

Mimicry

Scientific Background

The adult Monarch butterfly advertises the fact that it is bitter tasting and toxic to its predators by its bright orange, black, and white wing color pattern. This pattern helps the Monarch to avoid predators. If two toxic butterfly species do not look alike, a bird may have to kill several butterflies of each species to learn that both species are toxic or taste unpleasant. However, if another toxic butterfly looks like the Monarch butterfly, then birds have to learn only one warning color pattern to remember to avoid species of toxic prey. This means that both the Monarch and Viceroy butterfly species gain a selective advantage by having a similar appearance to one another. This type of mimicry in which both the model and the mimic are toxic to predators is called Müllerian mimicry.

The mimicry activity can be found by navigating to the Viceroy Butterfly screen, then clicking the mimicry icon at the bottom of the screen.

Vocabulary

- adaptation
- mimicry
- Müllerian mimicry
- predator
- toxin
- larva
- model
- natural selection
- species
- warn

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

Thinking Question

Compare a Viceroy butterfly that is not a close mimic of a Monarch butterfly to another Viceroy butterfly that is an excellent mimic of a Monarch butterfly. How do predator birds that eat Viceroy butterflies accelerate the process of natural selection in this species?

Exploratory and Extension Activities

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

Bug Book Share

Have students select a nonfiction book about bugs from the library to read. Provide students the opportunity to share their books as they complete them. The student presenting his or her book will have time to discuss the selection. The description should include the type of bug they read about, and how that bug is alike or different from the bugs being studied in ***Backyard Bugs***.

Once Upon a Bug...

Introduce fables as a literature genre. Discuss the fable's definition, purpose, style, and some famous fable authors, such as Aesop and Thurber.

Visit <http://www.aesopfables.com/> for a selection of Aesop's Fables.

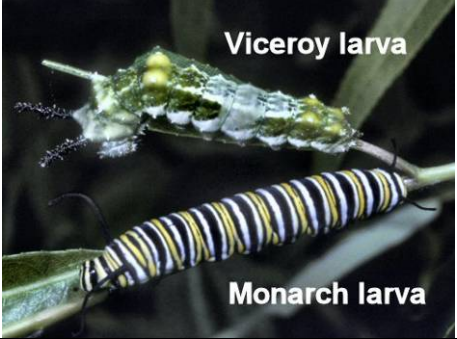

James Thurber's fables for the young audience can be found in *Fables for Our Time and Famous Poems* (Perennial, 1990, ISBN: 0060909994).

Read several fables out loud to the class. Discuss the use of talking animals to present ideas. Do the animals act like people? Do the animals retain their animal traits? Is there a moral to the fable? And if so, what is it? Have the students discuss the moral that is being presented by the author. Does Aesop use themes similar to those of Thurber?

Have students decide on issues for a fable's moral. Write this on the whiteboard. Have students create a fable (orally) about a Viceroy butterfly and a bird, for example. Write an outline on the board, so students have some direction for a beginning, idea development with characters speaking and a moral ending. The fable will not be written. Students will just join in with a sentence or two to add to the story, starting with "Once there was..."

Name: _____

Mimicry, Part 1

Describe the similarities and differences between Monarch and Viceroy butterfly larvae.		
	Similarities	Differences
 <p>Viceroy larva</p> <p>Monarch larva</p>		
Describe the similarities and differences between Monarch and Viceroy butterfly chrysalids.		
	Similarities	Differences
 <p>Viceroy chrysalis</p> <p>Monarch chrysalis</p>		

By looking at the caterpillars and the chrysalids of Monarch and Viceroy butterflies, we discover that these two insects probably:

are closely related species

belong to different groups of butterflies

Based on the comparison between the Monarch and Viceroy larvae and chrysalids, I predict the adult butterflies are:

very different

very similar

Name: _____

Mimicry, Part 2



Monarch



Viceroy

Describe the similarities and differences between the Monarch and Viceroy adults.

Similarities

Differences

Name: _____

Mimicry, Part 3

A bird that eats butterflies wants to avoid eating butterflies that taste bad.



If both the Monarch and white-banded purple butterflies taste bad, how many butterflies would a bird need to taste in order to learn that they both probably taste bad?

Why? _____

Group A: Monarch and White-banded Purple Butterflies



If both the Monarch and Viceroy butterflies taste bad, how many butterflies would a bird need to taste in order to learn that they both probably taste bad?

Why? _____

Group B: Monarch and Viceroy Butterflies

Think about Group A and Group B above. Suppose three birds prey on these butterflies. Which group would most likely have more survivors?

Group A

Group B

Name: _____

Mimicry, Part 4



Professor Platt bred Viceroy butterflies in his laboratory. He wanted to find out how the Viceroy butterfly might have evolved from an ancestor that looked like the white-banded purple butterfly. He found that he was able to breed Viceroy butterflies that looked less like the Viceroy, and more like the white-banded purple butterfly.

Think about Professor Platt's conclusions from his experiments.

How did the Viceroy butterflies change over time to resemble the Monarch butterflies?

Suppose there are some mimics that barely look like Monarch butterflies and other mimics that look more like Monarch butterflies.

And suppose there were no other tasty butterflies around.

Which butterflies, the ones that do not look like Monarch butterflies or the ones that look like Monarch butterflies, would birds most likely eat? Why?

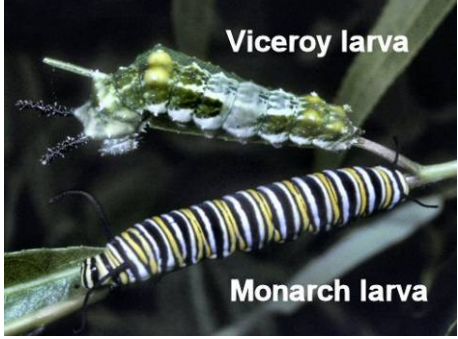
How did predator birds help change how the Viceroy butterfly mimics the Monarch butterfly?

Answer Key

Mimicry, Part 1


Describe the similarities and differences between Monarch and Viceroy butterfly larvae.

	Similarities	Differences
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	<p><i>Both the Monarch and the Viceroy larvae are caterpillars. Both larvae have antennae, true legs, prolegs. Both larvae eat leaves.</i></p>	<p><i>The Monarch butterfly larva is yellow, black, and white. Its body feels smooth. It eats milkweed leaves.</i></p> <p><i>The Viceroy butterfly larva is green and white. Its body feels bumpy. It eats willow tree leaves.</i></p>
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Describe the similarities and differences between Monarch and Viceroy butterfly chrysalids.

	Similarities	Differences
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	<p><i>Neither chrysalid moves on its own. Both chrysalids have a butterfly developing inside and are found hanging from a branch.</i></p>	<p><i>The Monarch butterfly chrysalis is bright green with gold and feels smooth.</i></p> <p><i>The Viceroy butterfly chrysalis is black and brown and feels rough.</i></p>
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By looking at the caterpillars and the chrysalids of Monarch and Viceroy butterflies, we discover that these two insects probably:

<input type="checkbox"/> are closely related species	<input checked="" type="checkbox"/> belong to different groups of butterflies
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Based on the comparison between the Monarch and Viceroy larvae and chrysalids, I predict the adult butterflies are:

<input checked="" type="checkbox"/> very different	<input type="checkbox"/> very similar
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Answer Key

Mimicry, Part 2



Monarch



Viceroy

Describe the similarities and differences between the Monarch and Viceroy adults.

Similarities

Both of these insects are butterflies.

Both of these insects have orange, black and white colorings.

The insects are about the same size and have similar wing shapes.

Differences

The Viceroy butterfly has a black stripe parallel to the edge of its hind wings. The Monarch butterfly does not have this black stripe on its hind wings.

The Monarch butterfly has two rows of white spots on its hind wings and the Viceroy butterfly has one row of white spots.

Answer Key

Mimicry, Part 3

A bird that eats butterflies wants to avoid eating butterflies that taste bad.



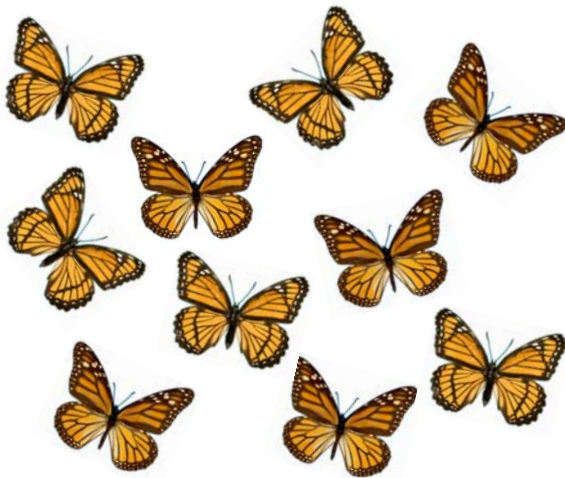
If both the Monarch and white-banded purple butterflies taste bad, how many butterflies would a bird need to taste in order to learn that they both probably taste bad?

Two, one of each kind of butterfly.

Why?

A bird would not know that both butterflies taste bad until it tasted one of each kind of butterfly.

Group A: Monarch and white-banded purple butterflies



If both the Monarch and Viceroy butterflies taste bad, how many butterflies would a bird need to taste in order to learn that they both probably taste bad?

Just one.

Why?

The Viceroy butterfly is a mimic of the Monarch butterfly. This means the Monarch and Viceroy butterflies look alike.

Group B: Monarch and Viceroy Butterflies

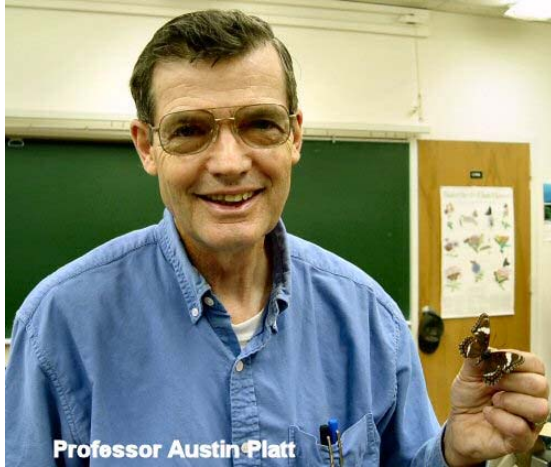
Think about Group A and Group B above. Suppose three birds prey on these butterflies. Which group would most likely have more survivors?

Group A

Group B

Answer Key

Mimicry, Part 4



Professor Platt bred Viceroy butterflies in his laboratory. He wanted to find out how the Viceroy butterfly might have evolved from an ancestor that looked like the white-banded purple butterfly. He found that he was able to breed Viceroy butterflies that looked less like the Viceroy, and more like the white-banded purple butterfly.

Think about Professor Platt's conclusions from his experiments.

How did the Viceroy butterflies change over time to resemble the Monarch butterflies?

The Viceroy butterflies changed over time by losing their white band and adding more orange color to its wings.

Suppose there are some mimics that barely look like Monarch butterflies and other mimics that look more like Monarch butterflies.

And suppose there were no other tasty butterflies around.

Which butterflies, the ones that do not look like Monarch butterflies or the ones that look like Monarch butterflies, would birds most likely eat? Why?

The butterfly mimics that do NOT look like Monarch butterflies would most likely be eaten by the birds. The birds would think that they as tasty as the butterflies that are NOT mimics of Monarch butterflies.

How did predator birds help change how the Viceroy butterfly mimics the Monarch butterfly?

The butterflies that are better mimics of the Monarch butterfly are less likely to be eaten by predators such as birds. Therefore they have a better chance to survive and reproduce. Over time, there will be more Viceroy butterflies that mimic the Monarch butterfly perfectly.