

Chapter 9 : The Butterfly Life Cycle

<i>Overall Objectives</i>	<i>74</i>
<i>9.1 Introduction</i>	<i>74</i>
<i>9.2 Stage I: butterfly egg</i>	<i>74</i>
<i>9.3 Stage II: the caterpillar</i>	<i>74</i>
<i>9.4 Stage III: the chrysalis</i>	<i>75</i>
<i>9.5 Stage IV: the butterfly</i>	<i>75</i>
<i>9.6 Summary</i>	<i>75</i>
<i>Experiment 9: From Caterpillar to Butterfly</i>	<i>76</i>
<i>Review</i>	<i>79</i>
<i>Notes</i>	<i>79</i>

Time Required:

Text reading - 20 minutes

Experimental - about 4 weeks

Experimental Pre-setup:

Purchase butterfly kit one week prior

Additional Materials:

*WARD'S Natural Sciences
(www.wardsci.com)*

*Insect Lore
Butterfly Garden (221)
(www.insectlore.com)*

Overall Objectives

In this chapter the students will examine the life cycle of the butterfly. The students will study a different kind of metamorphosis.

9.1 Introduction

Butterflies, moths and skippers are in the order Lepidoptera. This name reflects the fact that these insects have “scaly wings.” There are more than 100,000 known species and it is the second largest insect order next to the beetles, order Coleoptera. Moths are the most abundant species in this order, but butterflies are the more brightly colored and often the more familiar species.

Moths and butterflies come in a variety of shapes, sizes and coloration. The smallest moths and butterflies have wing expanses not much larger than the size of a pencil eraser. The wingspan of the largest butterflies can extend almost one foot.

The life cycle of Lepidoptera consists of four stages; egg, larva, pupa and adult. Some species develop as fast as three weeks. Other species can take up to three years to fully develop.

Moths and butterflies are found on every continent except Antarctica. Many species migrate from one place to another but only the Monarch butterfly makes true two-way migration from Mexico to North America and then back again.

9.2 Stage I: butterfly egg

The first stage in the life cycle of butterflies is the egg. The number of eggs laid can vary from only a few hundred to several thousand. Eggs are deposited onto suitable food sources such as leaves or branches.

Butterfly eggs come in a variety of shapes and sizes. The outer coating can be smooth and shiny, like Monarch eggs, or decorated with elaborate grooves and depressions. Some eggs are deposited as single eggs and some are deposited in groups.

The hatching of eggs coincide with favorable weather and growth of the food source. The eggs can exchange oxygen with the air via small passages in the shell whether wet or dry.

When the egg is hatched, the larvae, or caterpillar, eats the food source. Many species of moth and butterfly are limited to only a small group of suitable plants. Many species, therefore, remain in only one habitat. Other species, that can eat more variety, can be found in many different habitats.

9.3 Stage II: the caterpillar

Once the egg hatches, a larvae, or caterpillar emerges. The caterpillar’s sole function is to eat! This stage in the life cycle of many butterflies is the chief nutritional stage and a caterpillar consumes many times its weight in food during this part of the cycle.

Caterpillars can be brightly colored, hairy, or plain in color depending on the species. Those caterpillars that live and feed covered by foliage or are

burrowers, are mostly plain in color. Those caterpillars that feed in the open are usually brightly colored with ornamentation such as hair or horns which helps defend against predators.

The larval stage of butterflies can last anywhere from a few weeks to several years depending on the species. During this time, the caterpillar grows and molts, shedding the old skin as many as four or five times.

Once the caterpillar has completed the larval developmental stage it stops eating and finds a suitable place to weave a cocoon. Here the pupal stage begins.

9.4 Stage III: the chrysalis

The third stage in the butterfly life cycle is the pupal stage. The caterpillar has completed the growth and development of the larval stage and is ready for hibernation and metamorphosis.

Many species spin chrysalis on the underside of branches or other surfaces. A small bit of silk is woven at one end and the caterpillar tests the strength of this “button” to ensure it will hold. The caterpillar then spins the silk around itself making a tough chrysalis. Many chrysalises are made of silk alone, but some species incorporate leaves, hair, or chewed wood pulp. The chrysalis sometimes has a seam that helps the adult butterfly emerge.

The pupal stage varies depending on the species. Many small species take only a few days to a few weeks for developing. Other larger species may take several months. The adult will emerge only when conditions are right and some chrysalises have been known to survive several years before the adult finally comes out.

9.5 Stage IV: the butterfly

The final stage in the butterfly life cycle is the adult stage. Once the chrysalis has completed the time required for metamorphosis, and when the conditions permit, the adult butterfly will emerge from the chrysalis.

The adult is fully formed inside the chrysalis. To exit the chrysalis, the butterfly wriggles until it is finally free. Some species have spines along their back to help bore holes in the chrysalis and help push out the walls.

When the young butterfly emerges, it cannot fly yet. The wings are wrinkled up and the butterfly must pump fluid into them. Often the butterfly crawls to a place where it can hang with its head up allowing the fluid to flow into the wings. It may take several minutes or even a few hours before the wings are stiff enough for flight.

The main purpose of the adult stage in the life cycle of butterflies and moths is reproduction. Nutrition is essential only in a few species during this stage. Food is taken in only for supplying energy for flight. Many butterflies and moths travel great distances during the adult stage. In North America many moths migrate to Canada, and, in Europe, many butterflies and moths migrate to Scandinavia. Once a butterfly has found a mate, the female lays eggs and the cycle repeats.

9.6 Summary

Discuss the summary statements for this chapter.

Experiment 9 : From Caterpillar to Butterfly

Date: _____

Objective: We will observe the change (metamorphosis) as a caterpillar turns into a butterfly.

Materials:

Caterpillar or Butterfly kit
Small cage

Experiment:

1. Follow the directions on the butterfly kit for proper care of your caterpillar or provide food for your local caterpillar.
2. Fill out the life cycle chart on the next page.
3. Over the course of the next several weeks, observe any changes your caterpillar undergoes.
4. Record how much food your caterpillar eats.
5. Record how many times the caterpillar molts.
6. Record where the caterpillar spins its chrysalis.
7. If you can observe the caterpillar emerging, record how long before it can fly.

In this experiment, the students will observe the change from caterpillar to butterfly. There is no hypothesis for this experiment.

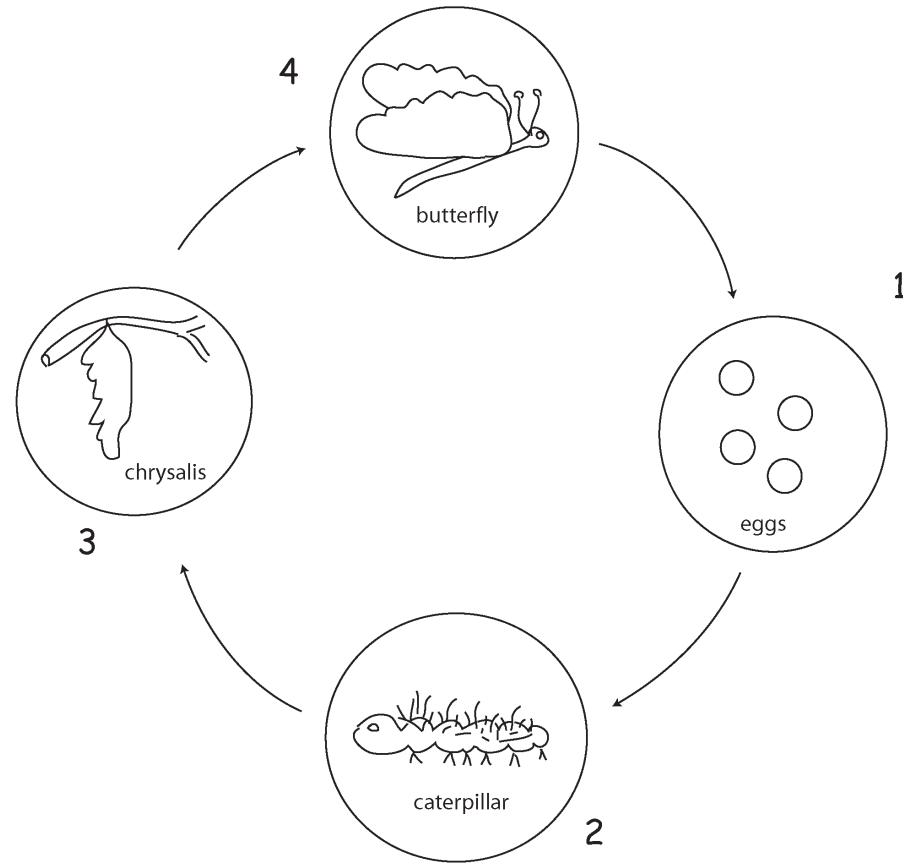
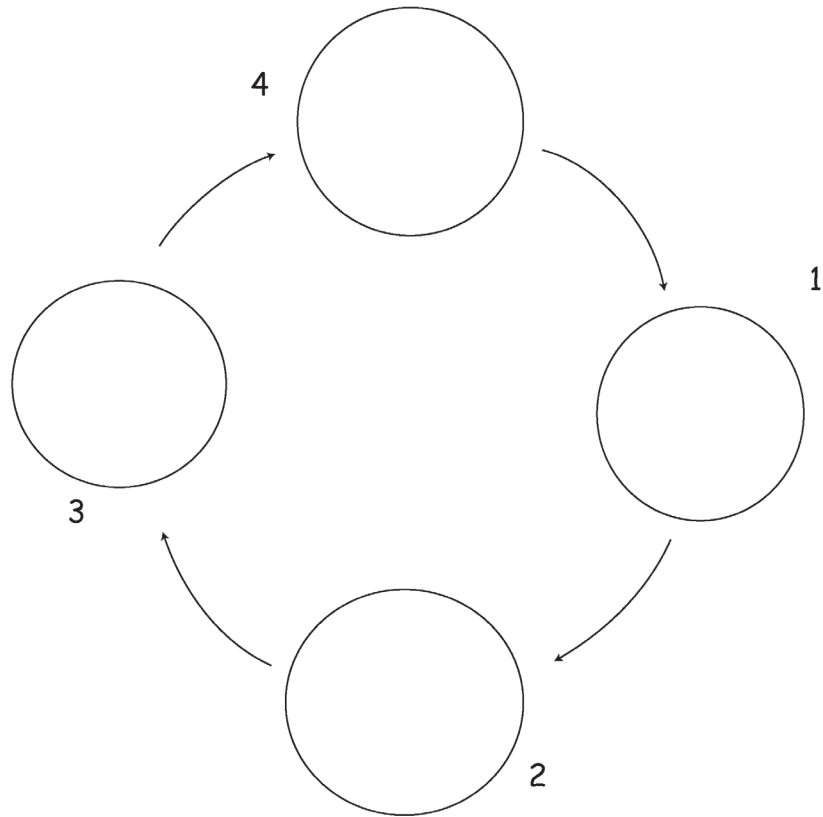
If possible have the students collect local caterpillars and house them in a small cage. If a caterpillar can be located, take several leaves from the plant where it was found for food. If a local caterpillar cannot be found, caterpillar kits can be purchased.

Resources:

WARD'S Natural Sciences sells several different butterfly pupae; www.wardsci.com

Also Insect Lore sells several butterfly kits. Insect Lore has excellent customer service, nearly 100% survival rate with a good guarantee on their product, and they allow you to designate a week in which you receive your specimen.

Draw the various stages in the life cycle of a butterfly,



Results:

Week	Amount of food eaten	Molting?	Other observations
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Conclusions:

Have the students write their observations in the Results section. It may not be possible to determine how much the caterpillar eats, or all of the molting stages. Have the students record any other observations such as movement or periods of inactivity.

Have the students write some conclusions based on their observations. Some possibilities are:

“I observed the caterpillar eating only three full leaves.”

“I recorded only three molts for the caterpillar.”

“It took two weeks for the caterpillar to form a chrysalis.”

Again, help the students be accurate with their concluding statements.

