

**Background:** Insects go through complex life cycles with different distinct changes. Some insects go through simple metamorphosis (Egg -> Larva/Nymph -> Adult) while others go through complex metamorphosis (Egg -> Larva/Nymph -> Pupa -> Adult). The goal of this lesson is for students to understand that the same animal has different life stages that can look very different and that this process varies among insects. Many students are familiar with this concept in butterflies but do not know that other insects go through a similar process.

**Grade level:** 1-3

**Academic Standards**:

**Time:** 45-60 minutes

**Logistics**: Break the class into small groups

**Materials**:

- Model magic

- Butterfly metamorphosis cards

-Matching game cards

**Preparation:** Obtain some live insects that are a good representation of different life stages. Crickets are a good example of simple metamorphosis and mealworms are a good example of complex metamorphosis. Both can easily be ordered online or bought in pet stores. For each insect put a few individuals in a container. Look for crickets that have wings and those that do not have wings as a good comparison. If possible, order both mealworm larvae and adults for comparison. Print out a few sets of the butterfly metamorphosis cards and a few sets of the matching card game.

Butterfly metamorphosis cards: <https://natureinspiredlearning.com/life-cycle-of-a-butterfly-worksheets-printables/>

**DO - Activity**:

**1.)** *Setting the stage* Explain to the students that insects go through different life stages, just like humans do. Ask students to name human life stages (baby, child, teenager, adult, etc.). In today’s lesson students will identify these stages in different insects.

**2.)** *Observe live insects* Give each small group two containers- one with crickets and one with mealworms*.* Give the students time to observe the crickets and mealworms. Ask them questions about what they see. What differences do they see between small and large crickets? Wait for students to observe that some have wings and some do not. Explain that those with wings are adults and those without wings are the children. Why do the beetles and mealworms look so different? Are they the same type of animal? Which one is the child and which one is the adult? Explain that young insects go through a lot of changes in their bodies as they grow up into adults. Show that some insects, like crickets, go through very gradual changes as they grow into adults; usually in their size and in their wing development. Each time they go through these gradual changes, they molt; meaning they shed their smaller exoskeleton as they develop a new larger form. Other insects, like beetles and butterflies, go through very complex changes in their bodies as they grow into adults. These insects go through a special life stage called a pupa. During the pupal stage, insects are able to completely change their body shape, as well as form wings. Once an insect becomes an adult, they no longer go through body changes.

**3.)** *Art Project*  Give each group a set of butterfly metamorphosis cards and ask them to put the cards in order. Leave the cards out as the students work on the art project to use as model. Give each student a small piece of modelling clay and talk them through the steps in butterfly development. First is the egg stage (everyone makes their clay egg). Next the little caterpillar hatches (everyone makes the clay egg into a little caterpillar). Then the caterpillar eats and gets bigger (give them more clay to make the caterpillar bigger). Have the caterpillar get bigger a few times. Then the caterpillar stops eating and turns into a pupa (make the clay into a pupa shape). Then the pupa waits for the right time and emerges as a beautiful butterfly (give them more clay and colors if desired to make a butterfly). Finished butterflies can be placed in plastic baggies to take home.

**REFLECT**

Have students share their butterflies and any special details they made. Ask students to describe which stage was their favorite to make and why.

**APPLY**

*Matching Game* Give each group a set of cards.Set out the cards face down in a grid. Let each student (or pair of students if playing in teams) take turns flipping over two cards at a time. The goal is to flip over a matching larva and adult of the same species. If a student/team flips over a matching pair, they keep the cards and get a point. Play until all cards are matched and count to see who wins. After the game ask students to look at their pairs and identify which is a larva and which is an adult. They should describe characteristics that allowed them to make this differentiation.

**Supplementary information:**

The word metamorphosis is derived from Greek, meaning “change of form” or “transformation”. Insects go through conspicuous physical changes as they develop from immature to adult. Adult insects have fully developed reproductive systems as well as wings (most). Though it is sometimes difficult to observe whether reproductive structures are fully developed, full wing development can be easy to spot.

Simple metamorphosis (also called incomplete metamorphosis or hemimetabolism) occurs when the physical changes are gradual and there is no pupal life stage. The hemimetabolous insect goes through several growth stages (instars), molting at each stage to allow for growth. Hemimetabolous larvae are often called nymphs, bear a strong physical resemblance to the adult forms and often live and eat in the same habitats as the adults (Exceptions include dragonflies, damselflies, stoneflies and mayflies; their nymphs are aquatic while the adults are terrestrial).

Complex metamorphosis (also called complete metamorphosis or holometabolism) occurs when there is a pupal stage where the physical characteristics of the larval stage are completely remodeled to form an adult. Holometabolous larvae are often shaped like worms; these larvae may be called special names like grub, caterpillar or maggot. After several stages (instars) of larval growth, the insect goes into the pupal stage where the larval tissues are digested as new adult tissues are formed; the pupa may be called special names like cocoon or chrysalis.