

Life Cycles: Metamorphosis

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The Monarch butterfly is one example of an insect that goes through metamorphosis. Photo from: Wikimedia Commons.

The transformation of a crawling caterpillar into a flying butterfly is one of nature's most amazing wonders. This change is an example of metamorphosis.

Metamorphosis is a series of astonishing changes in an animal's body after it hatches or is born. It occurs in thousands of types of insects, amphibians and other animals.

Metamorphosis Might Give Animals An Advantage

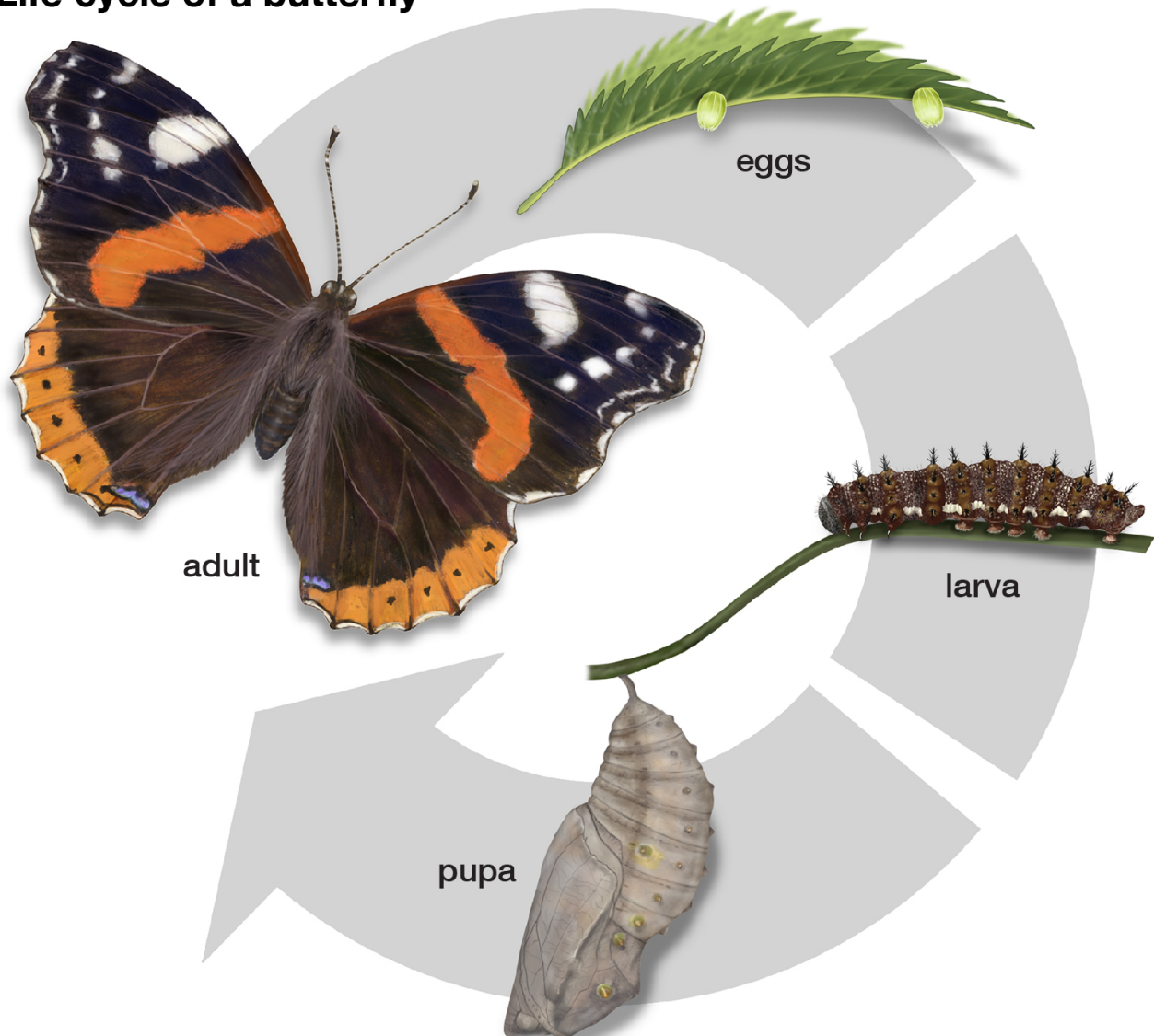
Biologists are scientists who study life on Earth. They think that metamorphosis might be a form of adaptation. An adaptation is a change in an animal species, or type, that helps it live better in its environment. Scientists think there are advantages for animals that go through metamorphosis.



For example, an insect might go through four stages of change. First, it is an egg. Then it hatches to become a very hungry, wormlike larva. Next it might go through an inactive pupa stage until it changes into an adult.

This metamorphosis helps the insect in a few ways. During each stage, the insect eats different food, so the parents and offspring don't have to fight over the same food. The metamorphosis also helps protect the insect from predators. Insects are ectothermic, which means their body temperature is controlled by their environment. An insect's body cools in the fall and winter. This causes the bug to slow down. During these seasons, it is more vulnerable to predators. Luckily for many insects, however, they are in the inactive pupa stage during these colder months. They are not moving around, so predators -- such as birds -- don't notice them. The pupa stage also allows the insects to survive the winter's food shortage.

Life cycle of a butterfly



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Stages Of Metamorphosis

Different insect types experience different degrees of metamorphosis. Some, such as beetles, butterflies and flies, undergo a complete, four-stage metamorphosis. Their first stage of life is the egg. The female parent always lays her eggs on a food supply, like a leaf. That prepares for the second, or larval, stage. When the larva hatches, it immediately begins eating the supplied food. A larva resembles a segmented worm.

An insect larva grows by shedding its hard outer skeleton. This is called molting. The larva can then expand and develop, replacing the outgrown outer skeleton with a new one. A larva usually molts five times.

The third stage of this insect's life is the pupal stage. This stage looks inactive from the outside. But inside the pupa, the final, astonishing transformation is happening. This last stage takes vast amounts of energy. That's why the larva eats so much.



Some pupae build a type of compartment to surround themselves. A butterfly pupa forms a chrysalis, which hangs from a tree. A moth's pupa forms a cocoon. These chambers may be made from woven larval hair, or from leaves. The pupa may also burrow into the soil.

This final metamorphosis can take all winter. The pupa's body tissue is disassembled, which means it comes apart. Then it is reassembled to make the adult form. The adult emerges with all the characteristics of an insect: three body sections (head, thorax and abdomen); wings

(usually two pairs); and three pairs of legs. The adult insect rarely grows further. Many live for weeks or months. During this stage they reproduce. Their babies will go through the same metamorphosis.

Partial Or No Metamorphosis

Other insects, such as grasshoppers and termites, go through a partial metamorphosis. They pass through only three life stages: the egg, nymph and adult. The nymph that emerges from the egg already looks much like the adult. It even has the basic wing structures, but the wings won't work until the insect becomes a mature adult. As the nymph grows and molts, it develops adult features and grows to an adult size.

The most ancient insect species, such as silverfish and springtails, have no true metamorphosis. The young insects that emerge from the egg look almost exactly like the adults. They just grow until they reach adult size.

Metamorphosis In Other Animals

Metamorphosis is usually associated with insects. But it occurs in other animals, too. Frogs, for example, begin life as tadpoles and grow into adult frogs. Starfish, crabs and lobsters, and snails and clams also go through metamorphosis.