

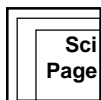
INSECTS IN THE GARDEN Teaching Tips



LEARNING OBJECTIVES

Youth will be able to:

- * Differentiate between insects and other arthropods.
- * Compare and contrast complete and incomplete metamorphosis.
- * Describe how insects over-winter.
- * Describe what and how insects eat, and how mouthparts are adapted for biting, chewing, or sucking.



HOW TO USE THE INSECTS IN THE GARDEN SCIENCE PAGE

Introduce the Science Page by asking youth to list some words that come to mind when they think of the word "insect." Many youth may feel that all insects are creepy, or a nuisance, or mostly harmful rather than helpful. Explain that insects make up three-quarters of all the animals that exist, and they play a very important role in the world of living things. Point out that the majority of insects that visit a garden are helpful, rather than harmful.

Not only are insects important to our survival, but they are also fascinating creatures to observe. They are easy to find, they generally do not move very far from one spot, and they usually allow you to get up rather close. What youth will discover is that the more they learn about and observe insects, the less hostile towards insects and more fascinated with them they will become.

Give youth some time to read the front of the Science Page, which includes information on how you can distinguish insects from other animals, how an insect grows, and what and how an insect eats. Then ask: How do you distinguish an insect from all other animals? (Answer: Adult insects

have two distinguishing traits:

1. They have three major divisions to their bodies, called head, thorax and abdomen.
2. They have three pairs of legs, all attached to the thorax. Many insects also have one or two pairs of wings, also attached to the thorax. Spiders have only two body divisions and eight pairs of legs.)

Explain that the word metamorphosis comes from the roots meta, meaning change, and morphe, meaning form. Emphasize that some insects, such as beetles, flies, butterflies, moths, and bees, undergo complete metamorphosis. These insects change a great deal during their lives, and look entirely different in the four different stages of their development. When an egg hatches, the larva, which looks like a small worm, sheds its skin from time to time as it grows. Then the outer skin hardens into a tough casing to form the pupa. During the pupal stage, the insect undergoes a radical change in form, and then emerges as an adult, which is able to reproduce.

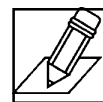
Insects that undergo gradual metamorphosis, including true bugs, aphids, and grasshoppers, emerge from the egg as a nymph, which looks like a miniature adult, except it lacks fully developed wings. With each shedding of their "skin" or exoskeleton, they look more like the adult.

Youth may wish to capture immature insects and keep them in captivity to watch how they grow and change. A large, wide-mouthed jar with a mesh cover can be used for a cage. In order to keep them alive, you must meet the basic needs of insects in captivity, including food, water, and the correct temperature. Many insects only eat specific plants, so you must observe what the insect is feeding on, and provide it with a daily fresh supply of the same plants. A damp sponge will provide sufficient water for most insects. As an alternative to capturing

insects outside, youth could purchase crickets or mealworms, which have less specific food requirements, from a pet supply store.

Ask: Do insects grow faster in warmer weather? (Answer: Yes, because they are cold-blooded. When their surroundings are warmer, their body temperatures are also warmer. So their body processes speed up, and they grow faster. That is why the number of generations for some insects can vary, depending in large part on the weather.) Ask: Where do insects in a garden come from? Do they just appear out of nowhere each spring? (Answer: Insects can over-winter in and around the garden, and begin growing and reproducing again when the weather warms up.)

Point out that it is possible to infer what an insect eats just by looking at its mouthparts. Encourage youth to use a magnifying lens to watch how different kinds of insect mouthparts are used. For example, they can watch how butterflies and moths uncurl their long proboscis to reach deep into flowers to suck up nectar.



PUZZLE

Challenge youth to figure out which mouthparts are used for each type of food, and then check their answers by following the lines.

Answers: A. The curled proboscis is used to suck nectar; B. the needle-like stylet is used to suck plant juices; and C. the chewing mandibles are used to eat aphids.



TRY THIS

The information about the shake-it box was taken from: Cayuga Nature Center. 1988. [Curriculum Guide in Environmental](#)

Studies, Grades Pre-K to 6. Ithaca, N.Y. Cayuga Nature Center, Inc. Before going to the garden, have youth construct the shake-it box. Also gather other materials they will need, such as plastic jars with lids, magnifying lenses, and insect identification books. Use field guides with lots of illustrations, available at bookstores or the library. There are also several websites developed by agricultural universities which feature full-color photographs of common garden insect pests, for example, check out: <<http://entweb.clemson.edu/cuentres/cesheets>> and <<http://www.entm.purdue.edu/entomology/vegisite/homeowners/insect1.html>>.

Before using the shake-it box, have students sit still in the garden for about 5 minutes, and

look closely at the plants around them. They will soon see insects crawling on leaves, flying about, or even landing on themselves. Then have them search more actively for insects, under leaves, around flowers and stems, and close to the ground. CAUTION: Tell youth to stay far away from stinging insects, such as bees and wasps. They can use a magnifying lens to look at the details of insect structure. Move around among youth, asking questions to help direct their observations. For example, ask: What do different insects eat? How do they obtain their food? Do they have chewing or sucking mouthparts? A jar with a lid works well for watching insects up close. After youth have made their observations, they should return

surviving helpful insects to where they were found. Allow some time for youth to discuss and share their observations with each other.



SPOTLIGHT ON RESEARCH

The information in this spotlight was drawn from:

Tauber, M.J., Tauber, C.A, Daane, K.M. and Hagen, K.S. 2000.

"Advances in the Commercialization of Green Lacewings. Part I: Introduction, Systematics and Mass Production." Biological Control News. Volume VII, No. 2. <<http://www.entomology.wisc.edu/mbcn/fea703.html>>