

Flower Powered!

Butterflies of Southeastern North Carolina



An Environmental Education Lesson Plan

Developed by Airlie Gardens
and the Cape Fear Audubon Society

2008

**Environmental Education Lesson Plan
developed
by**

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The lesson plan is available online at:

www.capefearaudubon.org

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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.

Complete the scheduling worksheet found on page 25 or the worksheet found in the science kits 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 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 fill out 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

Activity Summary

“Face to Face with Butterflies” 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 were 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.

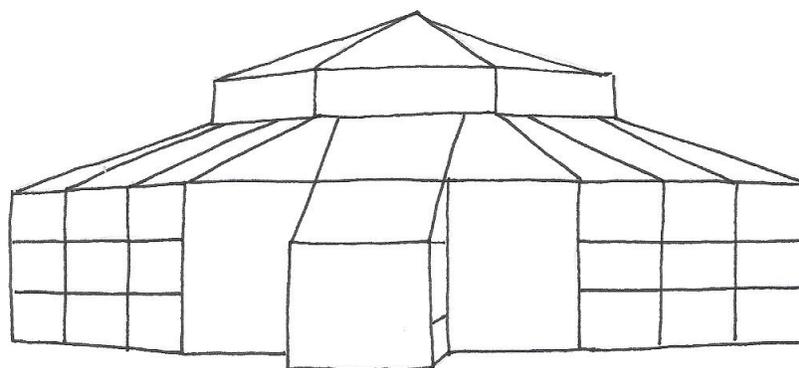
We encourage the use of the pre-visit activities before the field trip so that the students are prepared with the necessary background information.

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.



Airlie Butterfly House

Pre-Visit Activity 1 *Face to Face with Caterpillars*

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.

Location

Classroom

Group Size

30 students
(entire class)

Estimated Time

Approx. 30 minutes

Materials Needed

- Student Information Sheet (pp. 10-11)
- *Face to Face with Caterpillars*
- Projector to display book while reading (if applicable)

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.

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.

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
- CD (included in kit)
- *Your Local Five: A Butterfly Guide* (included in kit)

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 caterpillars, their behavior and how they interact with their environment.
- Learn to identify five local butterflies. Understand their major characteristics and differences.

Educator's Information

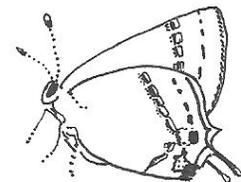
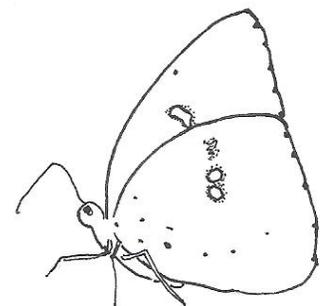
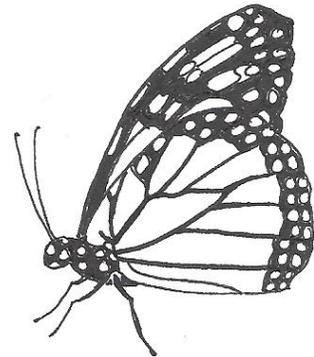
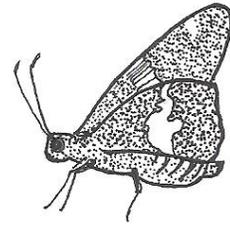
In this activity, students will learn the life cycle of butterflies and their basic needs. They will learn to identify five locally common butterflies, how they are alike and how they differ.

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 *Butterfly Guide: An introductory guide to the five common butterfly families in Southeastern North Carolina*.
- 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 the CD included in the kit. These same pictures

are also available on the www.capefearaudubon.org website under "Education."

- 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 report any notable traits, focusing on unique adaptations and behaviors.



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. Monarchs, for example, only lay eggs on milkweed plants. 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 poppyseeds.

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 "eyespot" 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 (1 of 2)

Space for Binding

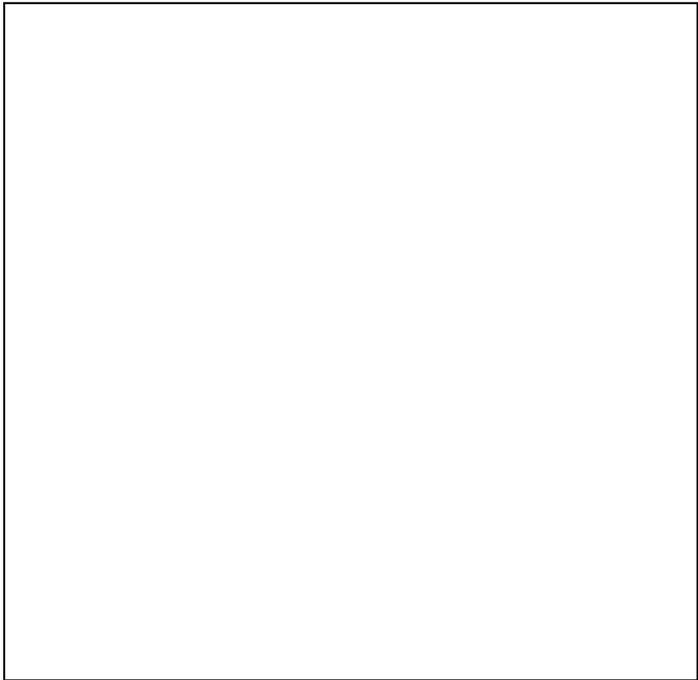
Egg / Ova

Egg Color: _____

Egg Pattern (circle answer):
single stacked grouped

Plants on which eggs are laid: ____

Other notes: _____



Space for Binding

Caterpillar/Larva

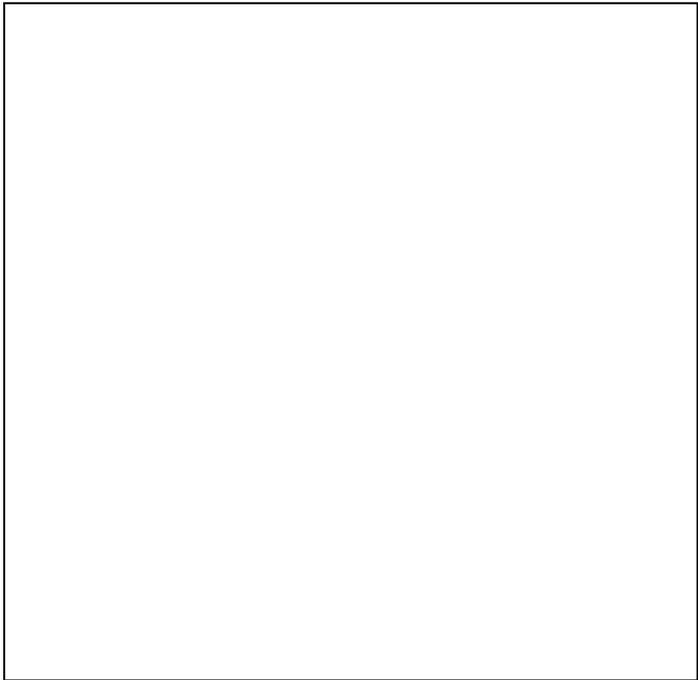
Caterpillar Color(s): _____

About how many instars do caterpillars have?

of True legs: _____

of Prolegs (false legs): _____

Other notes: _____



Flipbook Template (2 of 2)

Chrysalis / Pupa

Chrysalis Color: _____

Chrysalis support method (circle):
suspended girdled unattached

How is the chrysalis camouflaged?

Other notes: _____

Space for Binding

Adult / Imago

Adult Color: _____

Difference in color between male
and female?

How does your species overwinter?

Other notes: _____

Space for Binding

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.

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

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 where 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.

Butterfly, Caterpillar, Human Comparison Chart

	Butterfly	Caterpillar	Human
Sight	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.	Caterpillars have ocellus (plural: ocelli) which is a "simple eye." Ocelli are miniature eyes capable of sensing light but not its direction.	Humans have complex eyes that focus with a single lens. We can see color, light, shape, movement, and distance. We have sharp vision.
Sound	Most butterflies "hear" 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.	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.	Humans have complex ears that hear many types of sound, volume, pitch, location, and distance. We have highly developed vocalizations for communication.
Taste	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.	A caterpillar's mouth parts have taste cells. These chemical detectors tell the caterpillar what is good to eat and what is not.	Humans use their tongue to sense different tastes of bitter, sweet, sour, and savory. The tongue has chemical detectors similar to a butterfly.
Smell	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.	Caterpillars have tiny antennae, near their mouth parts, which sense smells.	Humans have chemical receptors in their noses that are similar to the chemical receptors of butterflies.
Touch	Setae (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.	A caterpillar's "fuzz", the long hairs called tactile setae, grow through holes all over its exoskeleton. Attached to nerve cells, the hairs relay information to the brain.	Human skin and hair connects to a central nervous system that communicates to the brain if the body touches something.

Curriculum Links

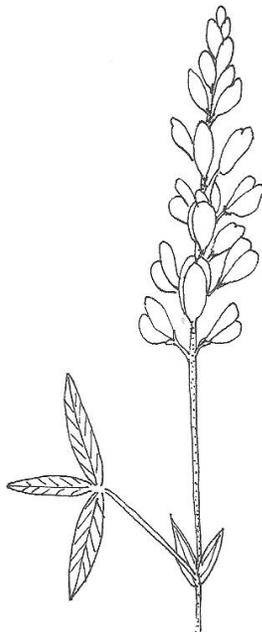
Grade 4

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



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

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.

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.

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).

Curriculum Links

Grade 4

Art Competency Goal 5

The learner will understand the visual arts in relation to history and cultures.

5.08 Explores the art and architecture of selected North Carolina artists.

Location

Classroom

Group Size

30 students (entire class)

Estimated Time

45 minutes

Materials

- Crayons, pencil, paper
- *Painting Dreams: Minnie Evans, Visionary Artist* by Mary Lyons book

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

http://www.artcyclopedia.com/artists/evans_minnie.html

Painting Dreams: Minnie Evans, Visionary Artist.
By Mary E. Lyons. 1996.

Minnie Evans: Artist.
Wellington B. Gray
Gallery, East Carolina
University. 1993.

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

Major Concept

Organisms develop adaptations based on the influence of the environment.

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

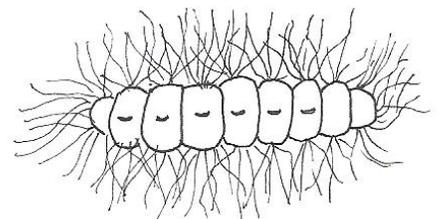
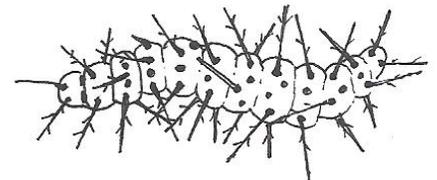
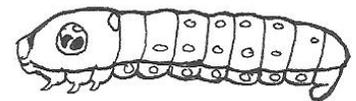
This activity encourages the students to integrate their knowledge of caterpillar body parts with their knowledge of the caterpillar's need to protect itself from predation and find shelter from harsh weather by creating a viable, though imaginary, caterpillar.

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.



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.

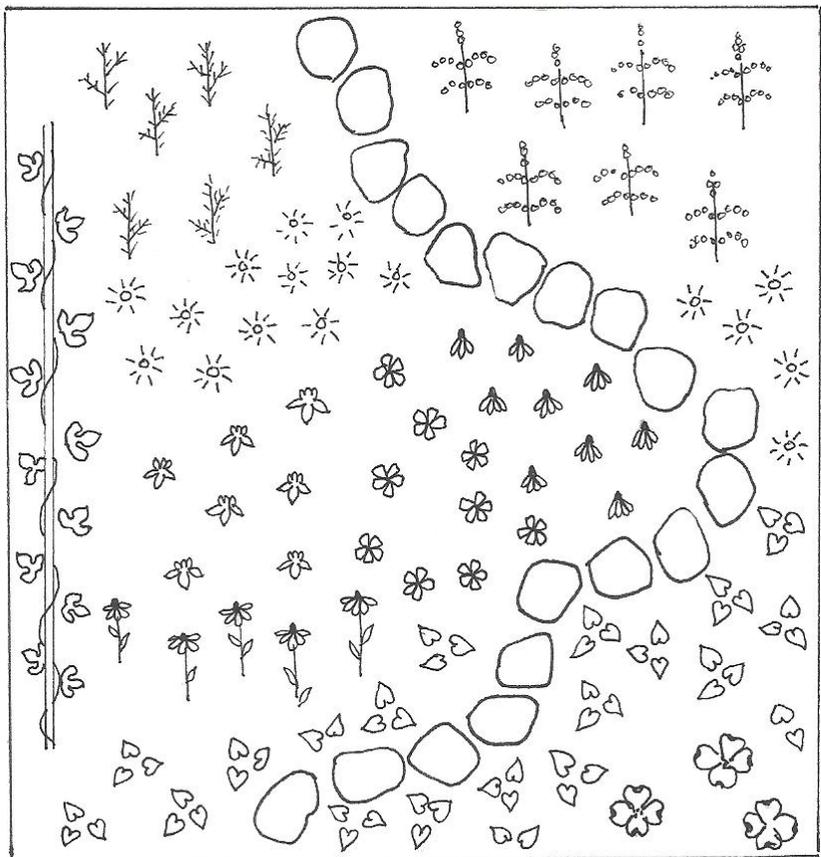
Biodiversity

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.



Glossary of Terms

Abdomen: Tail area of an insect, containing the heart, reproductive organs and most of the digestive system.

Antennae: Hair-like sensory 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 is a major component of 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: Fleishy 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 adversely affect the habitats they invade economically, environmentally, and ecologically.

Larva: Caterpillar; the second stage of complete metamorphosis.

Larval plant: The specific type of plant eaten by a species of caterpillar. Each caterpillar eats a species-specific type of plant for its nourishment 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 resemble 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: An introduced species that is not indigenous (native) to a given location, but that has been accidentally or deliberately introduced 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 material that changes the color of light it reflects as the result of selective color absorption. Pigments allow only certain colors to reflect off of a surface.

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 spinning apparatus (the silk glands) that helps the caterpillar make silk for support and make 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 butterflies' wings.

Resources and References

Publications

Allen, Thomas, Jim Brock, and Jeffrey Glassberg. *Caterpillars in the Field and Garden: A Field Guide to the Caterpillars of North America*. New York: Oxford University Press, 2005.

"Butterflies in Your Backyard." North Carolina Cooperative Extension Service, North Carolina State University. 11 March 2008. http://www.ces.ncsu.edu/forestry/pdf/ag/ag636_02.pdf

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Online Resources

Butterflies and Moths of North America. Big Sky Institute at Montana State University. 14 April, 2008. <<http://www.butterfliesandmoths.org/>>

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Notes on North Carolina Butterflies. 15th Approximation, 2008. North Carolina Department of Environment and Natural Resources. 7 April, 2008. <<http://149.168.1.196/nbnc/index.html>>

Pippen, Jeff. "Jeff's North Carolina Butterfly Page" 7 April, 2008. <<http://www.duke.edu/~jspippen/butterflies/nc-butterflies.htm>>

Airlie Gardens Program Evaluation

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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:

Notes