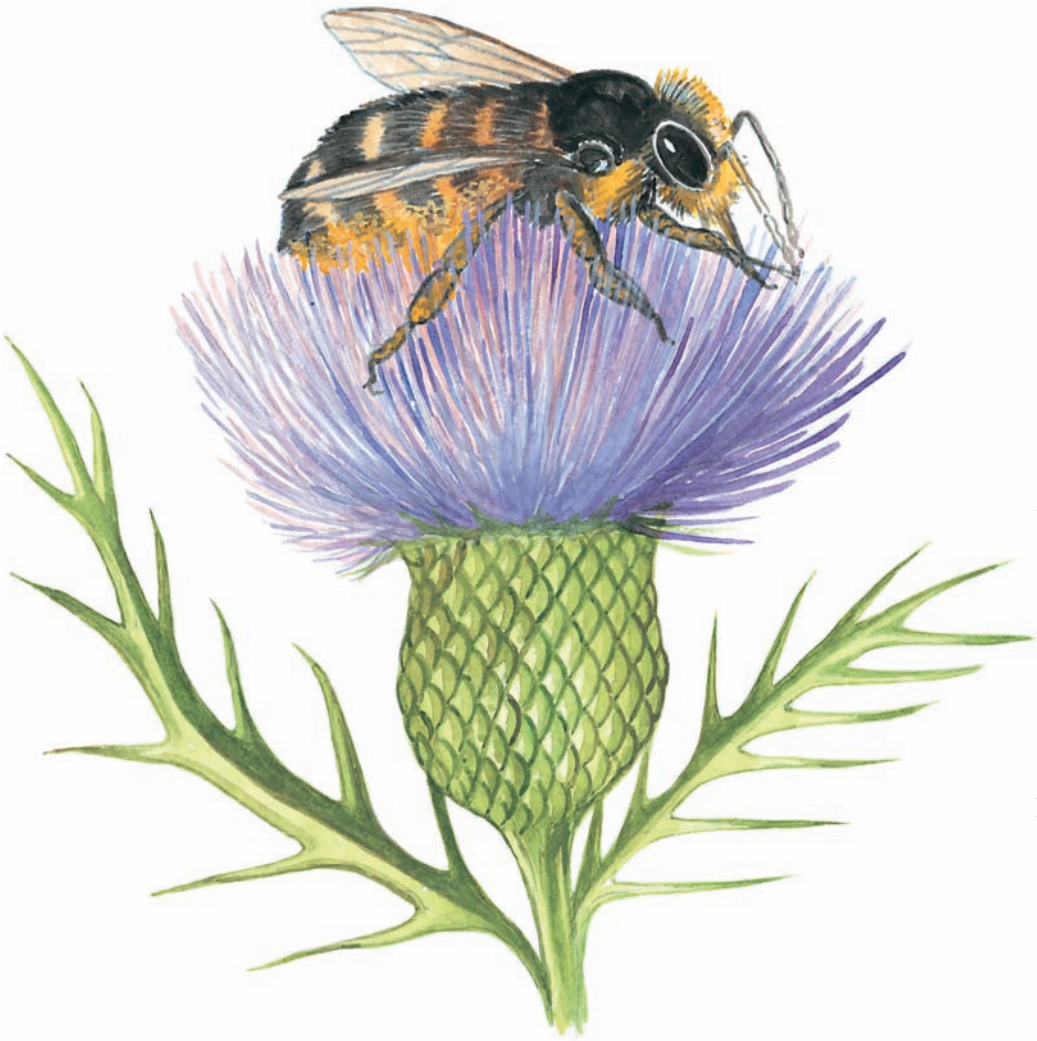
Wild in the Woods

# Pollination Partners

story by Carol A. Heiser
illustrations by Spike Knuth

Stop for a moment and think about all the delectable fruits and fresh vegetables that greet the eye in the produce section of your local grocery store. Bananas, peaches, oranges, squash, spinach, tomatoes—and the list goes on and on. Farmers expend enormous time and effort to put food on our tables. But behind the scenes, at a much more fundamental level of the food web, are diminutive field workers known collectively as *pollinators*, whose diligence usually goes unnoticed and is probably even taken for granted. We owe a debt of gratitude to innumerable tiny bees, efficient wasps, productive ants, busy hummingbirds and other industrious wildlife species that perform a life-supporting service every day. Without these intrepid workers, most plants would not be pollinated. Without pollination, flowers could not form; and without flowers, plants could not reproduce and grow fruits and seeds.

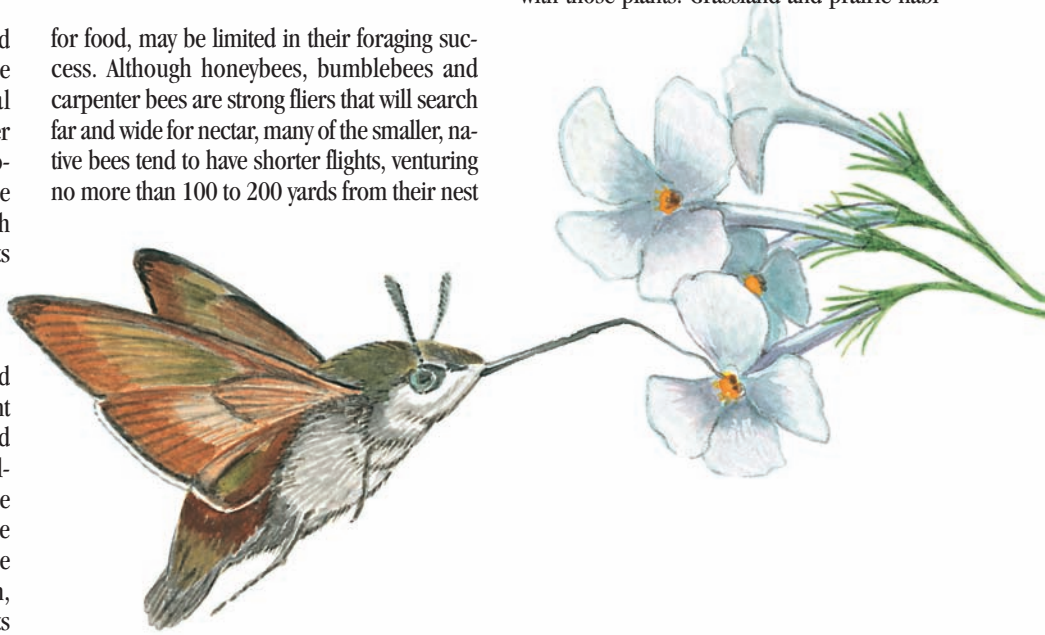


Previous page: A ruby-throated hummingbird *(Archilochus colubris)*, feeds on the nectar from the flowers of a wild columbine, *(Aquilegia canadensis)*. Left: Honeybees *(Apis mellifera)*, are excellent pollinators as they hop from one plant to another. Here a honeybee has found a field thistle, *(Cirsium discolor)* to feed on. Below: Hummingbird moths, unlike other species of moths, feed during daylight hours. They also help with the pollinating process

## A Patchy Existence

If we were to think of ecology as a car and the sun as the engine, at the wheel would be the pollinators, driving countless ecological processes in terrestrial environments. Whether or not a plant species occurs in any given geographical area is directly related to the presence or absence of various pollinator species which are needed to help spread the plant. Biologists who study these plant and animal interactions are extremely concerned that pollinators are losing ground—quite literally—to habitat fragmentation or other changes in land cover. As large expanses of contiguous plant communities are chopped up into smaller and smaller parcels for subdivisions and roads, pollinators are forced to "island hop" from one habitat remnant to another. It is believed that the plant material in these habitats may suffer the consequences of less consistent pollination, and that the animals, which rely on these plants for food, may be limited in their foraging success. Although honeybees, bumblebees and carpenter bees are strong fliers that will search far and wide for nectar, many of the smaller, native bees tend to have shorter flights, venturing no more than 100 to 200 yards from their nest and remaining more localized, concentrating on the same plant sources year after year.

There are several species of pollinators whose migration patterns follow the sequential blooming of flowering plants along "nectar corridors" as the spring season unfolds. Here in the east, monarch butterflies follow a time-worn route through the coastal states; groups of butterflies stop at various points along the way to feed and breed, while other groups continue northward. In the western states, nectar-feeding bats follow the cactus blooms from Mexico to Arizona and up through parts of California. The western white-winged dove and the endangered lesser long-nosed bat are just two species that play a substantial role in pollinating agaves, century plants (used for producing tequila), and the huge "cactus forests" of the Sonoran Desert, home to those misshapen saguaro giants. Unfortunately, the southwestern states are experiencing a habitat decline similar to that in the east, as desert and scrub vegetation are cleared for farms or pastures, with resulting detrimental impacts to pollinators associated with those plants. Grassland and prairie habi-



Left: A close-up look at various types of pollen.
Below: To successfully reproduce most flowering plants must rely on insects to help carry pollen from one plant to another.

tats are shrinking, too. As the diversity of grass and flower species decreases over time, butterflies and other insects must forage in less than ideal patches.

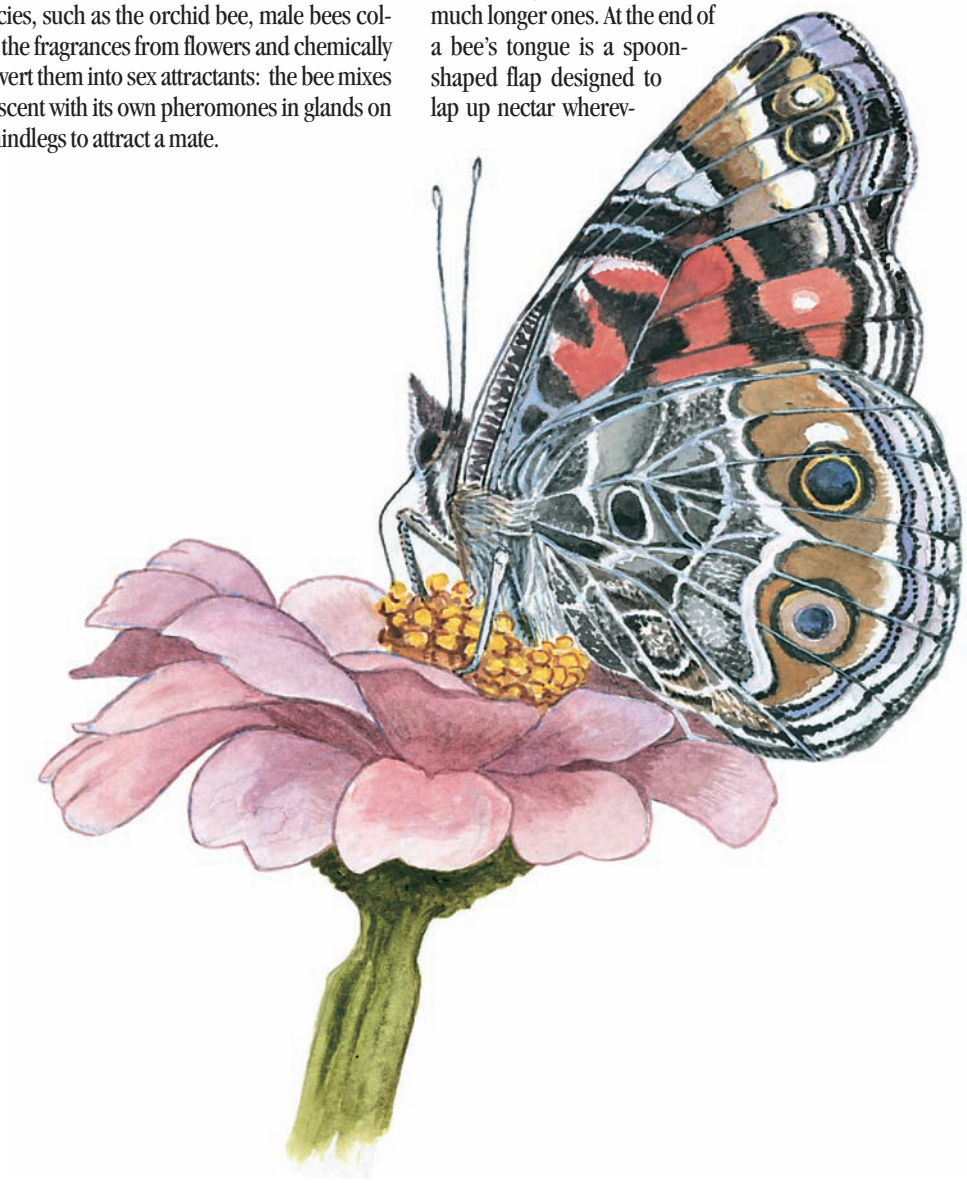
## Mutual Benefits

Many pollinators are adapted to a small range of specific flowering plants, and they key in on attractants like flower color and fragrance. Other pollinators like the honeybee—an exotic species that was introduced to North America from Europe almost 400 years ago—are considered "generalists" because they visit a larger range of plant types and will visit just about any kind of flower. Unfortunately, the honeybee's high adaptability, superior efficiency and greater numbers enable it to overwhelm smaller, native species through competition. Several studies have suggested that a honeybee colony can displace or outcompete native ants, wasps and bees like the carpenter bee or bumblebee.

Flowers come in a wide array of diverse shapes and sizes, each unique in their presentation of nectar and pollen. As beetles, bees and other insects feed on a flower's protein-rich pollen or sip its carbohydrate-rich nectar, the unwitting creatures passively transfer pollen from one plant to another. About 80 percent of flowering plants rely on insects to ensure their own reproductive success; the animals transfer pollen from the male organs (stamens) to the female organs (stigma), where flowers and seeds can then develop. In exchange for the insects' services, the plant imparts a bit of nutrition and protection, and the arrangement is mutually beneficial.

Not only do pollinators take advantage of available food and shelter while exploring every flower's nook and cranny, they may also congregate there and "harvest" chemicals from the plant, effectively using the plant as a mating ground. Biologists have observed that in some species, such as the orchid bee, male bees collect the fragrances from flowers and chemically convert them into sex attractants: the bee mixes the scent with its own pheromones in glands on its hindlegs to attract a mate.

Some insects and plants appear to have corresponding characteristics or attributes. For example, butterflies and moths have long, coiled, tubular tongues adapted for probing deep within equally long, narrow floral tubes—such as those of the honeysuckle—that other insects would have trouble reaching. Bees also have highly adapted tongues. Some have short, two-lobed tongues while others have much longer ones. At the end of a bee's tongue is a spoon-shaped flap designed to lap up nectar wherev-



Above: Bees, as well as other insects, use the color and shape of plants to help them when feeding on nectar and pollen. Below: With its long, needle-shaped bill the hummingbird is well suited for locating nectar from deep within flowering plants.

tale marks on flower petals that would otherwise be invisible to us. The marks are directional guideposts which entice the insect to travel down into the flower's reproductive center.

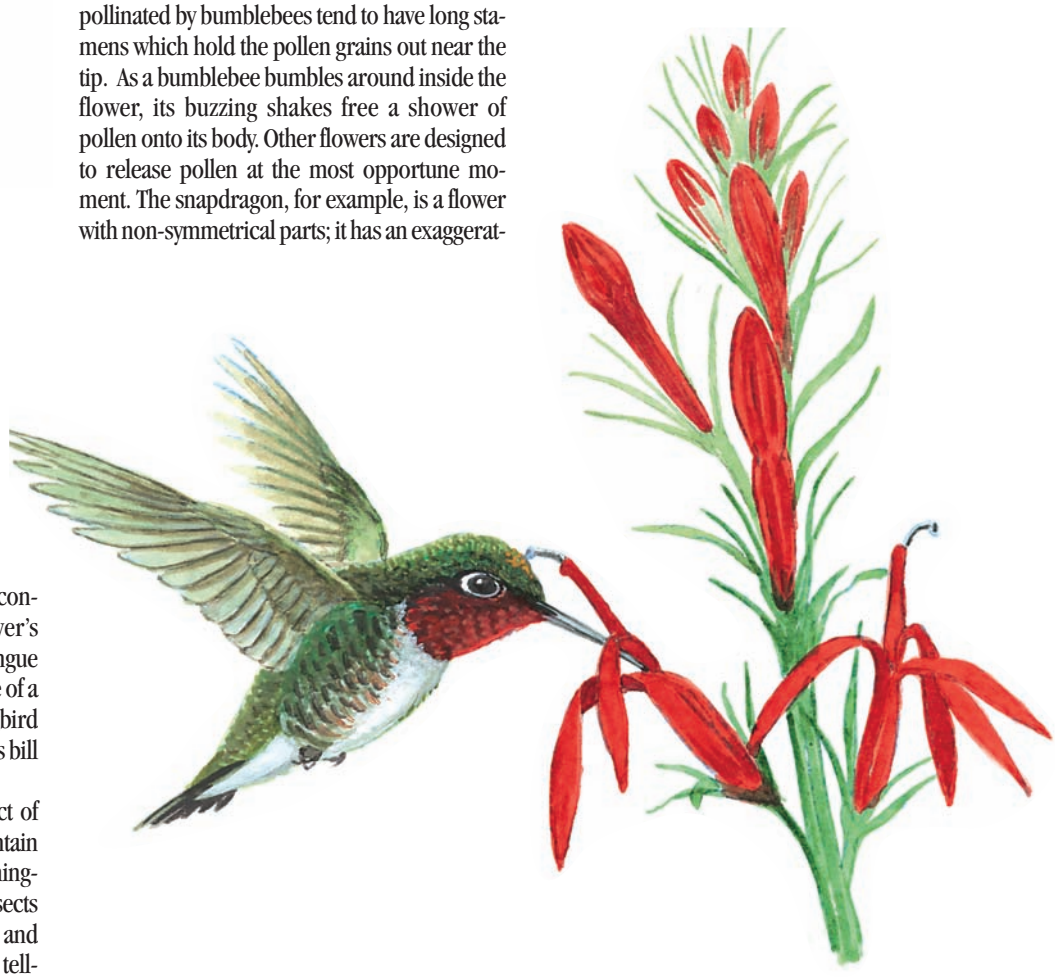
For their part, flowers display many other adaptations or traits that help "match" them to the right insects. Some flowers open only at dusk or at night; these tend to be white or pale green and have a sweet, moderately strong smell, intended to attract hawkmoths and other moths. In contrast, flowers aimed at attracting beetles or carrion flies may open during the day or night and have a strong, unpleasant odor—a smell that mimics decaying protein or other rotten organic matter. Pollen grains, too, show high variability that delivers adaptive advantages. Flowers that are pollinated by bees tend to have pollen grains that are very spiny or bumpy, the better to attach to the insect's body.

In many cases, plant structure and animal behavior are also linked. Flowers that are best pollinated by bumblebees tend to have long stamens which hold the pollen grains out near the tip. As a bumblebee bumbles around inside the flower, its buzzing shakes free a shower of pollen onto its body. Other flowers are designed to release pollen at the most opportune moment. The snapdragon, for example, is a flower with non-symmetrical parts; it has an exaggerated, protruding lower petal that serves as a landing platform for insects. When a bee lands on this petal, the stamen snaps down from the insect's weight and sprinkles the bee's back with pollen.

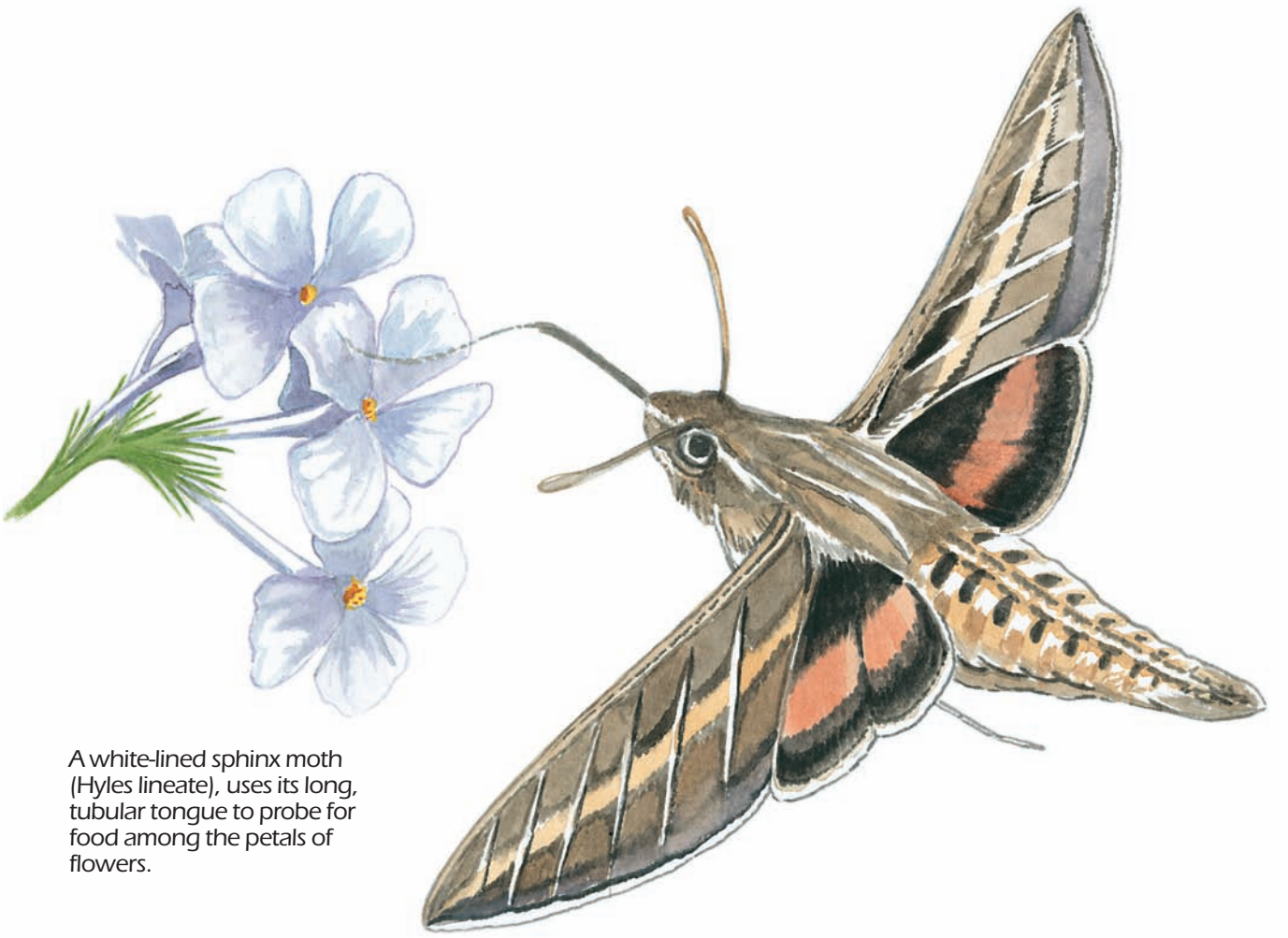
All of these plant and animal relationships suggest an intricate web of myriad patterns of interaction that have been going on for millions of years.

## A Hummer of a Bird

One of the most delightful pollinators to visit our gardens in spring and summer is the ruby-throated hummingbird. With its needle-like bill it probes tubular flowers for nectar while hovering on wings that beat 55 times per second. If you hang a nectar feeder by a window for close observation, you can see the bird's pulsing heartbeat, a rapid 615 beats per minute. Hummer the liquid might be pooled within the confines of a flower, regardless of the flower's shape. Similarly, a hummingbird's long tongue is well-suited to probe within the long curve of a columbine flower; in return, the hummingbird is benighted with pollen on the feathers of its bill and chin.



Flower color is also a significant aspect of pollination success. Red flowers tend to contain an abundance of nectar; hence the hummingbird is usually attracted to these first. Insects also perceive color differently than we do, and they rely on the ultraviolet spectrum to see tell-



A white-lined sphinx moth (Hyles lineate), uses its long, tubular tongue to probe for food among the petals of flowers.

mingbirds consume 50 percent of their weight in sugar each day, attracted to showy flowers such as cardinal flower, bee balm, trumpetvine, morning glory, azalea, columbine and jewelweed. Hummingbirds also feed on small insects for the protein they provide.

During the hummingbird migration from Central and South America, the sexes travel apart, with the male preceding the female in arrival time. Before leaving the tropics for the long trek across the Gulf of Mexico or northward along the coast, they fatten up on nectar and insects, often doubling their weight. Hummingbirds migrate chiefly or exclusively during the day, arriving in Virginia from the latter end of April until the end of May. However, they do not seem to migrate in relationship to any particular flower blooming times. Once settled into our neighborhoods, the wee birds breed from early May to mid July and lay a clutch of two, tiny white eggs, in two different broods and sometimes three.

The hummingbird's nest is extraordinarily small, about the size of a quarter, covered with moss, lichens and spider webs and lined with the down of thistle or dandelion. This nest is carefully constructed on the horizontal limb of a tree, usually more than six feet off the ground, and sometimes over water.

The sexes remain together for only a few days or until incubation begins. Thereafter the males and females compete for flower sources, intolerant of each other while feeding, aggressively chasing each other with gravity-defying acrobatics. These feisty birds also display aggression towards insects such as bees as well as other birds that may fly through their territory, sometimes chasing them in hot pursuit.

At night, the hummingbird's rapid metabolism slows in response to the cooling temperatures. This type of overnight dormancy is called *torpor* and is not true hibernation, for in the morning the bird resumes its energetic activity upon warming up.

## A Pollinator's Garden

If you have a sunny spot in your yard where you'd enjoy seeing a splash of color, consider planting a pollination garden there. Flowers can be planted in patches or drifts to provide food for insect adults as well as cover for overwintering eggs and larvae, especially if the garden is in a sheltered spot out of the wind. Start with tall flowers in the back, such as sunflowers, and a trellis with climbing varieties like trumpetvine or trumpet honeysuckle. Common milkweed and Joe pyeweed will also get tall; you can hide their straggly appearance with bushier plants in front. Choose a variety of flowering types: some with symmetrical rays (petals) like coreopsis, asters and black-eyed Susans; some with irregular shapes like bee balm and goldenrod; and those with shallow blossoms like thistle, knapweed, phlox and yarrow.

There are many things that you can do around your yard to lend a helping hand to our pollinator friends. Providing water, leaving natural areas, and even building nest boxes, like this bee box, will contribute to attracting beneficial insects.

It is best to plant groupings of the same key species in masses by color and type, rather than to plant lone soldiers with the "one of these and one of those" method. Try to pick plants that will bloom in succession, so that there are always some flowers available throughout the growing season. Bees seem to prefer species that are in the blue or yellow color range; hummingbirds seek out red and orange tubular shaped flowers. If you can find them at your local nursery, select native species that would grow naturally in your area, as certain hybrids do not provide pollen or nectar, even though they may have attractive, sweet-smelling flowers. If your propensity is vegetable gardening, certainly cucumbers, squash, tomatoes, melons, beans, peas and other favorites will provide flowers for pollinators, too. Plants like dill, fennel and parsley are needed by butterfly larvae.

Remember to provide water in the form of very shallow dishes or pools, and perhaps a small puddle for bees and wasps that require mud to make their nests. Butterflies prefer moist sand or mud where they can easily land to and sip water; they obtain minerals from these sources also. Find a warm spot in the garden to make a shallow depression, and fill it with wet sand or soil. Another method is to fill an old pie plate with sand and pebbles, then add some water to keep it moist. A piece of fruit laid on top will add a novel source of sugar.

Another option is to build artificial nest boxes for bees and wasps that need small holes to lay their eggs, such as the carpenter bee, mason bee and orchard bee (bumblebees nest in the ground). In general these species do not bother people when left undisturbed, but obviously you would place the bee box far from a deck or patio. Simply drill different sized holes into blocks of pine or other softwood, and secure the blocks onto a tree in the shade (not in direct sunlight), or on a post under a shelter. A good size piece of wood to use is an untreated 6 X 6 or 4 X 4 block of pine about 8 inches long, with six to 10 holes drilled 4 to 6 inches deep, about ½ inch apart, and ⅛ to ¾ inch in diameter.

## Learning More...

### Books

*The Forgotten Pollinators,* by Stephen L. Buchmann and Gary Paul Nabhan; c. 1996, Island Press-Shearwater Books, Washington D.C.; 292 pp.

*Pollinator Conservation Handbook: a Guide to Understanding, Protecting, and Providing Habitat for Native Pollinator Insects*, by The Xerces Society and Bee Works, c. 2003; 160 pp. (available at www.xerces.org).

*Creating a Hummingbird Garden,* by Marcus Schneck; c. 1994, Simon & Schuster; 80 pp.

*The Hummingbird Garden: Turning Your Garden, Window Box, or Backyard into a Beautiful Home for Hummers*, by Mathew Tekulsky; c. 1999, Harvard Common Press; 192 pp.

### Web Sites

Hummingbirds
www.hummingbirds.net

North American Butterfly Association
www.naba.org/links.html
Offers basic information and a useful page of butterfly links.

Monarch Watch
www.monarchwatch.org
A national program based at the University of Kansas that tracks monarch migration.

Migratory Pollinators Program
www.desertmuseum.org

The Pollination Home Page
www.pollinator.com □

---

*Carol A. Heiser is a Wildlife Habitat Education Coordinator with the Virginia Department of Game and Inland Fisheries.*

Virginia Naturally