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GREGORY GRAMBO

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# Raising Butterflies in Your Classroom

by Gregory Grambo

In life science, students discover relationships between plants and animals by observing the similarities and differences of various species. One similarity that links all living organisms is the life cycle—all organisms are “born,” they “live,” and eventually they “die.” Some sprout from seed and become mature plants that grow new seeds before dying. Some hatch from eggs, then grow up to lay eggs themselves. Still others are nurtured inside their mothers and born live.

An excellent classroom example of the life cycle is the butterfly. Because the life cycle of a butterfly is so compact, students can follow the insect from egg to caterpillar to pupa to chrysalis to beautifully colored butterfly in a matter of weeks. This process, known as metamorphosis, gives students a close-up view of the life cycle as it progresses.

Butterflies lay their eggs on the plants that will nourish the grow-

ing caterpillars. Different types of caterpillars eat different types of plants. This way, different species of caterpillars can coexist without competing for food. Table 1 shows different varieties of butterflies and which plants their eggs will be found on. For example, monarch butterflies lay their eggs on the underside of milkweed leaves, swallowtail butterflies lay their eggs on birch leaves, while cabbage butterflies lay eggs on cabbage leaves, and orange sulfur butterflies lay their eggs on clover. The leaves of the plants nourish the caterpillar until it begins its metamorphosis.

## The egg and beyond

To find butterfly eggs, begin by looking for a small dot or lump on the underside of the leaves listed in Table 1 during May and June in northern regions and earlier in southern regions. Cut these leaves off of the plants and loosely wrap them in a moist paper towel. Place the paper towel and leaves on a

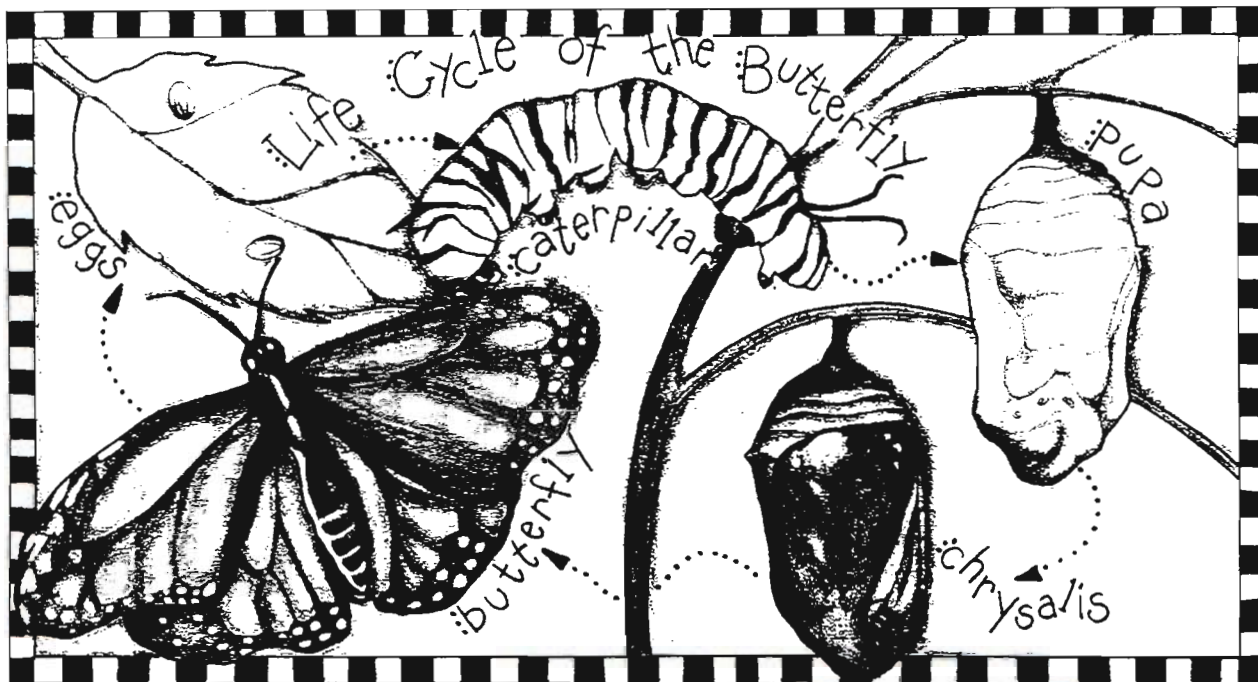
foil tray and place the tray in a zip-closure plastic bag to keep the leaves from drying out too rapidly. Be sure to inflate the bag with air before closing.

If you start with five eggs, you will most likely end up with at least three chrysalides. At least two of these should change into butterflies provided they are not touched and the caterpillars eat enough food.

The eggs should hatch within a week after they were originally placed on the leaf by the adult butterfly. The emerging caterpillar will crawl out of the egg and begin to eat and eat. It starts by eating its empty shell and then any other egg it may find on the leaf. For this reason, the adult butterfly usually only places one egg on each leaf. Within a few days, the caterpillar will double in size. Keep the new caterpillar supplied with fresh,

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*Gregory Grambo teaches sixth-grade science at the Louis Armstrong Middle School in East Elmhurst, New York.*



JOAN WIEBERG

moist leaves of the same variety as the eggs were found on. You can collect extra leaves at the same time that you find the eggs and then keep them fresh inside a plastic bag in the refrigerator. The young caterpillars can be kept inside the inflated plastic bag for about one week.

Next, the caterpillar will need to be moved to a rearing cage. Several different types of rearing cages work well. You may use a gallon jar with tiny holes poked in the lid, a three-liter soda bottle with the top cut off and inverted onto its plastic base, or a ten-gallon aquarium with a screened cover. If you would like groups of students to have their own cages, the soda bottles are the most economical option. However, if you prefer to have one cage at a central learning station, a fish tank or gallon jar will be more sturdy.

Also in the cage, you will need a weighted jar of water with a hole punched in the lid to hold branches and leaves for the caterpillar to eat.

This container can be glued to the bottom of the cage with epoxy or hot glue so that it will not topple.

Multiple caterpillars in one cage will not attack each other, but they will compete for food. If you put too many of the same type of caterpillars in the same area, you may find that there is not enough food to go around. Since different types of caterpillars eat different kinds of leaves, you may keep a number of different caterpillars in the same cage as long as you provide enough of each kind of leaves.

As the caterpillar begins its exciting change to a butterfly, it is important that all students have a grasp of each stage of the process as it occurs. You may wish to have your students document these changes by drawing or sketching the various stages or recording daily observations in a logbook. Classroom posters and charts are also an excellent way to illustrate the changes and share information

between groups.

As the caterpillar grows, it sheds its old skin so it can become larger. A caterpillar will generally shed four or five times before becoming a butterfly. The caterpillar releases a slippery substance between the old and new skin, making the molting process easier. Then its old skin breaks open and the caterpillar slides out. The caterpillar will be larger, and it may be a slightly different color.

About two weeks after hatching, the caterpillar is fully grown and will begin to change into a pupa—the last stage before becoming a butterfly. It will form a spinneret of fine silk and attach itself to a twig. It will weave a button of silk onto the twig and clamp its rear legs to this button. Then it will release its front leg grip on the leaf it has been eating and hang from its rear legs in a J position. Its caterpillar organs will soon cease functioning and die, and they will be replaced by butterfly organs.

**TABLE 1.**

Butterfly common name	Scientific name	Host plant
Tiger swallowtail	<i>Papilio glaucus</i>	cherry, birch, aspen
Black swallowtail	<i>Papilio polyxenes</i>	parsley, Queen Anne's lace
Monarch	<i>Danaus plexippus</i>	milkweed
Viceroy	<i>Limenitis archippus</i>	willow
Cabbage white	<i>Pieris rape</i>	mustard family plants (crucifers)
Clouded sulfur	<i>Colias philodice</i>	white clover
Orange or alfalfa sulfur	<i>Colias eurytheme</i>	pea family plants (clovers, vetches)
Snout butterfly	<i>Libytheana bachmannii</i>	hackberry
American painted lady	<i>Vanessa virginiesis</i>	sweet everlasting
Buckeye	<i>Precis lavinia</i>	purple gerardia
American copper	<i>Lycaena phlaes</i>	sheep sorrel, curled dock
Silver-spotted skipper	<i>Epargyreus clarus</i>	black locust, wisteria

At this point, the caterpillar molts for the last time. As the skin stretches, it rips open at the back of the neck, revealing a mushy blob. At the end of its stomach or abdomen is a black stem called a cremaster, which must be attached to the silk button the caterpillar wove. After the cremaster attaches to the silk button, the old skin will fall to the bottom of the cage. The blob will become smooth and hard in a few hours. It is now a chrysalis.

Warn students at this time that the chrysalis must never be touched. The butterfly cells that were in the egg and stored inside the caterpillar are beginning to grow and take form. The development of the butterfly can be sped up by placing the rearing cage in a warm place out of direct sunlight. Cold slows down the bodily processes of the caterpillar, while warmth tends to speed them up.

As the insect develops, the chrysalis will become transparent. Question your students as to their observations of the chrysalis at this time. They may notice the butterfly curled up inside. The butterfly has developed and needs to extricate itself from its casing. As the insect twists and turns, the chrysalis will crack open. The butterfly will emerge abdomen first, with its wings behind it. As the butterfly hangs onto the empty chrysalis shell, it begins to pump blood into its wings. It is important to remove all other developing caterpillars from the rearing cage at this time. Caterpillars are eating machines, and they will devour the emerging butterfly before it has strengthened its wings for flight.

The butterfly's wings should open fully in about 15 minutes. The butterfly could possibly stay in this position for a few hours until its wings dry. The newly emerged

insect will now need as much room as you can provide it. If the butterfly is kept in the rearing cage, it may damage its wings trying to fly among the leaves and branches. Move the butterfly to another cage, such as a ten-gallon or larger aquarium free of leaves and branches. The butterfly also does not have the same eating habits as the caterpillar did—the butterfly needs water to drink. Place a wet sponge inside a dish in the new cage. The insect will be able to drink from the sponge. After a few days of observation, the butterfly should be released into the environment.

### Butterfly gardening

If you want to see butterflies often around your school, try planting gardens to attract them. There are two main types of plants you will need in a butterfly garden—nectar plants for the adult insects and food plants for the young.

Caterpillars are very picky eaters, so without food plants such as those in Table 1, you will not have any young. Butterflies, on the other hand, will drink the nectar of most blooming flowers, but flowers such as asters, marigolds, hollyhocks, zinnias, lantana, cosmos, and nasturtiums are their favorites.

Butterfly gardens can be planted in the ground or kept in containers in the schoolyard or in window boxes outside your classroom. Butterflies also need a shallow dish for drinking and some flat stones to rest on and bask in the sun. A small garden with both types of plants will certainly attract many butterflies for your class to discover, watch, and study. □