

Insects: Masters of Survival

National Park Service
U.S. Department of the Interior

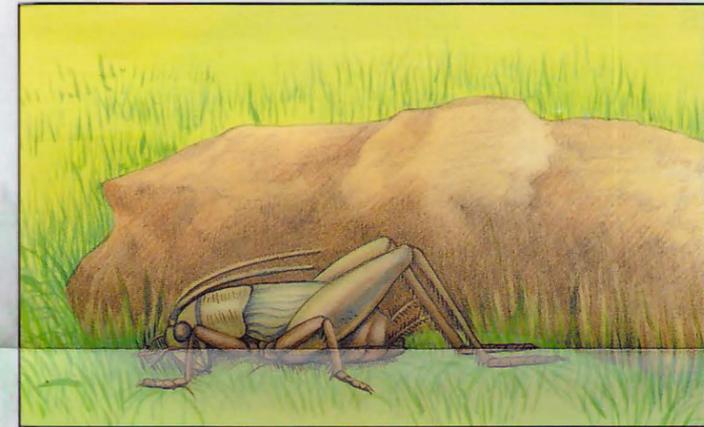


Dragonflies hover like helicopters over ponds and lakes, then suddenly dart away, pursuing prey or other dragonflies. Their long narrow abdomen gives them the name "darning needles."



This monarch butterfly has gone through a miraculous metamorphosis, changing from an egg to a hungry caterpillar to a quiet pupa and emerging as a beautiful winged adult. All butterflies, moths, bees, beetles and flies go through these life stages.

When a cricket rubs the rough file-like vein of one wing across the sharp ridge of the other, he produces the melodies you hear in late summer or fall.



The praying mantis is a master of disguise. Its green body, wings and legs merge into the green, leafy background so carefully you think it is part of the grass. Perched at an angle,

with its spiny forelegs raised in prayerlike pose, the mantis sits in rigid stillness – until an insect comes too near and is suddenly captured and devoured.

The World of Insects and Their Relatives

A remarkable variety of insects inhabit this planet. More species of insects exist than all other animal species together. Insects have survived on Earth for more than 300 million years, and may possess the ability to survive for millions more.

Insects can be found almost everywhere—on the highest mountains and on the bottom of rushing streams, in the cold South Pole and in bubbling hot springs. They burrow through the ground, hop and sing in the trees, and dart and dance in the air. They come in many different colors and various shapes. Insects are extremely useful to humans, pollinating our crops as well as flowers in meadows, forests, deserts and other areas. But ticks and some insects, such as mosquitos and fleas, can transmit disease.

Insects are vital to the immense cycle of life, furnishing food for other creatures and breaking down natural materials to chemicals and nutrients for recycling into new life. Whirling, buzzing, singing, chewing, vibrating with energy, they are all around us.

We have only to open our eyes to watch and begin to understand them.

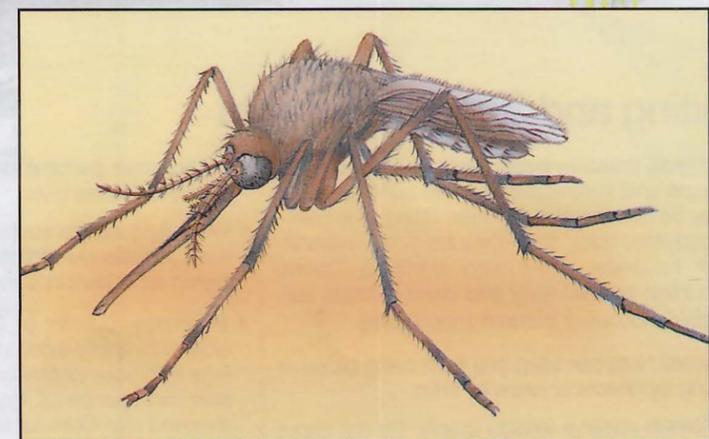
Insects belong to a group of organisms called arthropods—a word that means "jointed feet." Insect bodies are quite variable, but generally adult insects have a few things in common: a head with two antennae, a thorax with six legs and up to two pairs of wings, and an abdomen. In their immature stage, insects are called larvae (caterpillars or grubs) or nymphs.

Other arthropods—such as spiders, sow bugs, centipedes, ticks and mites—may superficially look like insects, but they belong to other animal groups.

There are many reasons why insects are so successful at surviving. Their amazing ability to adapt permits them to live in extreme ranges of temperatures and environments. The one place they have not yet been found to any major extent is in the open oceans. Insects can survive on a wide range of natural and artificial foods—paint, pepper, glue, books, grain, cotton, other insects, plants and animals. Because they are small, they can hide in tiny spaces. A strong, hard but flexible shell called an exoskeleton covers their soft organs and is resistant to chemicals, water

and physical impact. Their wings give them the option of flying away from dangerous situations or toward food or mates. Also, insects have an enormous reproductive capacity: A honey bee queen lays as many as 4,000 eggs a day, and an African termite queen can lay as many as 43,000 eggs a day.

Another reason for their success is the strategy of protective coloration. An insect may be right before our eyes, but nearly invisible because it is cleverly camouflaged like a green leaf, lump of brown soil, gray lichen, a seed or some other natural object. Some insects use bright, bold colors to send warning signals that they taste bad, sting or squirt out poison. Others have wing patterns that look like the eyes of a huge predator, confusing their enemies. Some insects also mimic bitter-tasting insects; hungry foes are fooled into avoiding them.



Mosquitos, one of the more commonly encountered insects, can be irritating with their humming wings and itching bites. Male mosquitos don't bite, but most females do because they need blood to nourish their eggs. Only a few species actually bite humans or transmit disease.

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Finding Insects in the Parks

Insects, along with other species of plants and animals in the National Park System, can be enjoyed through such activities as observation, study and photography. They are protected from collection, harassment or other activities that may injure them or alter their environments.

To observe the busy world of insects, go to a meadow or woodland or beside a stream and sit quietly. You'll soon notice all sorts of insects moving about, feeding, capturing prey, building homes, attracting mates, laying eggs—or just resting.

In the meadow, look for bubbles of the spittlebug on plant stems, or colonies of aphids feeding on plant juices, or the curious eyes of a praying mantis perched beside you. Goldenrods are particularly attractive for honey bees, wasps, butterflies and beetles. Crickets and grasshoppers may explode around your feet and knees, and in the evenings you can watch the fireflies rising from the ground.

In the woodlands, the early spring bumblebees drone loudly as they search for a site to build a nest. Some cicadas, after living underground for as long as 17 years, climb onto shrubs or trees, clinging tightly while they split their nymphal shells and emerge as winged adults. Look for the crisp brown shell they leave behind.

Sit beside a quiet pool of water and you'll soon see water striders skating as if on ice. The tips of their threadlike legs dent but do not break the water's surface tension. Or peer below the surface and look for caddisfly larvae or dragonfly nymphs creeping along the bottom. Watch a female dragonfly dipping her tail into the water; she is laying her eggs, which sink to the bottom of the pool and hatch as nymphs. The closely related damselflies have thinner bodies than dragonflies.

Biting and Stinging Insects

Stinging insects—bees, hornets, some ants, wasps and yellowjackets—may sting you, but they do not transmit diseases. Biting creatures—mosquitos, ticks, flies—may transmit diseases. For instance, ticks can transmit Rocky Mountain spotted fever and Lyme disease, and certain mosquitos transmit encephalitis.

Several hints can keep you from being bitten or stung by insects or bitten by ticks:

- Always observe insects quietly. Do not shout or thrash around.

- Do not wear perfume or other scented products; they attract bees.
- Wear light colors such as pastels, white or khaki. Insects are attracted to brightly colored, patterned or dark clothing.
- In grassy, brushy or wooded areas, wear clothes of tightly woven fabric, tuck your pants legs into your socks and your long-sleeved shirt into your pants. Inspect your clothes and exposed skin often for ticks while you are out, and especially when you get home.

- Wear a hat or hold your hand above your head to keep gnats away.
- Insect repellents can keep biting insects at bay, but do not usually keep stinging insects away. In areas with large numbers of biting insects or ticks, you may want to use an insect repellent, such as those containing DEET, on exposed skin and clothing. Read the label carefully and follow the directions.
- Keep lids on your soft drinks; cover sweet foods.

- Put your trash in cans and close lids tightly.

Integrated pest management, commonly called IPM, is a decision-making process for managing pests with a variety of methods. The National Park Service has adopted IPM.

In IPM, the goal is not to eradicate pests but to keep them from overpopulating an area where they could harm or damage park resources or affect visitor safety or historic areas. IPM is a many-faceted approach, rather than relying totally on chemicals. A knowledge of a pest's life

cycle is essential, as well as its seasons, activities and behavioral patterns.

The strategy behind this process is the incorporation of ecological information with a variety of management techniques that result in the least harm to the environment. Many methods are used to accomplish this: biological (preserve existing or introduce specific natural enemies and predators of the pests), genetic manipulations (modify new crop varieties with genes that enable the plants to resist insect pests), physical

(pick off pests by hand), cultural (use different patterns of planting agricultural crops), and minimum chemicals (use judiciously at the right stage of pest development).

This brochure is made possible through a donation by the S.C. Johnson Wax OFF! Family of Insect Repellents.

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In the magnified drawing of the ant at left, you can observe the three main segments of an insect's body: head, thorax and abdomen. Ants engage in many curious activities that you can easily watch: foraging and following trails to food sources, tapping with their sensitive antennae to communicate with one another, cleaning themselves, carrying seeds, or moving their eggs, or fighting with ants from other nests. You might find some ants tending colonies of aphids like herds of cows on top of meadow grasses, "milking them" for their sweet honeydew.



Ants, like bees, hornets and wasps, are social insects and live together in colonies in many-chambered nests. Ants construct their nests with mazes of tunnels, galleries and rooms for storing food, laying eggs and raising young.