Divide the JMG'ers into smaller work groups, with three to four gardeners in each group. Give each group a jar containing insects and leaf and grass debris. Ask the groups to first sort out all the insects they can from the grass and leaves. Then have them examine their insects and sort them into groups based on the insects' similarities and differences. (They can use any characteristics they wish for their chart—size, shape, color, etc. The grouping criteria they use do not matter; this is an exercise to practice sorting and grouping according to whatever organizational criteria they choose.)

Ask the gardeners to make an organizational chart for their insects showing the different types of insects they have and how they relate to each other. Each division should have all the characteristics of the level above it, but some that distinguish it from other groups at the same level. When they are finished, ask the groups to present their charts to the group.

The chart the gardeners created will be the same kind scientists use to classify insects and all other organisms. These charts are called keys, because they are the key to identifying insects and other organisms. The process of using a key to identify an insect is called keying out the organism. There are so many different organisms that scientists make separate keys for insects, plants or other organisms from a certain area. These are often referred to as the flora or fauna of a certain area. Keys have been developed specifically for the insects of Texas, of the tropics, and of New England. Some counties have their own keys for the insects found there.

Use the basic insect key from the Appendix to make a classroom-sized insect key on poster board. Hang it up to give the gardeners an ongoing reference to "key out" insects they find at home or in the group garden. Discuss with the group the similarities and differences in the keys they created.

In the Classroom

Create a collection of the insects found in and around the group garden. Show the different insect orders and examples of insects from each order found. You can use pictures or specimens that have been dried and mounted. This is a great ongoing activity, as the children will continually find new and different insects in their garden.

Metamorphosis Bracelets and Belts

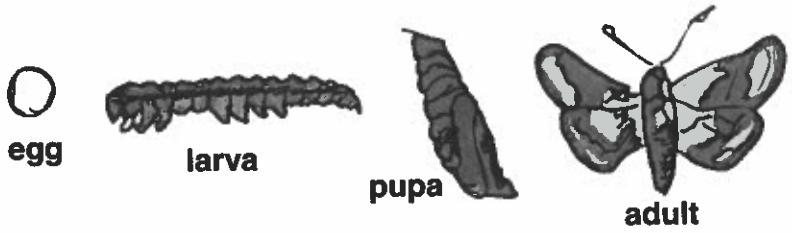
Objective: To learn the stages of metamorphosis.
Time: 1 hour.
Materials: String or cording, cardboard, markers, beads.

Insects go through different life stages as they grow. This process is called metamorphosis, which means "change of form." Some insects, such as butterflies, change form completely as they go through the different stages. Their larval forms, caterpillars, look very different and even have

different types of mouthparts than their adult forms, butterflies. Other types of insects may look similar to their adult forms throughout their life.

There are two different types of metamorphosis: complete and incomplete. The insects grouped together in an order all undergo the same type of metamorphosis. The stages of each type of metamorphosis are pictured below. (Note: Level I of the JMG Junior Master Gardener program focuses mainly on complete metamorphosis.)

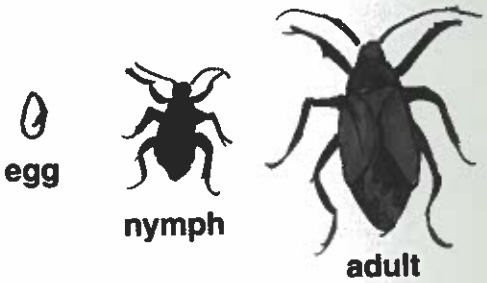
Complete Metamorphosis: egg, larva, pupa, adult



An adult insect lays its eggs in a protected place where the hatching larvae can easily find food. When the larvae hatch, they are eating machines! As a larva grows, it sheds its skin several times because its skeleton is on the outside of its body and cannot expand and grow with it. When it has reached full size as a larva, it is ready for the next stage, called the pupa (plural: pupae). The larva may form a cocoon, or chrysalis. Inside the cocoon, the insect's body changes form and is transformed into the adult form. Then the adult insect breaks out of the cocoon and mates. The cycle starts over again.

Incomplete Metamorphosis: egg, nymph, adult

There are several types of incomplete metamorphosis. Insects that undergo incomplete metamorphosis may change features somewhat as they grow, may change very little except for the addition of such features as wings or sex organs, or may not change at all. Some insects with this type of metamorphosis may live part of their lives underwater as aquatic insects.



An insect that undergoes incomplete metamorphosis sheds it skin during its growth stages; however, it doesn't completely change form (such as from caterpillar to butterfly), as insects do in complete metamorphosis.

Discuss metamorphosis with the gardeners using the cycle illustrations above as a guide. Discuss the different insects that undergo complete metamorphosis—butterflies, beetles, ants and wasps are a few examples.

Ask the gardeners to draw and cut out small pictures of each stage of the life cycle in complete metamorphosis (egg, larva, pupa, and adult). Each picture should be no larger than a 3- to 4-inch oval. Have them use a hole punch to make holes at both ends of the ovals, and tie a piece of cord or string through the holes. Tie all four pictures together to make a metamorphosis bracelet or belt. If they wish, they may add colorful beads or other decorations between the four segments. When they are finished, discuss again the four stages of metamorphosis, emphasizing the ongoing cyclical aspect of life cycles.