



Bloomin' Butterflies

ALABAMA OUTDOOR CLASSROOM ACTIVITY

Grade Levels

K-12

Overview

Students collect butterfly eggs or caterpillars, rear them, and then release the adult butterflies in the outdoor classroom site.

Subject Areas

Science, Environmental Education

Duration

Larva Containers Prep: 1 hour
Butterfly Cage Prep: 1 hour
Specimen Collection: 1 hour
Butterfly Rearing: App. 15-20 minutes each day for 3-4 weeks

Learning Objectives

Students will observe firsthand the metamorphosis and life cycles of a butterfly, and they will learn how butterflies utilize host plants.

Alabama Course of Study Objective Correlations

(on page 2)

Materials

Larva Containers...

- Two quart-sized plastic bowls with lids
- Pea gravel (or green oasis foam from florist or hobby shop)
- Water
- Host plant (refer to field guides for butterflies & host plants)
- Paper towels

Butterfly Cage...

- Opt 1: Hanging Cage (pg. 6)
- Opt 2: Wooden Frame Cage (pg. 7)
- Opt 3: Purchase a Butterfly Cage

Collecting Specimens...

- Magnifying glasses (*optional*)
- 4-6 medium sized plastic bowls with lids

Background Info

Butterflies and moths undergo complete metamorphosis as they go through their four different life stages. Students, through hands-on experiences, will observe the life cycle stages and metamorphosis of a butterfly as they help raise butterflies in the classroom. Then, they will release the butterflies in your butterfly garden in the school's outdoor classroom site. Although all butterflies go through the same life stages, the length of each life stage may vary for different species. The monarch butterfly is used as an example for each life stage description below. If you are raising a different kind of butterfly, you will need to research the length of each life stage for that specific species, so that you will know what to expect as you raise butterflies in your classroom.

Four Life Stages of a Butterfly

Egg – The female monarch lays its eggs on a specific “host plant,” which is milkweed for monarchs. The eggs typically hatch within 1-5 days if kept at normal room temperature. On average, 70-90% of the eggs will hatch and survive to adulthood.

Larva – The larva (caterpillar) hatches from the egg, and may eat its chorion (eggshell) and possibly other un-hatched eggs if they are nearby. The caterpillar will then eat the leaves or flowers of the host plant almost constantly. Newly-hatched caterpillars will eat small parts of a leaf throughout the day; whereas, a larger caterpillar may eat an entire leaf in a few hours sometimes eating a couple of large leaves a day. As it grows, the caterpillar molts (loses its old skin) many times, often eating the skin after it is shed. Monarchs remain in the larval stage for about 2 weeks, growing to be approximately 2 inches long.

Pupa – Once the caterpillar is fully grown, it looks for a firm place, such as a log or branch, which will protect it from the wind and weather. When raising butterflies indoors, the caterpillar will most often climb to the top of the butterfly cage. It then makes a silk-like mat and attaches its last pair of legs to the mat. The monarch allows itself to drop, forming a pre-pupal “J” before shedding their skin for the last time. It then hangs there for about one full day as it passes from the larval (caterpillar) stage to the pupa (chrysalis) stage of metamorphosis. Under the caterpillar's skin is a casing which is called a chrysalis. Inside the chrysalis, which is only about an inch long, the caterpillar will miraculously transform into a beautiful butterfly. Its new skin will be soft and damp at first, but after it dries for about an hour it becomes hard, providing a protective shell for the caterpillar inside. This is a resting stage that lasts for 9-14 days for monarchs.

Adult – When the metamorphosis is complete, the butterfly emerges from the chrysalis with its wings tiny, crumpled, and wet. The butterfly clings to its empty chrysalis shell as hemolymph, the blood-like substance of insects, is pumped through its body. As the hemolymph fills the butterfly's body and wings, they enlarge. About one hour after emerging from its chrysalis, the butterfly's wings are full-sized, dry, and ready for flying. It will make short flights until it is strong enough to fly a longer distance as it search for flowers with nectar. Four to six days after emerging from its chrysalis, the monarch is old enough to mate.....and so begins the life cycle of the next generation.



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Second: 6

Third: 3, 8 & 10

Fourth: 5 & 6

Fifth: 8 & 9

Sixth: 7

Seventh: 1, 4, 5 & 7

H.S. Biology: 9, 11, 12, 13 & 16

Outdoor Classroom Connection

Students will rear butterfly eggs or caterpillars and release the adult butterflies in the butterfly garden.

Butterfly Field Guides:

⇒ *Stokes Butterfly Book: Complete Guide to Butterfly Gardening, Identification, and Behavior* by Donald & Lillian Stokes (ISBN:10-0316817805)

⇒ *The Life Cycles of Butterflies: From Egg to Maturity, a Visual Guide to 23 Common Garden Butterflies* by Judy Burris (ISBN:10-1580176178)

⇒ <http://bugguide.net>

Other Related Conservation Education Activities

Project WILD

⇒ *Learning to Look, Looking to See*

⇒ *Urban Nature Search*

Preparation

1. Create **larva containers** for your butterfly eggs &/or larva.
 - a. Rinse your pea gravel.
 - b. Place the pea gravel (or green oasis foam) in the bottom of the plastic containers. If you prefer to use oasis, it can be purchased from your local florist or hobby shop; be sure to get the “wet” kind. Note: You should still be able to put the lids on the containers. If you cannot, then remove some of the rocks from the top (or cut off the top of the green oasis foam).
 - c. Cut a dime-sized hole, or slightly smaller, in the tops of the plastic lids.
 - d. Add water to the plastic containers, and then put on the lids.
2. Build a **butterfly cage** (see pages 6 and 7 for assembly directions or you can purchase a cage) for your butterflies to hatch in from the pupa stage.

Always clean your containers and cages between butterfly generations!

Specimen Collection Procedure

See Page 3 for Helpful Hints for Collecting Butterfly Eggs & Caterpillars!

1. Split the students into 4-6 groups.
2. Give each group a medium sized plastic container with a lid to collect the butterfly eggs **or** caterpillars in. Note: They cannot collect both butterfly eggs and caterpillars because the caterpillars may eat the eggs.
3. Give each student (or group) magnifying glasses so they can look for the tiny eggs **or** caterpillars.
4. Assist your students as they collect the egg/caterpillar specimens in your butterfly garden in the outdoor classroom site. As you collect the specimens, be sure to collect the stem of the host plant that they are attached to and place them in the medium sized plastic containers for transport back to the indoor classroom. You can turn the activity into a “treasure hunt” to see who can find them first. Explain to them that the best way to find the eggs/caterpillars is to look for their host plants. Consult field guides to find out the types of host plants, butterfly eggs, and/or caterpillars you have in your garden.
5. Once you return to the indoor classroom, remove the host plants with the eggs **or** caterpillars. Place the host plants (with the eggs/caterpillars) in the larva containers by sticking the stems through the holes in the top of the containers. Push the stems into the pea gravel (or foam) so that the stems or clippings are balanced and do not fall out of the containers.
6. Cut 2” x 2” pieces of paper towel and place them on the top of the lids along the base of the stems to prevent caterpillars from crawling under the lids. **Replace the paper towels daily** as caterpillar frass (droppings) collect on them.
7. Place the larva containers with the host plants and eggs/caterpillars inside the butterfly cage.



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Alabama Course of Study Objective Correlations

(on page 4)

Materials

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- Paper towels

Butterfly Cage...

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Collecting Specimens...

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Example Host Plants:

Butterfly Species	Host Plant
Monarch Butterfly	Butterfly Weed, Milkweed
Painted Lady	Thistle, Daisy, Hollyhock, Mallow
Zebra Swallowtail	Paw-Paw
Black Swallowtail	Parsley, Dill, Fennel, Queen Anne's Lace, Celery, Carrots
Clouded Sulphur	Alphalpa, Clover
Viceroy	Willows, Poplars, Cottonwoods, Apple

Helpful Hints for Collecting Butterfly Eggs:

Collect the butterfly eggs **and** the stem (with leaves) of the host plant they are attached to, and place them in the plastic containers. Do **not** remove the eggs from the host plant! For monarchs, eggs can be found on the under-side of the milkweed leaves. If the eggs fall off the leaf, it is very difficult to re-attach, so be careful.

Helpful Hints for Collecting Caterpillars:

Collect 5-10 caterpillars (depending on their size) **and** the stem (with leaves) of the host plant that they are eating, and place them in the plastic containers. Be careful to always put the lid back on the container as you collect the caterpillars since they can crawl away quickly. For monarchs, look for milkweed plants with little dark green pellets on them—those are caterpillar droppings and they usually give away a location if the caterpillar hasn't moved on to a different milkweed plant. Caterpillars normally like to stay shaded from the sun and will usually be on the under-side of a leaf, along the stem-line of the milkweed plant itself or within the tiny gathering of leaves at the top of the milkweed plant.

Optional: Butterfly larva of the well-loved Monarch butterfly can be purchased from Monarch Watch (www.MonarchWatch.org). These caterpillars are a favorite for a lot of classrooms because of their bright colors, and because so many people love the Monarch butterfly.

Butterfly Rearing Procedure

See Page 5 for Helpful Hints for Handling Caterpillars & Taking Care of Chrysalides!

1. After the eggs have hatched into caterpillars and they have eaten the original stem, replace it with a fresh cutting from the host plant. Be sure to **keep two fresh leaflets for each caterpillar** in each larva container as the caterpillars grow. The leaves will most likely need to be replaced once every day or two. Just clip new stems from the milkweed in your butterfly garden. Milkweed will stay fresh for several days if kept in a closed plastic bag in the refrigerator, and can also be frozen for several months if you need to store it. It dries out quickly after being removed from the freezer, so it is important to provide freshly thawed leaves frequently.

2. Once the caterpillars are fully grown, they will turn into chrysalides (pupae). In preparation for this they will, according to the species, descend to the floor of the cage (previously scattered with soil, leaves and grasses) or spin themselves up on supports (also provided in the cage with sticks or netting along the top of the cage). After the chrysalides are formed, you can remove the larva containers and host plants from the butterfly cage.



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Butterfly Rearing Procedure Continued...

3. Wait 9-14 days as the caterpillar goes through metamorphosis in the chrysalis. Your pupae do not need food or water during this stage. An occasional misting of the container will help keep the environment humid, which is helpful for the butterflies.

4. Adults often emerge from the pupal stage in the mid-morning. For monarchs, the pupa turns very dark and the orange and black wings will be visible. Check it often to increase your chances of observing the amazing event as the butterfly emerges from the chrysalis.

5. Allow the newly emerged adult plenty of time to inflate its wings and for the wings to dry before handling it or releasing it (3-4 hours). You may either set your butterflies free soon after they emerge, or keep them in your classroom for students to observe and study. Once the butterfly is ready to fly, you can simply take your butterfly cage outside and release the butterflies in your outdoor classroom's butterfly garden.

Note: Monarchs that emerge in the morning can be released at the end of the day, or kept until the following day without needing to be fed. Those emerging in the afternoon should be released the next day. It is best if they are released on a warm sunny day, near flowers if possible. If it is colder than 60° F, they often cannot fly. To hold a butterfly, always hold all 4 wings at once in their vertical position.

6. If you choose to keep the adults, their butterfly cage should be large enough to allow flight. Adults do not need to be fed until the day after they emerge. After this they should be fed daily.

Helpful Hints for Feeding Adult Butterflies

They can be fed in a variety of ways:

Option 1: You can re-use your larva containers (after they have been cleaned). Put fresh cut nectar flowers in the containers and place them in the cage.

Option 2: You can place a small dish in the cage containing a bright red or orange sponge (that has never used before) saturated with a sugar-water solution (3 tsp of sugar to 1 cup of water).

Option 3: You can cut fresh fruit such as watermelons, honeydew or cantaloupe and set it in the cage. These should be changed daily to prevent fermentation..



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Helpful Hints for Handling Caterpillars

Caterpillars can be handled safely with fingers after they are about three to four days old, but it is best to handle them as little as possible until they are over an inch long. If necessary, a moistened artist brush can be used to transfer younger caterpillars without hurting them. Caterpillars of any size should not be handled when they are molting. They are getting ready to molt when they remain very still, often on the side or top of their container, and when you can see their black head capsule about to come off. Just after they have molted, their tentacles will look droopy, and you may see the old skin behind the larva. They will usually eat this skin!

There is some mortality in the larval stage. One bacterial disease causes the caterpillars to turn very dark, and then die. Others may simply stop eating and growing, and then die after several days. While this may be difficult for the students to accept, you can assure them that as long as they have been keeping the containers clean, it is not their fault. Remove dead caterpillars and clean their containers daily to prevent the spread of disease. Always be sure to wash your hands thoroughly before and after handling the caterpillars. Note: Do not pick up caterpillars with branching spines! These spines can deliver a very painful sting.

Helpful Hints for Taking Care of Chrysalides

Some butterflies and moths will stay in their pupae throughout the winter. Therefore, if your caterpillars pupate in the fall (or at any time during the winter in the case of purchased caterpillars), there is a good chance that they will remain in their pupae until spring. Remember that your diapausing pupae are still alive. Keep the cage humid with occasional misting. Be sure your pupae are hanging in a proper location for your butterfly to emerge. A newly emerged butterfly must be able to hang high enough that the tips of its wings will not touch the ground when they are fully expanded. If a new butterfly does not have enough vertical and horizontal space for its wings to expand and dry, its wings will not form correctly and the butterfly will not be able to fly. If the butterfly falls to the ground when it emerges, it will not be able to expand its wings, and it will die.

Most butterfly pupae (chrysalides) will either turn dark or become clear when the butterfly is ready to emerge. When this happens, be especially sure that your cage is humid. Keep a careful watch! It only takes a few seconds for a butterfly to come out of its pupa!

Some butterflies do die in the pupa stage. Dead pupae often turn very dark. For monarchs, if your pupa has been very dark for over 48 hours or if you gently bend the abdominal region of the pupa and it stays bent, then it is probably dead.

Information for the Bloomin' Butterflies Outdoor Classroom Activity was derived from the following sources:

<http://www.monarchwatch.org/rear/index.htm>
<http://www.butterflyschool.org/teacher/raising.html>
<http://home.wi.rr.com/monarchraising/>
<http://home.neb.rr.com/monarchrose/raising.htm>
<http://www.monarchlab.org/rearing/RearingMonarchs.aspx>



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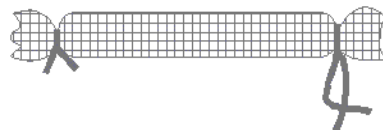
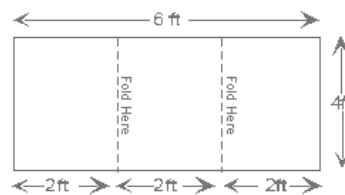
Hanging Net Butterfly Cage

Materials

- 2 yards of bridal netting with a width of 36 inches
- 2 - 12 inch Embroidery hoops
- 2 feet of strong ribbon or string (5 feet of strong ribbon or string if you prefer to stand the butterfly cage on a table top)
- 1 needle and 1 spool of thread
- 1 cardboard circle cut 12 inches in diameter (you can use a clean pizza box)

Assembly Directions

1. Fold your bridal netting into thirds as shown to make a rectangle.



2. Tie one end of your netting closed using a short piece (6 inches) of string or ribbon. Be sure to tie the knot securely! If this knot comes loose, you will lose your caterpillars &/or butterflies!

3. Tie the other open end with the longer piece of string. With the loose ends of this string, tie a loop from which you could hang your butterfly house.

4. Your tube of bridal netting should now be securely tied on both ends, and the only opening into this tube of netting is between the over lapped ends of the netting.

5. Place one of the embroidery hoops and the circle of cardboard in the bottom of the netting by slipping it in between overlapping layers of netting. Lay the embroidery hoop with the cardboard circle down on top of it, so that the diameter of the hoop and cardboard circle will be parallel to the floor and ceiling when hung. This should both open up the tube of netting and tighten the overlapping layers of netting.

6. Place the second embroidery hoop in the end of the netting from which the house will hang. Secure it to the netting with the needle and thread.

7. Hang the butterfly cage from a hook in your ceiling.

Another Option: If you prefer not to hang your butterfly cage from the ceiling without more support, you can place the butterfly cage on a secure table top before attaching the top of the cage. So that it will be stable and balanced, fasten the netting to the bottom embroidery hoop with your needle and thread (cutting away any unnecessary netting) and then use hot glue to attach the frayed edges of the netting to the cardboard circle.

Don't forget: Always clean your cages between butterfly generations!



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Alabama Course of Study

Objective Correlations

(on page 6)

Materials

Butterfly Cage...

Opt 1: Wooden Frame Cage (pg. 6)

Opt 2: Hanging Cage (pg. 7)

Opt 3: Purchase a Butterfly Cage

Collecting Specimens...

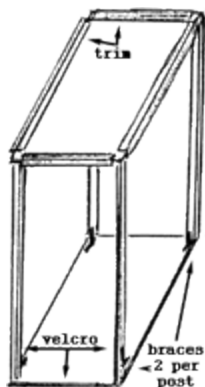
- Magnifying glasses (optional)
- 4-6 medium sized plastic bowls with lids

Wooden Frame Butterfly Cage

Materials

- Two 12" X 16" X 1/2" plywood boards
- Four 1" X 1" X 22" wood posts
- Four 14.5" square edge molding pieces
- Three 12" square edge molding pieces
- Eight 1" corner braces
- One 2' X 45" piece fiberglass screening or netting
- 5' X 1/2" Velcro
- Sixteen 1/2" wood screws
- Eight 1-1/2" nails
- 5/16" heavy duty staples
- 9/16" heavy duty staples

Assembly Directions



- 1) Cut a 2' x 1' piece of screening and double stitch the fuzzy side of the Velcro on three sides of the screening.
- 2) Nail posts onto corners of one of the plywood boards. Nail other board onto the top of the posts.
- 3) Screw brackets into corners, attaching 2 brackets per post. It's easiest to use a power drill with screw attachment.
- 4) Wrap large piece of screen around three sides of cage (all but the front), attaching screen with 5/16" staples to the posts. There will be overlap of screening at the top and bottom of the cage. This will be tucked under the molding.
- 5) Staple three strips of velcro to the front of the cage, on the outside edge of the two front posts, overlapping the screening, and on the bottom plywood edge.
- 6) Attach the front screening panel using the Velcro and attach the top edge with staples.
- 7) Finish the cage by attaching molding. Staple, with 9/16" staples, the square edge molding to the top and bottom edges, covering all edges except the bottom front edge where Velcro is attached.

Don't forget: Always clean your cages between butterfly generations!

The Alabama Outdoor Classroom Program is a partnership between:



Alabama Cooperative
Extension System



Alabama Wildlife Federation

www.alabamawildlife.org/classrooms/



Alabama Department of
Conservation & Natural Resources