

## Like a Moth to a Flower



### Moths

**A**fter dark, moths, as well as bats, take over the pollinating night shift. Nocturnal bloomers, with pale or white flowers heavy with fragrance and copious nectar, attract these pollinators. Some moths are also active by day.

### Moths and Butterflies

Butterflies, possibly the best loved of all insects, are appreciated as benign creatures that add color, beauty, and grace to our gardens. Moths, on the other hand, aren't nearly as appreciated for their pollinating contributions. Butterflies and moths belong to the same insect order, Lepidoptera.

### *Can you tell the difference between a moth and a butterfly?*

In general, butterflies are brightly colored, and fly by day, and moths are more likely to be grey or brown, and fly at night. But there are numerous exceptions: such as bee-mimicking hawkmoths, colorful luna moths, and colorful, day-flying scape moths.

At rest, butterflies tend to hold their wings either partially open or closed vertically over their bodies (like the sails of tiny sail boats). Most moths, however, hold their wings flat. Moths tend to be fatter and hairier than butterflies. And moths' antennae are often broad, complex and feathery, while butterflies generally have simple antennae with clubbed tips.

### Metamorphosis

Like a butterfly, a moth begins life as an egg laid on or near its host plant. The egg hatches into a tiny caterpillar, eating and growing until it transforms into a chrysalis. They go through complete metamorphosis into sexually active, winged adults. Some moths spin a cocoon from their silk glands, creating an additional layer of protection. (Example: Silk moths)

### Feeding

Caterpillars spend most of their time eating, and most species have a very specific plant on which they feed. Nectar from flowers and sugar from sap or overripe fruit provide most of the nutrition that moths need. They will also sip at mud puddles for mineral salts, and feed at animal scat, bird droppings, or animal carcasses to get amino acids and other nutrients.

### Thermal regulation

At night, moths cannot use the sun to maintain body temperature like butterflies do. To regulate their temperature, moths use flight muscles to make small, rapid vibrations which looks like shivering. Moths are also covered with "heat insulating hairs."

### Sense and Sensibility of Moths

#### *Sight*

Butterflies depend on keen vision, but night-flying moths depend heavily on a developed sense of smell for feeding and reproduction. Male moths' antennae contain complex scent organs capable of detecting pheromones produced by a receptive female.

#### *Hearing*

Some moths have sound receptors. These "ears" are connected to nerve cells, tuned to the usual range of bat frequencies (40 kHz), and make it possible for moths to detect bats (a main predator) up to a distance of 30 meters.

### Moths as Pollinators

Some moths are significant pollinators, such as the noctuid moth and many hawkmoth species. These nocturnal pollinators are seldom seen. Moth-pollinated flowers are typically pale or white so they reflect moonlight. They usually have a strong, sweet perfume – a practical advertisement in the darkness. The scent is often released only at night. (Examples: night-blooming jasmine, evening primrose, yucca species, and Madonna lily)

### Garden Pests: Moth Larvae

Although adult moths are harmless, fascinating to watch, and beneficial as pollinators, moth larvae (caterpillars) are sometimes seen as garden pests; damaging plants' leaves, stems and fruit with their voracious appetites.

Two infamous moth caterpillars are the tobacco hornworm (adult: sphinx moth) and the tomato hornworm (adult: 5-spot hawkmoth). Both are easily recognized by their large size (4-5 inches across) and characteristic “horn” on their rear. They feed on tomato, potato, eggplant and pepper plants. Other lesser-known “hornworm” species are generally innocuous, attracting little attention and causing little injury to garden plants.

If hornworms are a problem in your garden, here are a few toxic-free steps you can take to minimize the damage:

- **Rototill the soil.** Turning up the soil after harvest will destroy any pupae that may be there.

-**Handpick caterpillars off your plants.** Drop them in a bucket of water or snip them in half to kill them.

-**Natural selection.** One parasitic wasp, a natural enemy, lays its cream-colored, oval egg sacs on the hornworm's back. If found, such worms should be left in the garden so the emerging wasps can parasitize other hornworms.

-**A neat science experiment.** If you want to see the hornworms' colorful adults, giant sphinx and hawkmoths, sequester the offspring on a few plants in the corner of your garden. Then wait and watch!

### House Pests: Clothes Moths

Clothes moths are small, buff-colored moths, well-known as pests of stored woolens, but they will eat a wide range of other fibers including hair, fur, silk, felt, and feathers. Serious infestations can cause significant damage to clothing, bedding, floor coverings and other articles.

Clothes moths are seldom seen because they avoid light, preferring dark, undisturbed areas like closets, basements and attics. If you do see tiny moths flying about in the kitchen, they are probably grain moths feeding on cereal, grain or flour. Clothes moth adults do not feed so they cause no injury to fabrics. However, the adults produce eggs which hatch into the fabric-eating larvae.

**Prevention:** Woolens and other susceptible fabrics should be dry cleaned or laundered before being stored in insect-free environments. Cleaning kills eggs or larvae that may be present and also removes perspiration odors that are attractive to the pests. Be sure to vacuum the edges of carpets, along baseboards, underneath furniture, inside closets and other "quiet" areas where clothes moths prefer to live.

### Moth Facts

- Moth species outnumber butterflies by about ten to one
- Hawkmoths are impressive flyers. These giant moths fly upwind, tracking the airborne fragrance trail to a clump of flowers.
- The hummingbird hawkmoth has a proboscis (the hollow straw-like tongue) longer than the rest of its body. A proboscis is adapted for reaching nectar at the base of narrowly tubular flowers, and has a “knee-bend” that

facilitates entry into the flowers. When not in use, the proboscis is coiled up like a garden hose.

- Moth-pollinated trees and other plants comprise about 10% of the dry forest of Costa Rica.
- Nocturnal moths are important pollinators of the sacred datura, which is a member of the nightshade family, and a plant used traditionally by some Native American tribes in rituals.
- The Luna moth is considered one of the most beautiful insects. Adults have light green wings up to 4.5 inches across and two long, trailing "tails" extend back from the hindwings. The caterpillars are yellow-green with tiny red spots along the body.
- The yucca moth pollinates a yucca plant by grasping the flower's pollen mass and forcing pollen into the receptive stigma. Pollination specialists Dr. Steve Buchmann and Dr. Gary Nabhan claim that they are not aware of any other pollinator that *intentionally* pollinates a flower. The yucca moth does this to ensure a supply of seeds for its larvae developing within the yucca's immature fruits.
- A rare species of evening primrose found in the Antioch Dunes in the San Francisco Bay Area is in a critical state due to a drastic decline in the local hawkmoth population, the primrose's pollinator. Large-scale regional use of pesticides over many years, and other factors, have eliminated much of the hawkmoth's habitat.
- The frightful-looking hickory horned devil is the larval form of the Royal Walnut Moth. These giant moths have orange painted front wings with yellow spots, and can be up to 5.5 inches tip to tip.

### **What you can do!**

- Educate others about the importance of moths as pollinators
- Appreciate moths for their delicate beauty.
- Plant sweet-smelling, night-blooming flowers in your garden.
- Take an evening stroll through your garden to see who you might find flitting about from flower to flower.

### Links:

[www.whatsthatbug.com/moths.html](http://www.whatsthatbug.com/moths.html) Have a moth or other bug that you can't identify? Send these guys your bug questions and photos!

[www.npwrc.usgs.gov/resource/distr/lepid/moths/mothsusa.htm](http://www.npwrc.usgs.gov/resource/distr/lepid/moths/mothsusa.htm) U.S. Geological Survey's guide to North American moths, including a photo key to moth identification and moth distribution maps.

### Resources:

The Forgotten Pollinators by S. Buchmann and G. Nabhan, Pollinator Conservation Handbook by The Xerces Society in association with The Bee Works, and The Natural History of Pollination by M. Proctor, P. Yeo, and A. Lack