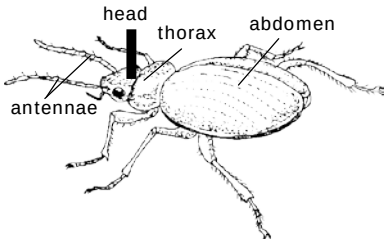
UNITED STATES BOTANIC GARDEN www.usbg.gov

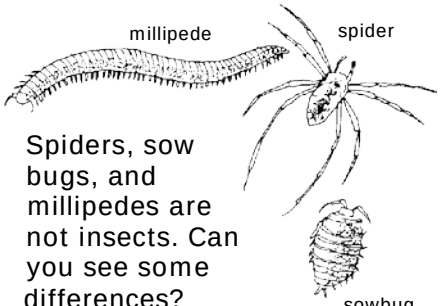
INSECTS IN THE GARDEN Science Page

Many different kinds of insects visit a garden. Some can be harmful, but most are helpful.

HOW CAN YOU TELL AN INSECT FROM OTHER ANIMALS?

All insects have 3 pairs of legs and 3 body parts (head, thorax, and abdomen). A hard outer covering protects the insect's body. This covering is called an exoskeleton.



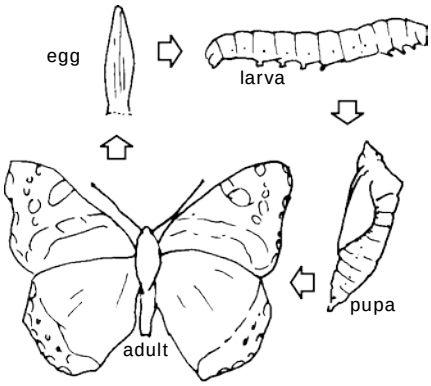


Spiders, sow bugs, and millipedes are not insects. Can you see some differences?

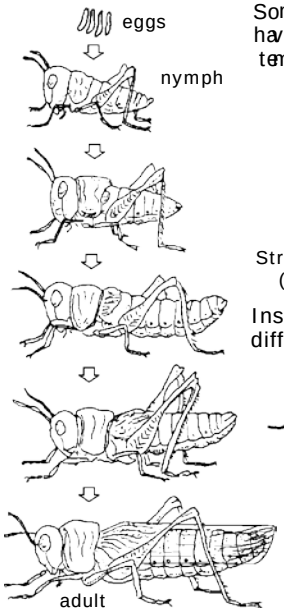
HOW DOES AN INSECT GROW?

An insect begins life as an egg and changes shape as it grows. This is called metamorphosis.

In insects such as butterflies, moths, and beetles, the egg hatches into a larva, which becomes a pupa. Then a mature adult emerges from the pupa.

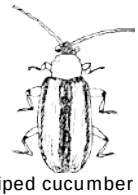


In other insects, such as grasshoppers and aphids, the young insect (nymph) looks like the parent when it hatches. It sheds its exoskeleton several times as it grows.



Insects are cold-blooded animals, so the rate at which they grow depends on the temperature. Cooler temperatures slow down their growth, and warmer temperatures speed up their growth.

Some insects have only one generation per year. Others have up to 12 generations per year, depending upon the temperature.



Striped cucumber beetle (1 generation/year)

Colorado potato beetle (up to 3 generations/ year)

Aphids (up to 12 generations/ year)

Insects do not grow in cold weather. They over-winter at different stages of metamorphosis:

Mexican bean beetle (as an adult)

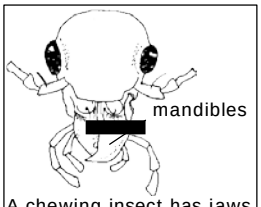
praying mantid (as an egg)

cabbage butterfly (as a pupa)

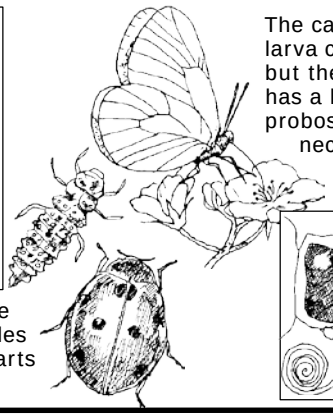
Japanese beetle (as a larva)

WHAT DOES AN INSECT EAT?

Lots of insects come to a garden to eat. Some come to suck nectar and eat pollen. Others chew on leaves, stems, and fruits. Some are predators and prey on insects and other small creatures. Mouthparts of most insects are specialized for a particular kind of food. Some mouthparts are adapted for biting or chewing. Others are adapted for sucking up blood, nectar, or other fluids.

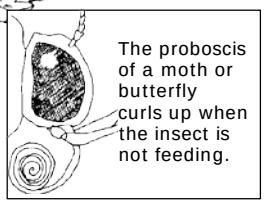


A chewing insect has jaws called mandibles that move together when the insect is eating.

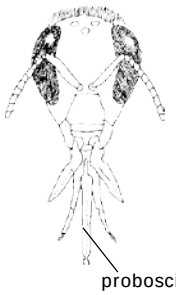


Both the adults and the larvae of ladybug beetles have chewing mouthparts for feeding on aphids.

The cabbage butterfly larva chews on plants, but the mature butterfly has a long tube called a proboscis for sucking nectar.

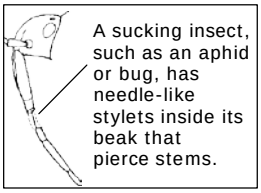


The proboscis of a moth or butterfly curls up when the insect is not feeding.



The honey bee has an extended proboscis to suck up nectar.

Aphids have needle-like mouthparts, which they use to make a hole in the plant stem and then suck up plant juices.



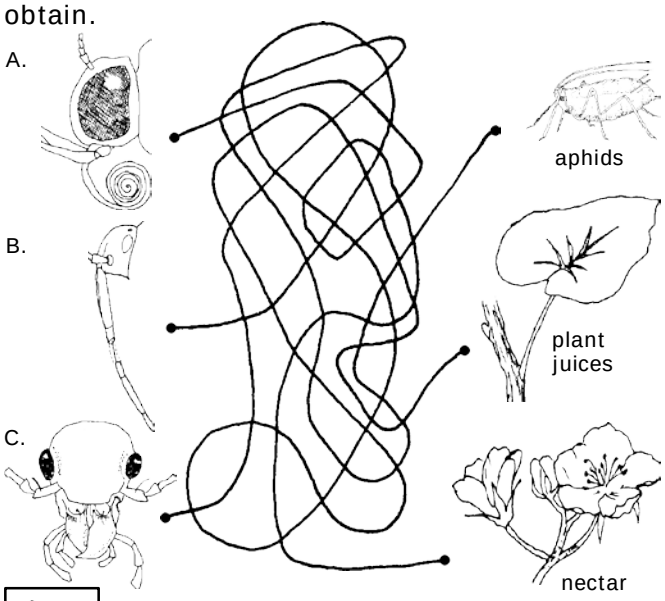
A sucking insect, such as an aphid or bug, has needle-like stylets inside its beak that pierce stems.

CIVI LAB ECOLOGY

Cornell University

PUZZLE

Follow the line from each insect mouthpart to find out what food the mouthpart is able to obtain.



TRY THIS

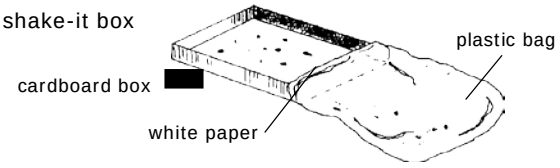
OBSERVING INSECTS IN THE GARDEN

What you need

* shallow cardboard box, about 25 cm by 30 cm
* white paper to line the box if it is not already white
* plastic bag to fit over the end of the box
* tape
* plastic jar with lid
* paper and pencil
* magnifying lens, if available
* insect field guide, if available

What to do

1. To make a shake-it box, cut off one side of the box. If the inside of the box is not white, line it with white paper, taping the paper in place.
2. Tape the plastic bag to the bottom and two sides of the box (see picture).



3. To use the shake-it box, hold the box under a plant in the garden and gently shake the box and the plant. Insects on the leaves and stems will drop into the box.
4. You can observe the insects in the box. You can also transfer the insects to a jar, where they are less likely to escape. To do this, untape the bag from the box and close the bag so the insects don't get out. Hold the plastic bag over the jar and shake the insects down.
5. Observe the insects you have collected with the naked eye and with a magnifying lens. How many different kinds of insects did you collect? If possible, use an insect field guide to identify the insects that you collect.

SPOTLIGHT ON RESEARCH

Using Green Lacewings in Biological Control

Imagine a creature that looks like a tiny green-gray alligator with ice tongs for a mouth. It seizes and punctures its prey, injects it with poison, and sucks out the body fluids. Sounds like science fiction? This creature, called an aphidlion, actually exists. It is the larva of the green lacewing. Its prey is the aphid, a garden pest. The adult lacewing is light green, with long slender antennae, golden eyes, and large, thin, "lace-like" wings. (An intricate pattern of veins in the wings creates the lacy effect.) Because of what it looks like, and the fact that it flies around at night feeding on nectar and pollen, some people mistake a lacewing for a fairy!

Although not as pretty as the adult lacewing, the aphidlion is extremely effective at controlling aphids. One aphidlion feeds on up to 200 aphids a week. Worldwide they rank as one of the most commonly used biological controls. However, it is very expensive to produce lots of aphidlions. Scientists are trying to find better ways to mass-rear aphidlions, so that they can be made available at a lower cost to growers of vegetables, fruits, nuts, and flowers. One reason why aphidlions are costly to rear is that they eat each other when other food is not available!

Scientists have developed a new diet for aphidlions that is cheap and does not spoil quickly. When it becomes available to lacewing growers, scientists believe that the cost of rearing will be reduced from $0.35 to $0.00025 per insect. Engineers and biologists are also working together on ways to harvest, package, and ship the insects. When a mechanized way of doing all these things is fully developed, the cost of this natural insect control should be cut drastically.

Source: Tauber, M.J., Tauber, C.A., Daane, K.M., and Hagen, K.S. (2000). Advances in the commercialization of green lacewings. Part 1: introduction, systematics, and mass production. Biological Control News. Vol. 7 (2). <http://www.entomology.wisc.edu/mbcn/fea703.html>

RIDDLE

Why do bees hum?

Answer: Because they forgot the words!