

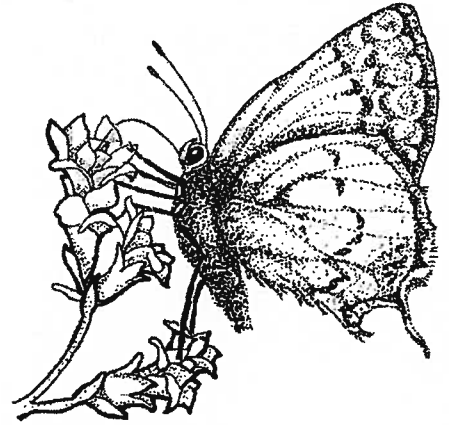


Smithsonian Institution

Horticulture Services Division

Butterfly Gardening Fact Sheet

"Splendor awaits in minute proportions" - E.O. Wilson, Biologist



The ephemeral beauty of the butterfly and the peculiarity of its life cycle symbolize transformation in nature and the passage of time. In some languages, the word for "butterfly" is the same as that for "soul."

Smithsonian Butterfly Habitat Garden

The garden is located on the east side of the Smithsonian Institution's National Museum of Natural History, on the corner of 9th Street and Constitution Avenue in Washington, D.C. The original Butterfly Garden was built in 1995 with funds from the Smithsonian Women's Committee, a group dedicated to supporting education, outreach, conservation, and research projects within the Smithsonian through its fundraising activities.

In 2000, the Garden Club of America designated the Smithsonian's Butterfly Habitat Garden one of its Founder's Fund Projects. This gift was in keeping with one of the GCA's stated goals, that of restoring, improving, and protecting the quality of the environment through educational programs and action in the fields of conservation and civic improvement. This donation enabled the garden to expand threefold to its current scope which includes an educational amphitheater for outdoor learning programs.

The garden offers interpretive tours, weather permitting. See back page for details. Artfully enameled signs throughout the garden offer a self-guided experience for visitors.

Conservation

Like all living organisms, butterflies suffer from a loss of habitat. A habitat is built on a complex network of relationships which are delicately balanced and easily disrupted. Removing a species or even introducing just one foreign species to a given habitat can set off a chain reaction that endangers a whole ecosystem that was once perfectly in balance.

Habitat destruction, the result of deforestation, pollution, land development, modern farming practices, and indiscriminate use of pesticides, among other

things, jeopardizes the survival of many species of butterflies and plants. Many butterfly species depend on a single species of plant for food, while most plants rely on butterflies and other insects for pollination.

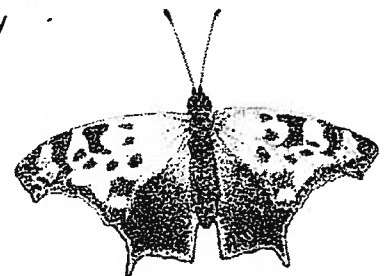
There is no question that we need to preserve existing habitats, but we can also begin to reestablish habitats and increase diversity by integrating native plants into the landscape, both on a large scale and in our own backyards.

A garden of native plants represents a return to a natural and evolving system. Encouraging a community of select plants and insects to thrive in your garden will actually reduce the need to apply pesticides and herbicides since nature provides its own system of checks and balances. Using plants adapted to existing moisture conditions reduces stress on water resources. Creating a situation that emulates nature will give way to an environment that is self-regulating and eliminate the need for excessive cultivation, maintenance and pest control.

More than 700 species of butterflies can currently be found in the U.S. Their habitats may be defined by the dominant plant life and relative wetness of the area in which they live. Forests, treeless regions (prairie, tundra, fields, or any open, sunny area) and wetlands are three major habitat divisions. In the Smithsonian Butterfly Habitat Garden, these divisions are represented by a Woodland Edge, a Wetland, a Meadow, and a Backyard or Urban Garden. Each is designed to support the life cycle of a number of local species of butterflies.

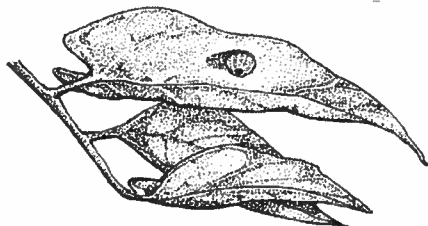
Common Butterflies of the Mid-Atlantic

- Mourning Cloak
- Great Spangled Fritillary
- Painted Lady
- Comma
- Tiger Swallowtail
- Monarch
- Buckeye
- Gray Hairstreak
- Red Admiral
- Cabbage
- Spring Azure
- Viceroy



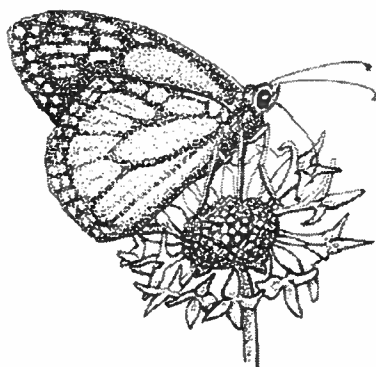
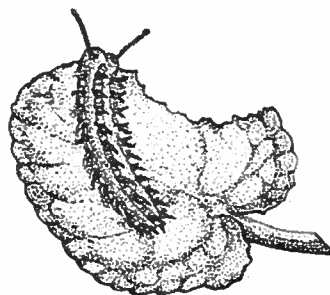
LIFE CYCLE A butterfly passes through several distinct stages in the course of its life. This type of development is called **complete metamorphosis**. Understanding a butterfly's life cycle is an important part of successful butterfly gardening.

1. A female butterfly usually deposits her eggs on a leaf, singly or in clusters. She can lay up to 1,600 eggs in her lifetime, and is usually particular about the plants she uses. Most species have adapted to feeding on one or a few closely related plants. Just as with a bird egg, the butterfly embryo is nourished by the yolk. The shape and color of an egg varies widely according to the species.



2. Butterfly larvae, or caterpillars, hatch from the egg in 5-10 days, then feed voraciously on their host plants. The body of a larva includes a head with tiny simple eyes and chewing mouthparts, a thorax with three pairs of legs, and an abdomen with prolegs that disappear in later stages. As the larva grows, it must periodically replace its skin.

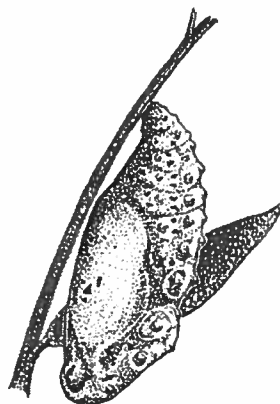
Each time it sheds the old skin it becomes a new instar with a larger exoskeleton. A larva will usually pass through four to five, and as many as seven, such instars.



4. A newly emerged adult butterfly must pump **hemolymph** (insect blood) into its

limp, wet wings. Once the wings take shape and harden, it can begin feeding and pursuing a mate. Like all insects, the adult butterfly has three main segments and a tough exoskeleton. A coiled tube known as the proboscis extends from the head like a straw to sip nectar. Large compound eyes allow 180 degrees of vision. Club-shaped antennae are used as feelers, for picking up scent, and for orientation. The thorax bears three pairs of segmented legs and two pairs of wings. The abdomen contains most of the organs for digestion, respiration, excretion, and reproduction. Depending on the species, the lifespan of an adult butterfly varies from one week to several months.

3. When the time is right, according to physiological and environmental cues, a larva stops feeding and prepares to form a chrysalis, or pupa, in which the transformation from larva to adult butterfly takes place. The caterpillar will hang from a leaf or twig facing down, attached by a silk pad. It may also spin a silk sling around its thorax for extra security. Inside the chrysalis, the larval tissues break down and adult organs develop.



Butterfly Wings are for ...

- **Flight-** Rapid contraction and relaxation of opposing pairs of muscles in the thorax allows for mobility.
- **Migration-** Butterfly species that cannot endure freezing temperatures during any stage of their life cycle must migrate south. In the case of the Monarch, survival depends on its ability to fly to food sources in Southern California or Central Mexico.
- **Courtship-** Partner recognition and display.
- **Temperature regulation-** Absorbed heat-energy is circulated throughout the body.
- **Protection-** Wing colors often protect butterflies from danger by providing camouflage or by startling predators. The colors and complex *patterns* we admire and use as tools to identify butterflies are formed by tiny scales that overlap like shingles on a roof.

Butterfly Behaviors to Look For...

Basking-

All cold-blooded animals rely on the sun's energy to regulate their temperature. Butterflies can be found basking with their wings exposed to the sun in preparation for flight.

Puddling-

Adult males often cluster in wet sand or muddy areas to drink. It is believed they are extracting extra minerals, especially salts. They may also land on our skin in hot sweaty weather.

Courtship and Mating-

Male butterflies locate females of the same species by passively **perching** at a lookout point, or by actively **patrolling** an area. A male butterfly may "drop" a female to the ground; as the mating ritual continues, he rubs his scent glands on her antennae as a further measure of acquaintance. Mating will commence if the female is receptive to these actions.

BUTTERFLY GARDENING TIPS

- Learn about the butterfly species in your area and encourage them to live in (not just visit) your garden by planting both nectar food for adults and host plants that serve as food for caterpillars.
- Design your garden using information gathered on local butterflies, their nectar sources and larval food. Try to extend the bloom period by mixing native and non-native plant species into your design.
- Heirloom (old-fashioned, non-hybridized) species tend to have more nectar, more scent, and more appeal to butterflies. Many garden catalogues indicate which plants attract butterflies.
- Butterflies are extremely sensitive to pesticides and lawn chemicals. In fact, the presence of dandelions, clovers, and other "weeds" in your lawn may actually attract more butterflies. If possible, plant your butterfly garden far from your driveway and other possible sources of pollution and disturbance.
- Provide sunny areas for basking (such as heat absorbing rocks), shelter from wind, and wet areas (though not open water) for puddling.
- As some eggs, larvae, and pupae spend the winter on twigs, branches, and dead leaves, it is better to cut back a garden early in the autumn in order to avoid discarding latent butterflies along with your yard waste.
- Even a small area will suffice if there are plants to provide the proper environment for all stages of the butterfly life cycle. Host and nectar plants are often too tall for a small garden. Encourage shorter plants and increase the number of blooms per plant by cutting the plant back when it reaches a height of approximately two feet.

BUTTERFLY LARVAL HOST PLANTS

The keen ability of butterflies to recognize the appropriate host plant is genetic. Careful plant selection to lay eggs on is the extent to which the female nurtures and protects her offspring. It is important to provide these plants in your garden. Check your area for a list of native plants appropriate for your growing region or zone. The following list includes Zone 7 plants.

<u>PLANT</u>	<u>BUTTERFLY</u>
Tulip Poplar- <i>Liriodendron tulipifera</i>	(Tiger Swallowtail)
Paw Paw- <i>Asimina triloba</i>	(Zebra Swallowtail)
Dogwood/ Viburnum- <i>Cornus sp./ Viburnum sp.</i>	(Azures)
Wild Cherry- <i>Prunus serotina</i>	(Red spotted Purple)
Spice Bush- <i>Lindera benzoin</i>	(Spicebush Swallowtail)
Black Willow- <i>Salix nigra</i>	(Mourning Cloak, Viceroy)
Violet- <i>Viola sp.</i>	(Fritillaries)
Dutchman's Pipe- <i>Aristolochia sp.</i>	(Pipevine Swallowtail)
Milkweed- <i>Asclepias sp.</i>	(Monarch)
Pearly Everlasting- <i>Anaphalis margaritacea</i>	(Painted Lady)
Dill/ Fennel/ Parsley- <i>Apiaceae</i> Family	(Black Swallowtail)
Heath Aster- <i>Aster ericoides</i>	(Pearl Crescent)
White Clover- <i>Trifolium repens</i>	(Eastern Tail Blue)

BUTTERFLY-ATTRACTING NECTAR PLANTS

Butterflies pollinate 4% of all flowering plants. Sugary nutritious nectar is the reward for pollination. Adults are not as selective in their choice of nectar plants as larvae are in their choice of host plants, but they do respond to various flower characteristics.

Flower shapes that draw the most attention are those which allow a butterfly to perch while sipping nectar.

- Daisy-like- Coneflower, Aster, Coreopsis
- Clusters or spikes of blossoms- Bee Balm, Button Bush
- Umbels (flat clusters of flowers)- Yarrow, Milkweed

Clumped or massed plantings in the blue, purple, yellow, white, orange, pink or red color spectrum offer heightened foliage-to-flower contrast and aid the butterfly in plant identification.

Fragrant flowers also advertise nectar, but many of the new flower cultivars bred for enhanced color and size have lost their fragrance in the process. Choose heirloom varieties instead.

(Butterfly Bush and Lantana, although excellent nectar plants, are not native species).

FUN FACTS

Butterflies evolved relatively recently, around 100 million years ago, during the Cretaceous Period. This was roughly the time that flowering plants, or angiosperms, began to appear, the first indication of the important relationship between butterflies and flowering plants.

Butterflies, in the insect order Lepidoptera, meaning "Scaly Winged," are found on every continent except Antarctica.

The majority of butterfly species exist in the tropics. Out of roughly 18,000 known species, less than 5% live in North America.

A six pound human baby growing at the same rate as an average caterpillar would weigh eight tons in two weeks!

The moths of the silkworm family have been raised in China since 2697 B.C. These are the only truly domesticated insects in that they are completely reliant on human beings for their survival.

Just 1% of butterfly eggs will survive to adulthood and successfully reproduce. Although this is enough to keep a population stable, butterflies have adapted numerous survival strategies to improve the odds, including protective coloration and toxins.

Butterflies, Skippers, and Moths

The insect order Lepidoptera is divided into dozens of families, 90% of which are moths. There are five families of butterflies and one family of skippers. (Skippers are similar to butterflies, but distinct enough in physiology and behavior to be classified into their own family). It is therefore difficult and misleading to make generalizations about the differences between butterflies and moths, as some species of moths are as different from each other as they are from butterflies.

In a very general sense, butterflies may be thought of as a group of moths specialized to fly during the day.

Where do Butterflies go in the Winter?

Species that are adapted to freezing temperatures will enter a resting period known as diapause, waiting in cracks of rocks, fence posts, or bark for spring. Depending upon the species, diapause occurs in the larva, pupa or adult stage.

Migration is an alternative for species unadapted to freezing temperatures. The classic southward migration of the Monarch begins in late summer. They travel huge distances to reach their over-wintering grounds. Those that complete the return trip are the offspring of the southern migrants.

Other Butterfly Gardens to Visit

Brookside Gardens- Wheaton, Maryland
Callaway Gardens- Pine Mountain, Georgia
Niagara Falls Butterfly Conservatory- Ontario, Canada
Sophia M. Sachs Butterfly House- Chesterfield, Missouri

Websites

Smithsonian Butterfly Habitat Garden
www.mnh.si.edu/museum/butterfly.html
www.gardens.si.edu/horticulture/gardens/nmnh/butterfly.html

The Lepidopterists' Society
www.lepsoc.org

North American Butterfly Association
www.naba.org

Washington Area Butterfly Club
<http://users.sitestar.net/butterfly>

New England Wild Flower Society
www.newfs.org

Suggested Reading

The Butterfly Gardener's Guide. The Brooklyn Botanical Garden, Inc., Brooklyn, 2003.

Glassberg, Jeffrey. Butterflies Through Binoculars: A Field and Finding Guide to Butterflies in the Boston, New York, Washington Region. Oxford University Press, Oxford, 1993.

Grissel, Eric. Insects and Gardens. Timber Press, Portland, 2001.

Mikula, Rick. Garden Butterflies of North America: A Gallery of Garden Butterflies and How to Attract Them. Willow Creek Press, Minocqua, 1997.

Pyle, Robert Michael. Chasing Monarchs: Migrating with the Butterflies of Passage. Houghton Mifflin Co., Boston, 1999.

Xerces Society/ Smithsonian Institution. Butterfly Gardening: Creating Summer Magic in Your Garden. Sierra Club Books, San Francisco, 1990.

Smithsonian Butterfly Habitat Garden Tours & Contact Information

Guided tours are available June through September on Thursdays at 2:00 pm in the garden or by appointment for groups except Federal holidays.

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