

Cycles of Life

Teacher Guide

Grade Levels: 1 – 3

Program Overview

The instructor will introduce the concepts of growth and change in all living things. Students will handle museum animal specimens as the instructor demonstrates the life cycle changes of several different animals. Students will then work in groups to discover the proper sequence of life stages for seven different kinds of plants and animals using real specimens. The program will end with a metamorphosis movement activity.

Objectives/Student Learning Outcomes

After participating in this program, students will be able to:

- Identify the basic life stages of plants, insects, egg laying vertebrates, and live bearing vertebrates.
- Correctly sequence the life cycles stages of many different kinds of plants and animals.
- Recognize that some stages of a plant or animal's life cycle may look very different from the mature or adult form.
- Understand that all living things change and grow, some gradually and some through metamorphosis.

Background

Whether from seed, spore, or egg, all living things start small then **grow** and **change**. Some organisms go through dramatic changes during development from young to adult, while others change gradually.

Most **plants** begin life as a spore or **seed** and are activated by soil, water, and sun to begin growing **roots** into the soil and leaves above it. In the case of flowering plants, a mature plant produces a flower that, when pollinated, will produce seeds. The seeds are distributed by wind, water, or animal, and when a seed reaches a suitable location, it will germinate and begin growing.

Animals can have very different life **cycles**. Insects hatch from **eggs** as **larva** and will go through a **pupal** stage before maturing into **adults**. All insects go through **metamorphosis**, or a change in form. Some insects, such as grasshoppers, go through gradual metamorphosis. Dragonflies go through incomplete metamorphosis, meaning

P.A.S.S.

GRADE 1

Science Process – 1.2, 2.2, 3.1, 4.2

Life Science – 2.1, 2.2

GRADE 2

Science Process – 1.2, 2.2, 3.1, 4.2

Life Science – 2.1, 2.2

GRADE 3

Science Process – 1.2, 2.2, 3.1, 4.2

Life Science – 2.1, 2.2, 2.3

that there is no pupal form; the larvae change gradually with each molt and emerge as an adult directly from larval form. Butterflies go through complete metamorphosis, which is the more widely known from. The **larva** passes through a pupal or resting stage, in which the **caterpillar** produces a **chrysalis** inside itself and sheds the outerskin to reveal the chrysalis, the pupal form of a butterfly. After remaining in the chrysalis for a period of time, the adult butterfly will emerge.

Many vertebrates also begin life as **eggs**, but what happens after hatching can be very different. Amphibians such as frogs will also go through metamorphosis. The **larva**, or tadpoles, look more like fish than frogs. Reptiles, including turtles and snakes, look like small adults when they hatch. Baby birds look very similar to their parents, although many are born without feathers, giving them a slightly different appearance, but adult and newborn skeletons are basically the same. Mammals are the only vertebrates that do not hatch from eggs (with a few odd mammalian exceptions), and generally resemble their parents.

However different in size and form, all living things have this in common: they all **grow** and **change**. Humans grow and change quickly when they are young. Your students have a unique perspective on growth and change, as they have grown so much since birth, but have a lot of growth and change still ahead of them.

VOCABULARY

Egg - a small object made by an animal that holds its young and the food required for development.

Grow - to get bigger and develop to maturity.

Cycle - a series of stages through which something passes during its lifetime.

Life - the time from birth to death; an organism that is born, grows, consumes food, reproduces, and dies is alive.

Seed - a small object made by a plant that can produce another plant; the reproductive unit of a flowering plant.

Root - the underground part of a plant that helps the plant get water and nutrients from the soil and helps hold the plant up.

Baby - a very young child or animal.

Adult - a fully developed and mature animal; grown-up.

Instinct - a behavior that an animal can do without being taught; a behavior that an animal is born knowing how to do.

Metamorphosis - a noticeable change in the form of an animal that happens after birth or hatching.

Change - to become different.

At the Museum

Hall of Natural Wonders

The Oak Hickory Forest features the life cycles of several different animals. Look for the rail panel and flip book by the spring pool. This shows how the life cycles of four different animals interact in temporary water sources, such as a pool on a forest floor created by spring rains.

Activity: There are examples of animals in different life cycle stages in the Upland Stream and the Mixed Grass Prairie. Ask your students to look for them. Can they find eggs or babies?

Supplementary/Enrichment Activities

Science

1. **Grow a butterfly.** Animals in the classroom are a great way to engage students. Caterpillars make great short-term animal guests in the classroom, as most will change into butterflies within 3-6 weeks.
 - Look around in the late summer and early fall (August and September) and spring (April and May) for caterpillars or chrysalis. You can find caterpillars munching on plants in butterfly gardens. A great place to look is in your or a friend's herb garden. Our state butterfly, the black swallowtail, loves to eat dill and fennel as a caterpillar.
 - You'll need the following things for your caterpillar:
 - Medium size aquarium or critter cage with a tight fitting lid and some screen in the lid for adequate air flow. A food jar is not large enough for this activity.
 - small sponge for water. This needs to be a new sponge that has been rinsed well in water. You'll need to add a little water to the sponge everyday to keep it damp. Caterpillars can drown in open water dishes.
 - host plant – the plant you found your caterpillar on is probably its host plant, so be sure you can collect fresh leaves every 2-3 days until your caterpillar goes into pupal form (chrysalis). If you're not sure about your caterpillar's favorite food, check a field guide or nature website to identify your caterpillar and its host plant(s).
 - Small vase with very small opening at top for host plant. Fill the vase with water and place the host plant in it as you would cut flowers. Do be sure that your visiting caterpillar can't fall into the vase. You can use plastic wrap or fine metal screen around the opening of the vase to be

Larva – the early form of an animal; it will change into another form to become an adult.

Chrysalis – the pupa of a butterfly or moth, the hardened outer layer

Caterpillar – a young butterfly or moth; a long worm-like animal with several legs and a soft, squishy body.

Pupa – a life stage of an insect between larva and adult, usually enclosed in a cocoon or case, during which the insect changes from larval to adult form.

sure there's not a hole for a wayward caterpillar to climb through and drown.

- Now you're ready! Your caterpillar should make itself at home. You'll know it's healthy if it poops a lot. Caterpillar poop is called frass. You'll need to remove the frass occasionally as your caterpillar eats and grows. Too much frass can mold and make your guest sick.
- Encourage your students to check on their classroom guest everyday. What can they do to make their guest feel more at home? Can they see the caterpillar eating? Can they find any areas of the plant that have been eaten? Is the caterpillar growing? How many days did you have it before it became a chrysalis? How many days was is a chrysalis before it became a butterfly?
- You can also collect a chrysalis and place it in the same aquarium, without any plants. The butterfly will usually emerge in the morning. Most chrysalis will change in color, usually darker, or start to become translucent on the day before the butterfly emerges. The wings will be wet and sticky and will need to dry before you can let the butterfly go. When the butterfly starts flying around the cage, it's time to take the cage out side and free the butterfly. New butterflies will be very hungry, so you should let them go shortly after they emerge.

Language Arts

1. **Be a Butterfly.** Imagination is a powerful learning tool. You give your students the power and control to create their own butterfly and the world around it. You encourage them to change their perspective from human child to insect, from large to small, from grounded to flight. They may remember more if they experience it, even if the experience is imagined. Ask your students to imagine they are a caterpillar.
 - What do they look like?
 - What kinds of plants do they like?
 - Do they live in forests, wetlands, grasslands, or deserts?
 - What does their chrysalis look like?
 - What is it like to be a chrysalis, to just rest inside a protective shell for several days to several months?
 - What does it feel like to emerge from a chrysalis?
 - What does it feel like to have wet, sticky wings?
 - How does it feel to flap their wings for the first time?
 - What do they look like as butterflies?
 - What kinds of flowers or tree sap to they like to eat?

Math

1. **Life changes chart.** Make a list of changes that some of your students may have gone through, such as losing teeth or learning to ride a bicycle. Make a large chart showing the numbers of students who have lost teeth, or how many teeth. Are there any changes everyone has made or skills everyone can do? Are there things that only some students have done?

Additional Resources

For Early Elementary

The Tiny Seed. Eric Carle. Simon and Schuster Children's Publishing, 1991.

Waiting for Wings. Lois Ehlert, Harcourt 2001

Where Butterflies Grow. by Joanne Ryder, Lynne Cherry Penguin Young Readers, 1996.