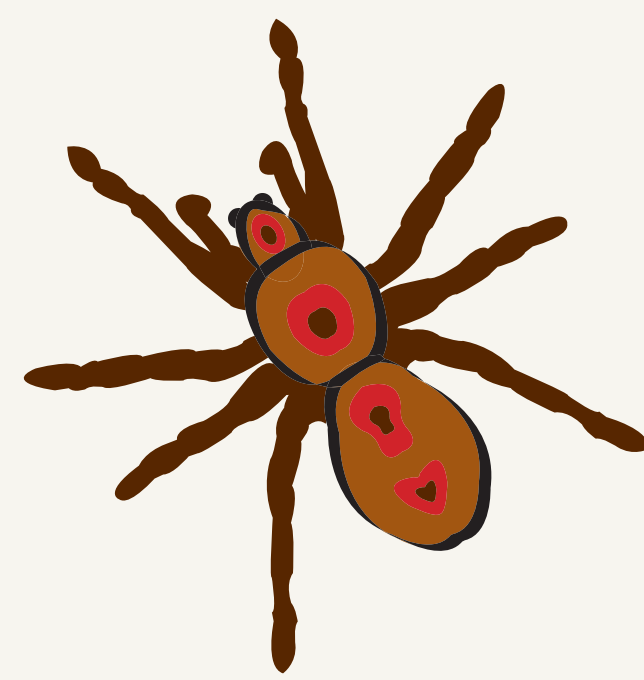




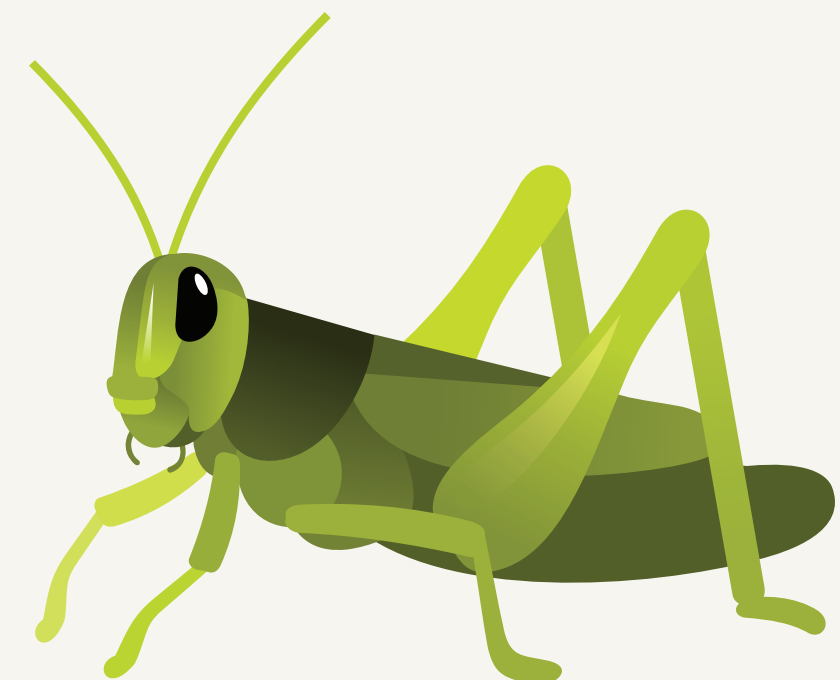
The Pollinator Partnership




Insects, birds, bats, and even monkeys, lemurs, and a lizard! About 75% of the world's flowering plants depend upon these animals for pollination. Most other plants rely upon wind to carry their pollen grains from plant to plant.



Pollination is the transfer of pollen within or between flowers (or between cones). Pollination leads to fertilization and eventually to seeds and new life!



We can survive on wind-pollinated plants such as  corn, wheat, and other cereals, but we thrive when our diet includes fruits, vegetables, nuts, chocolate, and other foods produced by pollinators.

Habitat loss, pesticides, diseases, and invasive plants and animals can all harm pollinators.

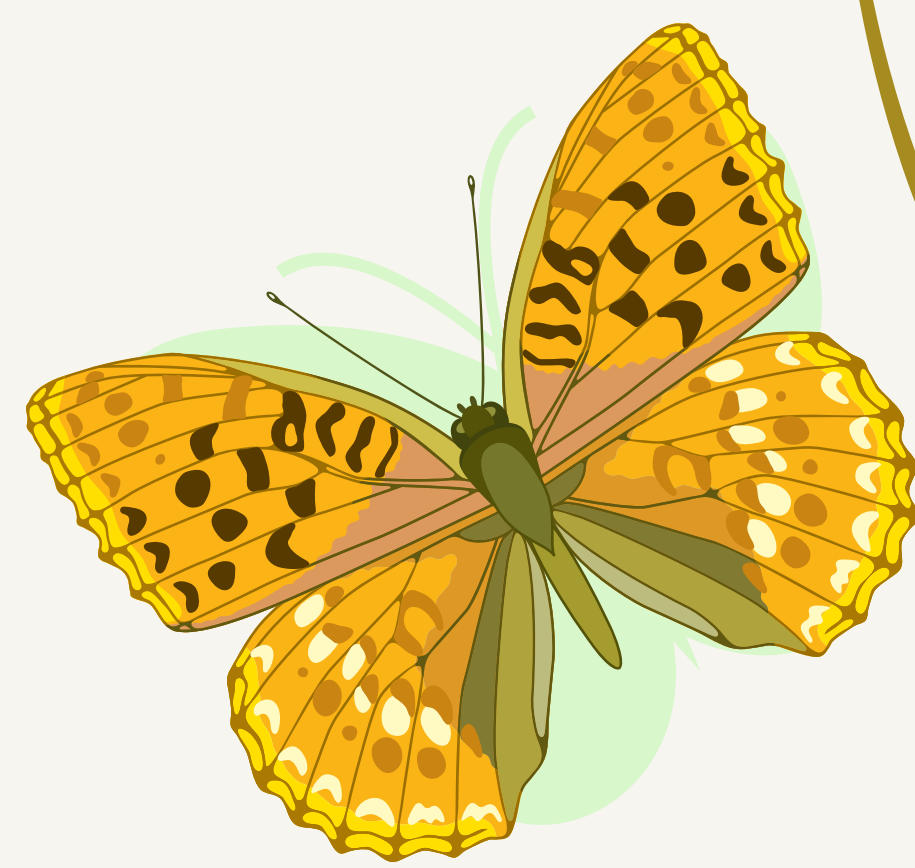


You can help sustain pollinators:

- Plant flowers, vegetables, and trees that supply vital pollen and nectar.
- Use pesticides sparingly, if at all. Apply at night when most pollinators are inactive.
- Become informed: visit online sites such as www.fs.fed.us/wildflowers/.



Learn more and join the effort to protect pollinators with the Pollinator Partnership™ at www.pollinator.org.





The Solitary Bees

Single Moms with Families To Feed

Carpenter bees, mason bees, leafcutter bees, plasterer bees – all are solitary bees.

Instead of living in hives, females excavate or reuse nests in soil or wood. They visit flowers for energy-rich nectar and high-protein pollen to feed their young (larvae).

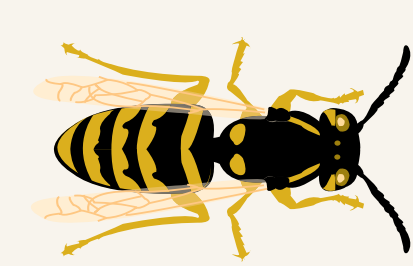
Females lay single eggs on pollen mixed with nectar within nest cells. The eggs hatch and the grub-like larvae feast for several weeks and then pupate. The new adult generation may emerge soon or not until the next year.



Flowering plants and their environments

provide essential resources needed by all

bees. Solitary bees use materials such as water, leaves, mud, sand, stones, plant resins and downy plant fibers for their nests.



You can help solitary bees

with diverse plantings, by leaving dead

branches for nesting sites (when safe

to do so), or by drilling boards to make

bee “condominiums.”

The Social Bee

A Queen and Her Court

About 20% of the world's 20,000 bee species

live in colonies. Each colony has one queen who is the mother of sterile daughters (the worker bees) and a few males called drones.

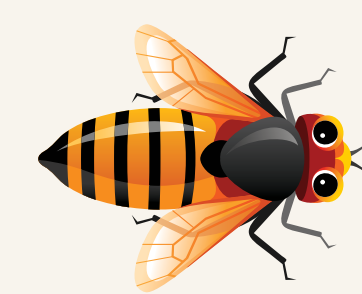


The best-known social bees are the honey bees (especially *Apis mellifera*). Originally native to Europe, honey bees traveled with their human caretakers and now are found worldwide. Another well-known group is the fuzzy black-and-yellow bumble bees.

Social bees need dependable floral sources year-round. Honey bees quickly find and exploit rich sources of nectar and pollen.



(In fact, their efficiency and numbers can cause hardships for native bees.) Honey bees communicate about floral resources through a waggle dance in which scout bees inform others about the distance and direction to newly discovered flowers.



Help sustain social bees by assuring your garden has abundant

flowers throughout the year – and by not using pesticides toxic to bees.

Beetles, Flies, and Wasps

When flowering plants first appeared about 150 million years ago, beetles and flies were among the first pollinators. Magnolia blossoms are typical beetle flowers—they have succulent parts; heavy, sweet, sometimes fruity perfume; and abundant pollen.

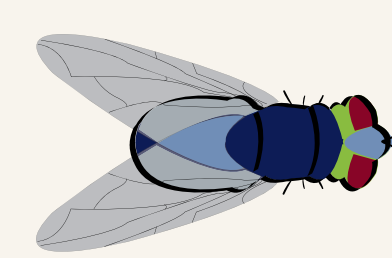
Fly pollinators include the beneficial hover flies, bee flies, and midges. The smell of decay, rotting flesh, or dung is a beacon for many flies. Dutchman’s pipe, pawpaw, and



some viburnums are among the fly-pollinated plants with foul-smelling flowers. But not all flies have disgusting tastes. Hover flies and bee flies love sweet-smelling flowers. Like humans, the tiny midges that pollinate cacao are “chocoholics.”

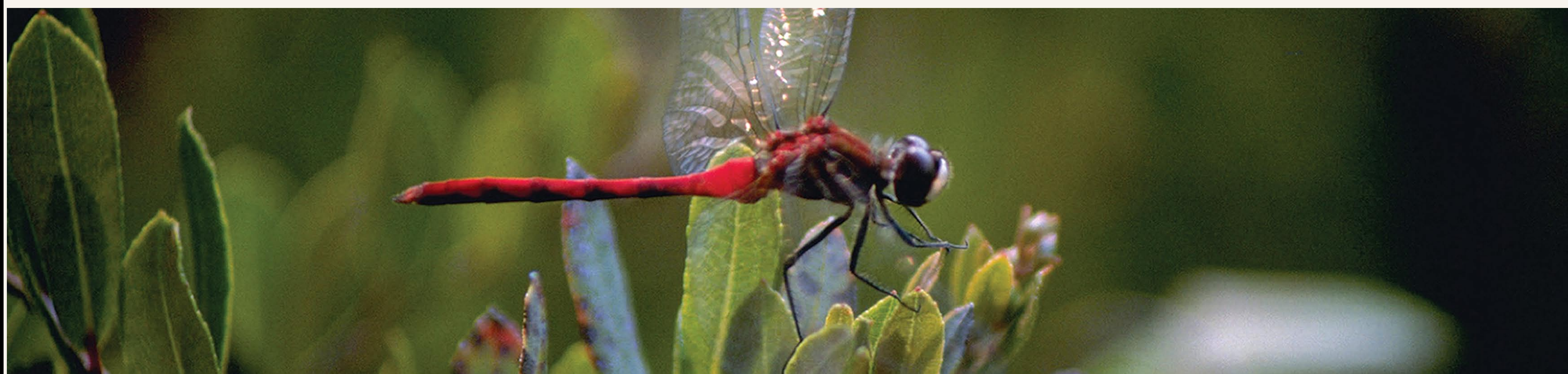


Flower-visiting wasps provision their nests with pollen and nectar, just like bees. The champion wasp pollinators are the fig wasps of tropical forests.



Observe your garden – can you tell the bees from the wasps from the flies?

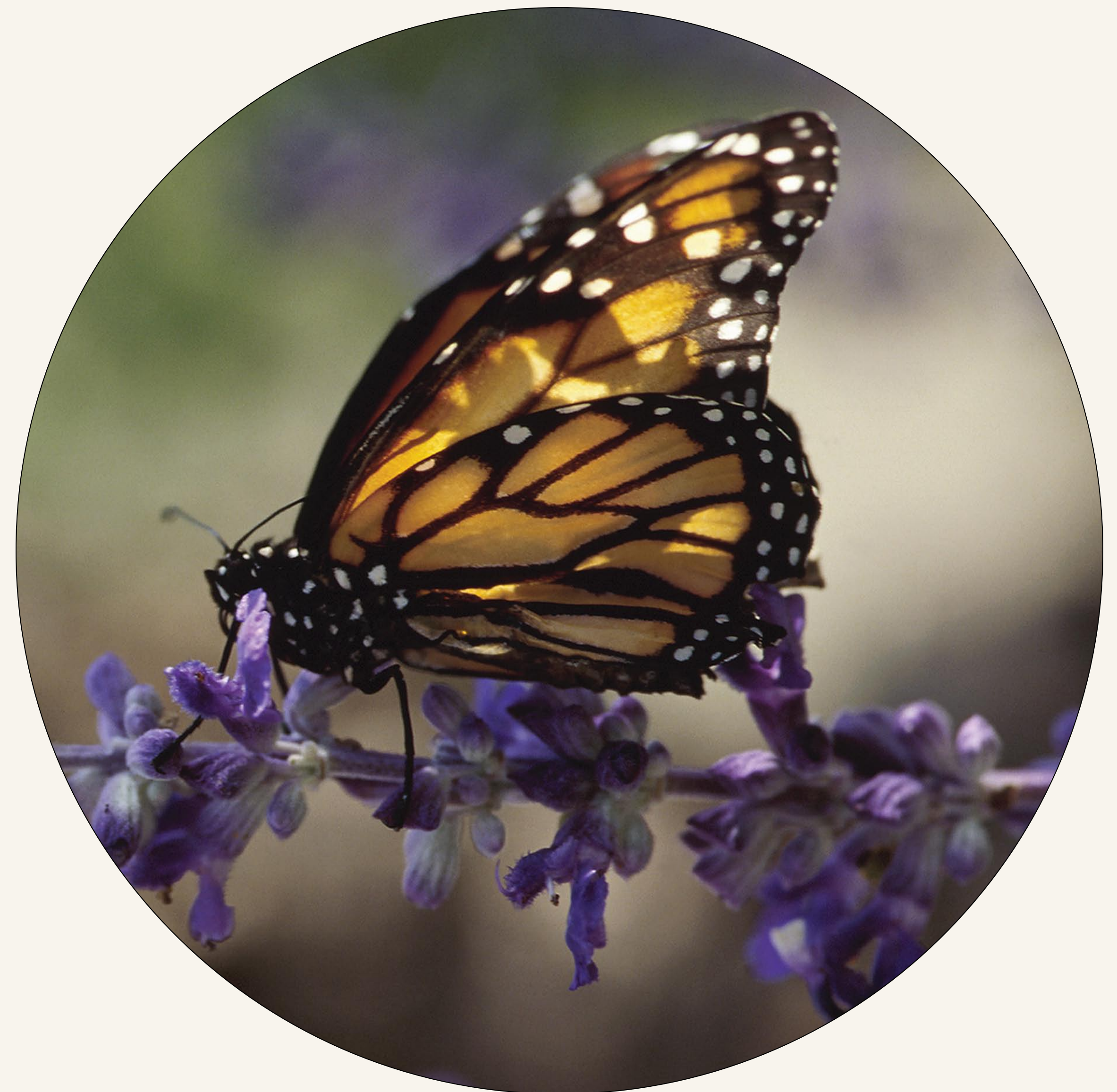
They are all hard at work!



Butterfly Bounty

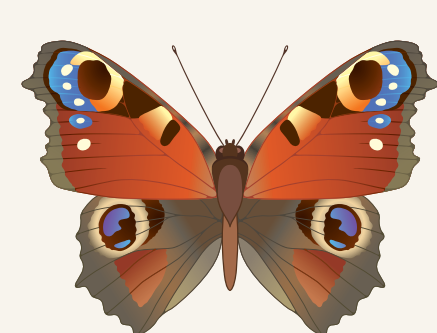
On Gossamer Wings

The ancients believed butterflies were departed spirits of the dead. We know, at the very least, that they help to transport pollen and enrich our lives.

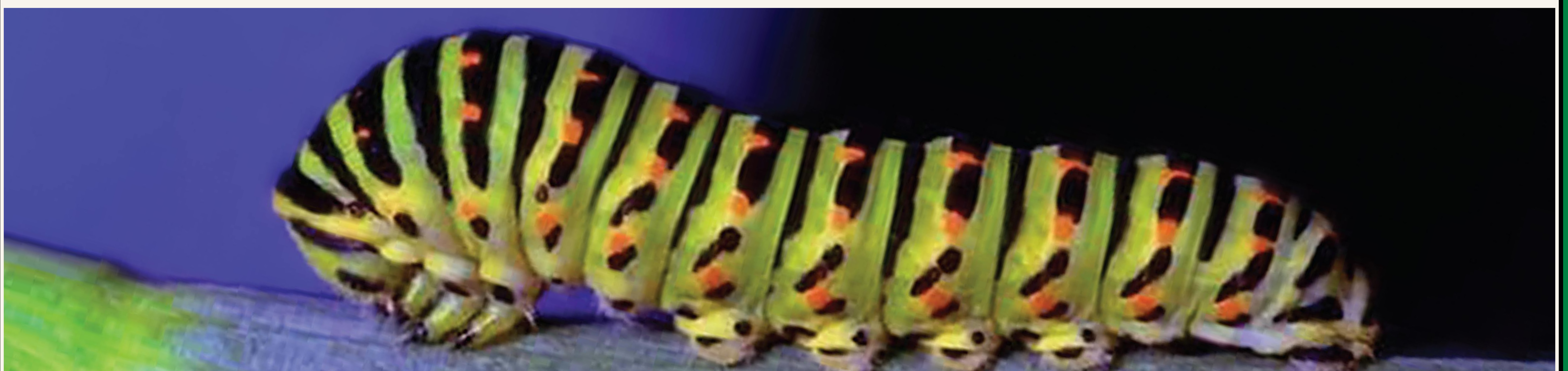


Butterflies prefer flowers with bright colors.

Floral shape is even more important – their favorite blossoms are dense, sweetly scented clusters of small flowers with flared petals and narrow throats. The broad clusters provide both a “landing pad” and abundant resources.



If you garden for butterflies, select blooms like verbena, lantana, and milkweed, with bright colors and good landing platforms. Don't forget to include food plants for their hungry caterpillars.



Hummingbirds

Darting Hummers & Scarlet Blossoms

Long bill. You've planted clumps of tempting red, orange, and yellow nectar-rich flowers.

And now whirring wings, darting bodies, and



clicking chirps announce the presence of hummingbirds.

Floral color, tubular blossoms, copious nectar, and bloom timed to coincide with bird migrations are features of this co-evolutionary duet. Many

red, tubular flowers are pollinated almost exclusively by hummingbirds, whose bill length and shape are perfect for reaching the nectar.

Hearty eaters. Hummingbirds must eat several times their weight each day. They require 6,000

to 12,000 calories daily to support their high metabolic rates. To supplement their sugar diets they also catch and eat small insects and even spiders.



Plant large clumps of tubular red, orange, or yellow blossoms and these "type A" birds will find you!



Moth & Bat Pollinators

Working the Night Shift

Night bloomers advertise to a select group.

Long-tongued hawkmoths are highly specialized floral visitors that hover like hummingbirds. Charles Darwin predicted that a moth with a foot-long tongue (*proboscis*) was the pollinator of an orchid in Madagascar with nectar spurs up to 14 inches long. Many years after his death, the moth was discovered.



Moth-attracting flowers produce heavenly sweet scents, abundant nectar, and are usually white or cream-colored to reflect moonlight. Why not create your own “moonlight and fragrance”



garden? Night-blooming jasmine, four o’clocks, and moonflowers are just a few of the possibilities.

In the Americas, pollinating bats can be found in deserts or lush tropical forests. Bats pollinate the Arizona state flower, the saguaro cactus, along with the elegant century plant (*Agave americana*). In Southeast Asia, tropical Africa, and Pacific islands, over 300 plants rely solely on bats for pollination.



Planting a moonlight garden with fragrant night bloomers will help sustain these night-shift pollinators.

POLLINATOR PARTNERSHIP

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“One Planet” (Pollinator Information for USBG Docents)

Why Pollinators are Critical to Our Planet

Pollination is vital to our survival and the existence of nearly all ecosystems on earth. 80% of the world's crop plants depend on pollination.

Pollinators, almost all of which are insects, are indispensable partners for an estimated 1 out of every 3 mouthfuls of food, spices and condiments we eat, and the beverages we drink. They are essential to the fibers we use, the medicines that keep us healthy, and more than half of the world's diet of fats and oils. Insect pollinators, including honey bees, pollinate products amounting to \$20 billion annually in the U.S. alone.

A colorful set of 6 signs about pollinators and their plants was created by the Pollinator Partnership of the North American Pollinator Campaign. It will be on display at the USBG, as part of the One Planet exhibit this summer and fall. A set of directed enquiry questions and activities is proposed on the second page of this info sheet about the Pollinator Partnership.



NAPPC and Pollinator Partnership Background

Since its inception in 1997 as a 501(c)3 organization, the Pollinator Partnership (P2), previously known as the Coevolution Institute (CoE), has established itself as an innovator in biodiversity protection. P2's major focus is on the conservation of pollinators: bees, butterflies and many other nectar and pollen eating insects, bats and birds.

P2 manages the North American Pollinator Protection Campaign (NAPPC), which is a group of over 120 partners throughout North America including government agencies, scientists, gardeners, farmers and ranchers, and many more. P2 works collaboratively to achieve its objectives by

promoting the adoption of wide spread stewardship practices on working lands by government agencies, businesses, organizations, institutions and individuals.

What have the Pollinator Partnership and NAPPC Accomplished?

Past projects of P2 and NAPPC include the National Academy of Science *Status of Pollinators in North America*, the issuance of the U.S. pollinator postage stamp series, and an annual NAPPC International meeting in Washington, DC. Where invited members develop focused action plans for the upcoming year. We have signed a number of ground-breaking memorandums of understanding that has resulted in agreements covering 1.5 Billion acres of federal, state and private lands across the United States.

A second annual National Pollinator Week, June 22-28, 2008, designated by the U.S. Senate (S.Res. 580) and the U.S. Department of Agriculture celebrates the importance of pollinators and plants with events all around the world; from cooking a pollinator friendly meal to nature walks.

Learn more and join the effort to protect pollinators with the Pollinator Partnership at www.pollinator.org

Specific Ideas to Explore with USBG Pollinator Exhibit Visitors

1. See how many types of pollinating animals they can find on the 6 signs.
2. Ask adult and children visitors if they saw any pollinators during their garden visit (butterflies, bees, moths, flies?). What kind of flowers were they on.
3. What kinds of flowers had the most pollinators? What colors, shapes, scents and floral rewards (nectar or pollen) were present? This is a perfect introduction to the idea of “pollinator syndromes.” For example, a tubular thin, yellow or red flower with dilute nectar and no odor would attract hummingbirds as pollinators but exclude bees. Blue, yellow and pink flowers with a landing platform would be attractive for bees and butterflies.
4. Did they notice nectar robbers, large black carpenter bees cutting slits at the base of floral corollas to reach the nectar? Do they think nectar robbing helps or hurts the pollination process, and why?
5. Did the visitors notice honey bees in the gardens, and if so, on which flowers? Do they know about CCD, colony collapse disorder? Make them aware that honey bee colonies have been dying and the cause may include a virus (IAPV) along with diseases, insecticides and other environmental stresses.
6. Did they see charismatic colorful black and yellow bumble bees? Let them know that at least 4 species of bumble bees are declining rapidly on both coasts, due to an introduced microbial disease.
7. Explain about advantages of using locally adapted wildflowers in their gardens and to plant in clumps. Its important to have nectar and pollen available throughout the year.
8. If pesticides are used they can be sprayed at night when pollinators are not active.
9. Dead branches with beetle holes should be fostered and not removed. They can also make bee houses for leafcutter and mason bees by drilling 8mm diameter holes into blocks of wood.
10. Gardeners can enjoy pollinators even more by using close-focusing binoculars and going “butterflying” just like birding for butterflies. Pollinators are watchable wildlife. Get out of the house and enjoy them, and the beautiful flowers they visit and pollinate.