

## Photo Description



A monarch butterfly caterpillar with yellow, black, and white stripes crawls on a rock. Next to it is an empty white shell that the caterpillar came out of when it grew bigger.

## Scientific Phenomena

This image captures the Anchoring Phenomenon of metamorphosis in action - specifically a monarch caterpillar that has just molted (shed its old skin). The white, translucent structure is the caterpillar's old exoskeleton that it outgrew and left behind. This molting process happens because caterpillars don't have internal skeletons like humans - they have hard outer coverings that can't stretch. As the caterpillar grows, it must periodically shed this outer layer and form a new, larger one underneath.

## Core Science Concepts

1. Life Cycles and Growth: Monarch caterpillars go through several molting stages before becoming butterflies, demonstrating how living things change as they grow.
2. Structure and Function: The caterpillar's striped pattern serves as a warning to predators that it is poisonous from eating milkweed plants.
3. Adaptation for Survival: Molting allows the caterpillar to continue growing despite having a rigid outer covering.
4. Observable Changes: Students can see direct evidence of growth and change in living organisms through the shed skin.

### Pedagogical Tip:

Have students compare this to how they outgrow their clothes - the caterpillar "outgrows" its skin and needs a new, bigger one!

### UDL Suggestions:

Provide tactile experiences by letting students handle snake skins or cicada shells to feel what molted exoskeletons are like, supporting kinesthetic learners.

## Zoom In / Zoom Out

1. Zoom In: At the cellular level, special hormones trigger the caterpillar's skin cells to separate from the old cuticle layer, allowing the new, soft skin underneath to harden after the old skin is shed.

2. Zoom Out: This molting process is part of the larger monarch migration system - caterpillars must grow quickly and efficiently to become butterflies that can travel thousands of miles to their wintering grounds.

### Discussion Questions

1. What do you think happened to make the caterpillar leave behind this white skin? (Bloom's: Analyze | DOK: 2)
2. How is a caterpillar shedding its skin similar to you outgrowing your shoes? (Bloom's: Apply | DOK: 2)
3. Why might it be important for caterpillars to be able to grow bigger? (Bloom's: Evaluate | DOK: 3)
4. What other animals do you know that change as they grow up? (Bloom's: Remember | DOK: 1)

### Potential Student Misconceptions

1. Misconception: The white shell is an egg or cocoon.  
Clarification: It's the caterpillar's old skin that was shed as it grew bigger.
2. Misconception: The caterpillar is hurt or sick because it lost its skin.  
Clarification: Molting is a healthy, normal process that allows the caterpillar to grow.
3. Misconception: All animals shed their skin like this.  
Clarification: Only animals with exoskeletons (like insects and spiders) molt their outer covering.

### NGSS Connections

Performance Expectation: 2-LS4-1 - Make observations of plants and animals to compare the diversity of life in different habitats.

Disciplinary Core Ideas:

- 2-LS4.A - Biological Evolution: Unity and Diversity
- K-LS1.A - Structure and Function

Crosscutting Concepts:

- Patterns
- Structure and Function

### Science Vocabulary

- \* Molting: When an animal sheds its old outer covering to grow bigger.
- \* Caterpillar: The larva stage of a butterfly that eats and grows before changing into a butterfly.
- \* Exoskeleton: A hard outer covering that protects an animal's body like armor.
- \* Life cycle: The different stages a living thing goes through as it grows and changes.
- \* Metamorphosis: The process of changing from one form to another, like caterpillar to butterfly.

### External Resources

Children's Books:

- From Caterpillar to Butterfly by Deborah Heiligman
- Waiting for Wings by Lois Ehlert
- The Very Hungry Caterpillar by Eric Carle

YouTube Videos:

- "Monarch Caterpillar Molting Time Lapse" - Shows actual footage of a caterpillar shedding its skin: <https://www.youtube.com/watch?v=LE2v3sUzTH4>
- "Butterfly Life Cycle for Kids" - Educational video explaining metamorphosis stages: <https://www.youtube.com/watch?v=75NQK-Sm1YY>