will learn the parts of a butterfly and discuss butterflies in cultural art and what they symbolize to people.

**Activity #4**

**Butterflies Up Close**

Students will use microscopes to observe the structure of butterflies: wing, eyes, legs, spiracles, etc.

**Activity #5**

**Pollination Tag Game**

Students will participate in a butterfly role-playing game. They will search for the appropriate larval host plant to lay eggs on, avoid predators, and look for nectar plants as adult butterflies.
Post-Visit Activity 1

Compare and Contrast

Major Concept
People and butterflies differ widely in their body parts. Both, however, share the same basic needs.

Objective
Compare and contrast the needs and behaviors of humans and butterflies.

Educator’s Information
Students will use the knowledge gained in their readings and on-site visit to Airlie to explore the physical similarities and differences between humans and butterflies.

Instructions

- Review with your students how people, butterflies, and caterpillars compare to each other in terms of sensory abilities.
- On the blackboard, or a surface which the entire class can view, create the simple table found on p. 17, but keep this Comparison Table blank.
- Through discussion and brainstorming as a class, fill in the Butterfly, Caterpillar, and Human Comparison chart. Teachers can use the completed table on page 17 to give the class direction.
- Reinforce why organisms need energy to live and grow, and the similarities between humans, caterpillars, and butterflies. Compare the senses of a butterfly to the senses of a human.

Curriculum Links

Grade 4
Competency Goal 1
The learner will make observations and conduct investigations to build an understanding of animal behavior and adaptation.

1.05 Recognize that humans can understand themselves better by learning about other animals.

Competency Goal 4
The learner will conduct investigations and use appropriate technology to build an understanding of how food provides energy and materials for growth and repair of the body.

4.01 Explain why organisms require energy to live and grow.

Location
Classroom

Group Size
30 students (entire class)

Estimated Time
30 minutes

Materials Needed
- Butterfly, Caterpillar, and Human Comparison Chart (page 17).
- Blackboard
## Butterfly, Caterpillar, Human Comparison Chart

<table>
<thead>
<tr>
<th></th>
<th>Butterfly</th>
<th>Caterpillar</th>
<th>Human</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sight</strong></td>
<td>Butterflies have compound eyes made up of hundreds of lenses that work together so that butterflies can see objects to the side of them. Adults see in all visible colors and in ultraviolet (a range of light not visible to humans). Their vision is blurry.</td>
<td>Caterpillars have ocellus (plural: ocelli) which is a “simple eye.” Ocelli are miniature eyes capable of sensing light but not its direction.</td>
<td>Humans have complex eyes that focus with a single lens. We can see color, light, shape, movement, and distance. We have sharp vision.</td>
</tr>
<tr>
<td><strong>Sound</strong></td>
<td>Most butterflies &quot;hear&quot; sounds through their wings by sensing sound vibrations. Some species of butterfly hear sounds through a tympanum, which is a thin membrane that vibrates when hit by sound waves. A few species of butterfly make clicking sounds or produce sounds at frequencies not easily detected.</td>
<td>It is unknown if caterpillars truly “hear”, but they do startle at loud noises. Some caterpillars make noise with their mandibles, and some gossamer-wing caterpillars produce low-frequency sounds to call for help from the ants they live with.</td>
<td>Humans have complex ears that hear many types of sound, volume, pitch, location, and distance. We have highly developed vocalizations for communication.</td>
</tr>
<tr>
<td><strong>Taste</strong></td>
<td>A butterfly’s feet have sense organs that can taste the sugar in nectar, letting it know if something is good to eat or not. Some females taste host plants to find appropriate places to lay their eggs. Adult butterflies feed using a proboscis, a long, coiled tube, like our tongue.</td>
<td>A caterpillar’s mouth parts have taste cells. These chemical detectors tell the caterpillar what is good to eat and what is not.</td>
<td>Humans use their tongue to sense different tastes of bitter, sweet, sour, and savory. The tongue has chemical detectors similar to a butterfly.</td>
</tr>
<tr>
<td><strong>Smell</strong></td>
<td>Butterflies have a well-developed sense of smell. Sense receptors in their antennae, feet, and proboscis help them find food, mates, and appropriate plants to lay eggs on. Butterflies communicate with each other by the use of pheromones, chemical signals that they can produce and detect.</td>
<td>Caterpillars have tiny antennae, near their mouth parts, which sense smells.</td>
<td>Humans have chemical receptors in their noses that are similar to the chemical receptors of butterflies.</td>
</tr>
<tr>
<td><strong>Touch</strong></td>
<td><strong>Setae</strong> (sensory hairs) on the insect’s entire body (including the antennae) can feel the environment. They also give the insect information about the wind while it is flying.</td>
<td>A caterpillar’s &quot;fuzz&quot;, the long hairs called tactile setae, grow through holes all over its exoskeleton. Attached to nerve cells, the hairs relay information to the brain.</td>
<td>Human skin and hair are connected to a central nervous system that communicates to the brain if the body touches something.</td>
</tr>
</tbody>
</table>
Post-Visit Activity 2

Butterfly Garden

Location
In classroom

Group Size
30 students (entire class)

Estimated Time
2 hours

Materials
- Art supplies
- Guide books for butterflies
- Guide book on native plants

Instructions
- Pass out art supplies. Divide students into 5 groups, each with a different species of butterfly.
- Discuss with them the habitat needs of each species, identifying larval and nectar plants. Find images of the larval and nectar plants for each species.
- Have the students create on paper a butterfly habitat for their butterfly species, including all essential habitat components and that butterfly’s larval and nectar plants. This could also be a group project for a mural covering all five species from the provided guide book.

Major Concept
Identify the essential components of good habitat for each of the five species of butterflies.

Objective
Learn how to design a habitat that is attractive to butterflies, and to other wildlife.

Educator’s Information
Students will make a butterfly garden on paper integrating the facts learned about species’ preferences.

Curriculum Links
Grade 4

Science Competency
Goal 1: The learner will make observations and conduct investigations to build an understanding of animal behavior and adaptation.

1.01 Observe and describe how all living and nonliving things affect the life of a particular animal including:
- Other animals
- Plants
- Weather
- Climate

To learn more about plant selection for your butterfly garden, see “Butterflies in Your Backyard” from the North Carolina Cooperative Extension Service (see p. 24).
Major Concept
The close link between an artist and his or her environment is demonstrated in an artist’s work.

Objectives
- Create art based on observation of the natural world and the style of Minnie Evans.
- Understand the link between the themes of her art and her love of the outdoor world, including Airlie Gardens.

Educator’s Information
This activity allows students to look at the link between butterflies and people in a different way, through the art of Airlie gatekeeper, Minnie Evans, who was inspired by the birds, flowers and butterflies of Airlie.

Instructions
- Using the books and websites below, show students the elements of Evans’ style. Point out her use of bold colors, symmetry, natural environment, and mythical objects. Have each student pick a butterfly species, and then create a crayon-and-pencil fantasy based on Evans’ style. The artwork design should include images from each of the four life cycle stages of their butterfly. Include species-specific plants (larval and/or nectar) in the artwork too.

Resources
- http://en.wikipedia.org/wiki/Minnie_Evans
- Painting Dreams: Minnie Evans, Visionary Artist. By Mary E. Lyons. 1996.
Post-Visit Activity 4  

Build a Caterpillar

Objectives
- Show an understanding of the need for organisms to adapt to their environment.
- Understand how body parts evolve to allow an organism to compete successfully in meeting basic needs.

Educator’s Information
This activity encourages the students to integrate their knowledge of caterpillar body parts with their knowledge of the caterpillar’s need to protect itself from predation and find shelter from harsh weather by creating a viable, though imaginary, caterpillar.

Instructions
- Review the body parts of caterpillars and their function. Students will use their new-found knowledge of butterflies and their own creativity to create their own caterpillar, built to survive a particular environment.
- Have students focus on defensive mechanisms, choosing different styles of eyes, legs, organs, appendages, or a newly imagined feature to create a caterpillar able to compete within the chosen habitat.

Major Concept
Organisms develop adaptations based on the influence of the environment.

Curriculum Links
Grade 4
Science Competency
Goal 1: The learner will make observations and conduct investigations to build an understanding of animal behavior and adaptation.
1.03 Observe and discuss how behaviors and body structures help animals survive in a particular habitat.

Location
Classroom

Group Size
30 students (entire class)

Estimated Time
45 minutes

Materials
- Art supplies

Post-Visit Activity 4
Follow-Up Extension Activities

**Compare & Contrast**
Compare and contrast the Dragonflies (Odonates) and Butterflies (Lepidoptera) between Halyburton Park and Airlie Gardens, comparing incomplete and complete metamorphosis.

**Butterfly Garden**
Design, plant, and manage a butterfly garden at the school (sustained by subsequent 4th grade classes that may add, improve, or maintain the garden as a teaching tool). For information on butterfly garden plant selection, see “Butterflies in Your Backyard” in the resources and reference section below.

**Raise Eggs**
Rear your own butterflies in class. Eggs and proper plant material required.

**Biodiversity**
Teach about biodiversity by asking students to pick a place they have traveled to (other parts of NC, other states, or other countries). Then compare species of butterflies found there to those found in southeastern NC.

**Conservation**
Ask students to look up current events on anything butterfly-related, including habitat conservation or research.
Abdomen: Tail area of an insect, containing the heart, reproductive organs and most of the digestive system.

Antennae: Hair-like structures attached to the head of some insects and used to detect air movement, vibrations and smells.

Basking: Holding the body and wings perpendicular to the sun to catch the heat; sunbathing.

Breathing pores: Openings in the exoskeleton through which insects breathe; spiracles.

Brood: A single generation of butterflies that fly during the same time period.

Camouflage: Colors and patterns that make an organism hard to see in its environment.

Caterpillar: The worm-like larval stage of butterflies and moths.

Chitin: The tough, colorless material that forms the hard exoskeleton of insects.

Chrysalis: The hard, protective covering of a pupa.

Complete metamorphosis: The series of changes in the body of some insects from egg to larva, pupa and adult; a four-stage life cycle.

Compound eye: An eye made up of many tiny simple eyes that allow an insect to see in almost every direction.

Exoskeleton: Hard outside covering of an insect

Filament: Fleshy, thread-like extension on a caterpillar that provides sensory information and may help protect it from parasitic flies.

Frass: Caterpillar waste; excrement.

Girdle: Silken thread that attaches the caterpillar to a leaf or twig just before the pupal stage.

Habitat: Area or environment where an organism normally lives that provides food, water, space and shelter.

Hill topping: Behavior of some butterflies that gather on a high place, probably to find mates.

Honeydew: Sweet liquid that some caterpillars secrete to attract and feed beneficial insects such as ants.

Host plant: Plant that a butterfly lays its eggs on. Butterflies have only a few host plants for each species.

Instar: A single stage of larval development.

Invasive Species: Plants or animals that crowd out other species, making a habitat less diverse.

Larva: Caterpillar; the second stage of complete metamorphosis.

Larval plant: The specific type of plant eaten by a species of caterpillar. Each caterpillar eats only a few kinds of plants in the larval stage.

Lepidoptera: Scientific name for butterflies and moths; it means “scaly-winged.”

Life cycle: The series of changes in a species from conception through growth, reproduction, death and the beginning of a new generation. (See complete metamorphosis for butterfly life cycle.)

Migration: Movement by large numbers of a species to another region to avoid bad conditions.

Mimicry: The resemblance of one organism to another that helps it produce larger numbers of surviving offspring, often by resembling an organism that predators will not eat.

Molt: Shedding the exoskeleton to grow.
Moth: Moths are winged insects that belong to the Order Lepidoptera. They are not butterflies even though they may look like butterflies. Moths usually have feathered antennae, are mostly nocturnal, rest with wings flat, and typically have fuzzy bodies.

Nectar: Sweet liquid produced by many flowers.

Nectar Plant: Plants that provide nectar to adult butterflies. Some butterfly adults will only take nectar from a specific type of nectar plant.

Non-native Species: A species that has been accidentally or deliberately brought to a new location by human or natural means. This often results in damage to the ecosystems where these organisms are introduced.

Ocellus (plural ocelli): Small, simple eyes on a caterpillar’s head or between a butterfly’s compound eyes.

Osmeterium: An orange, Y-shaped gland on the neck of some caterpillars, especially swallowtails, that gives off a strong, unpleasant odor when the caterpillar is threatened.

Overwintering: Hibernation; a state in which the butterfly lowers its metabolism to survive cold temperatures.

Ovipositor: Organ at the end of the female’s abdomen for laying eggs.

Pheromone: Chemicals given off by an animal that causes specific reactions in other animals; often used to attract a mate.

Pigment: A substance that produces color in plants or animals.

Pollinator: An organism (like a bee or butterfly) that transfers pollen from flower to flower. Without pollinators, many plants cannot make new seeds.

Proleg: One of the peg-like legs on the abdomen (hind region) of a caterpillar which disappears in the adult.

Proboscis: Flexible, tube-like “tongue” used by butterflies to sip nectar or other liquids.

Puddling: Gathering at mud puddles to sip the mineral-rich water.

Pupa: The third stage in the butterfly’s life when it is protected within a chrysalis.

Scales: Tiny overlapping pieces of chitin on a butterfly’s wings that produce the iridescent colors; they are really flattened hairs with ridges.

Setae: Long hairs used to sense touch.

Spinneret: Tube-like structure on a larva’s lower lip. It contains the gland that helps the caterpillar make silk for girdles, webs or cocoons.

Spiracles: Openings in the exoskeleton through which insects breathe; breathing pores.

Swarm: Group of butterflies; also called a rabble.

Thorax: Chest area of an insect; contains the muscles that move the wings and legs.

Trap lining: Behavior in which a butterfly follows the same route every day looking for nectar.

Veins: Narrow tubes on a butterfly’s wings that support and nourish the wings; they form the dark lines visible on butterfly wings.
Resources and References

Publications


Online Resources


Please photocopy or download this sheet and fill out the copied version. Do not fill in the original.

Scheduling Worksheet

1) Name of group (school): ____________________________________________

2) Contact Person: ________________________________
   name phone (work) (home)
   ______________________________________________________
   address

3) Day/date request: ________________________________________________

4) Number of students: ________

5) Number of chaperones: ________
   (Note: We require one adult for every 10 students)

6) Areas of special emphasis:_______________________________________

7) Special considerations of group (e.g. allergies, health concerns, physical limitations):
   __________________________________________________________________

Use the parental permission form provided on the following page. Return the photo release portion to Airlie Gardens.

Call the Environmental Education Office at 910-798-7564 to schedule a field trip, or fax a completed form to 910-256-5367.

I, ________________________, have read the entire “Flower Powered! Butterflies of Southeastern North Carolina” Lesson Plan and understand and agree to all the conditions.

Return to: Airlie Gardens
           Attn: Environmental Education Program
           300 Airlie Road
           Wilmington, NC  28403
Parental Permission Form

Dear Parent:

Your child will soon be involved in an exciting, hands-on learning experience at Airlie Gardens. They will participate in many different activities in two of our outdoor teaching areas. Please understand that insects, poison ivy and other potential risks are a part of any outdoor setting.

To make your child’s experience as safe and enjoyable as possible, be sure they wear clothing appropriate for outdoor activity and weather. Comfortable, closed-toe shoes should be worn. Please provide the following information:

Child’s Name: ___________________________________________

Does your child:

• have any allergy to bee stings or insect bites? ________________  
  If so, please have the child bring their medication and make sure that they, or a group leader, know how to administer it.

• have other allergies? ________________________________

• have any other heath problems that we should be aware of? ______

__________________________________________________________

In an emergency, I give permission for my child to be treated by the attending physician. I understand that I will be notified as soon as possible.

_________________________________________       __________________
Parent’s signature                Date

Parent’s name: ________________________________                Home phone: __________________________
(Please print)                                    Work phone: __________________________

Family Physician’s name: ___________________________ Phone: ___________

Alternate Emergency Contact:____________________________________________

Name: ____________________________________________ Phone: ___________

I give permission for my child to be photographed by an Airlie staff member or a professional photographer, and I allow those photographs to be used in Airlie Gardens’ publications and on the Airlie website.

_________________________________________       __________________
Parent’s Signature                Date
Airlie Gardens Program Evaluation

Please take a moment to evaluate the program you received. Airlie Gardens is committed to providing quality programs that meet teachers’ needs. **By filling out the provided form, you are helping us achieve this goal.** Please mail completed forms to 300 Airlie Road, Wilmington, NC 28403 Attn: Environmental Education Program.

Date of Program: _________________________

Program leader(s): _______________________________________________________

Did the program meet your curriculum needs?  Yes ☐  No ☐
If no, please explain:
_______________________________________________________________________
_______________________________________________________________________

How would you rate the on-site program?  Excellent ☐  Good ☐  Fair ☐  Poor ☐
Comments:
_______________________________________________________________________
_______________________________________________________________________

Would you recommend this program to other teachers?  Yes ☐  No ☐
Are you likely to return for a program in the future?  Yes ☐  No ☐
How would you rate the pre-visit activities?
Excellent ☐  Good ☐  Fair ☐  Poor ☐
Comments:
_______________________________________________________________________
_______________________________________________________________________

How would you rate the post-visit activities?
Excellent ☐  Good ☐  Fair ☐  Poor ☐
Comments:
_______________________________________________________________________
_______________________________________________________________________