

Comparing Incomplete to Complete Metamorphosis

Scientific Background

Complete Metamorphosis

Metamorphosis is a change in the appearance of the body.

Insects with a *complete metamorphosis* have a four-stage life cycle. Two examples of insects that undergo complete metamorphosis are the antlion and the hickory horned devil, which is called a Regal moth in its adult stage. Insects that have a complete metamorphosis are said to be *holometabolous*.

The insect starts its life as an *egg*. After it emerges from its egg, the insect is called a *larva*. A larva that undergoes complete metamorphosis seldom looks like the adult form of the insect. There may be several stages of development while the insect is in its larval stage. In the next life cycle stage, the larva changes into a *pupa*. An *adult* insect emerges after it develops during its pupa stage and continues the life cycle by reproducing and laying eggs.

Scientists believe that the differences between adults and larva diminish competition between the life cycle stages for resources and allow the adults to specialize in breeding and dispersing eggs to new sites.

This diagram shows the steps of complete metamorphosis.

Egg » Larva 1 » Larva 2 » Larva 3 » Pupa » Adult » Next Generation Egg

Incomplete Metamorphosis

Insects with an *incomplete metamorphosis* have a three-stage life cycle. Two examples of insects that undergo incomplete metamorphosis are the cockroach and the dragonfly. Insects that have an incomplete metamorphosis are said to be *hemimetabolous*.

The insect starts its life as an *egg*. After it emerges from its egg, the insect is called a *nymph*. A nymph usually looks like a miniature, wingless, adult version of the insect. Some nymphs are aquatic while the adults are not. Insects with an incomplete metamorphosis have no pupa stage. Their wings develop on the outside of their bodies. Nymphs complete several body changes, called molts, as they develop into adults. Adults continue the life cycle by reproducing and laying eggs

This diagram shows the steps of incomplete metamorphosis.

Egg » Nymph 1 » Nymph 2 » Nymph 3 » Adult » Next Generation Egg

Vocabulary

- adult
- complete metamorphosis
- egg
- generation
- hemimetabolous
- holometabolous
- incomplete metamorphosis
- larva
- life cycle
- molt
- nymph
- pupa

*Vocabulary definitions can be found in the **Backyard Bugs** Glossary.*

Thinking Question

What is the difference between an insect that has complete metamorphosis and an insect that has incomplete metamorphosis?

Exploratory and Extension Activities

Additional Exploratory and Extension activities are available in the *Backyard Bugs* Teacher's Guide.

Bug Play

Using a life cycle outline written on the whiteboard, have students create storybook frames for a play about a bug they studied. Students in small groups will create narratives to accompany outline sections. Use bug puppets to stage the play.

Rhythm Experiences

Show students how to use rhythm sticks, pick out the number of syllables of arthropod and metamorphosis related words, and focus on accents.

Name: _____





Comparing Incomplete Metamorphosis to Complete Metamorphosis

**Cut out the pictures of the nymphs, larva, pupa, and cocoon below.
Paste them next to the correct adult.**

Egg	Nymph		Cockroach
Egg	Nymph		Dragonfly Adult
Egg	Larva	Pupa	Regal Moth
Egg	Larva	Cocoon	Antlion Adult



Answer Key
Comparing Incomplete Metamorphosis
to Complete Metamorphosis

<p>Cut out the pictures of the nymphs, larva, pupa, and cocoon below.</p> <p>Paste them next to the correct adult.</p>			
<p>→ Egg</p>	 Nymph		 Cockroach
<p>→ Egg</p>	 Nymph		 Dragonfly Adult
<p>→ Egg</p>	 Larva	 Pupa	 Regal Moth
<p>→ Egg</p>	 Larva	 Cocoon	 Antlion Adult