

## Photo Description



Two butterfly chrysalises hang from a building corner. One chrysalis is brown and appears empty with a clear window showing it has opened. The other chrysalis is bright green with small yellow spots and looks full, suggesting a butterfly is still developing inside.

## Scientific Phenomena

This image shows the metamorphosis anchoring phenomenon - specifically the pupal stage of butterfly development. The green chrysalis contains a developing butterfly undergoing complete transformation from caterpillar to adult. Inside, the caterpillar's body structures are breaking down and reorganizing into entirely new body parts like wings, antennae, and reproductive organs. The brown, empty chrysalis shows evidence that this amazing transformation has been completed and an adult butterfly has emerged.

## Core Science Concepts

1. Complete Metamorphosis: Butterflies undergo four distinct life stages - egg, larva (caterpillar), pupa (chrysalis), and adult butterfly
2. Life Cycle Patterns: All organisms have predictable life cycles that repeat generation after generation
3. Structural Adaptations: The hard chrysalis shell protects the developing butterfly during its vulnerable transformation period
4. Environmental Interactions: Butterflies choose specific locations like building overhangs to protect their chrysalises from weather and predators

### Pedagogical Tip:

Have students compare the two chrysalises in the photo and make predictions about what's happening inside each one. This develops their observation and inference skills while building excitement about the transformation process.

### UDL Suggestions:

Provide multiple ways for students to represent their understanding of metamorphosis - through drawings, clay models, dramatic play, or digital presentations. This supports diverse learning preferences and abilities.

## Zoom In / Zoom Out

1. Zoom In: Inside the green chrysalis, special cells called imaginal discs are rapidly dividing and growing to form new butterfly body parts. Digestive enzymes are breaking down caterpillar tissues to provide building materials for wings, legs, and other adult structures.

2. Zoom Out: These developing butterflies are part of larger ecosystem food webs as pollinators. When they emerge, they'll transfer pollen between flowers, helping plants reproduce and maintaining the health of gardens, forests, and agricultural systems across entire regions.

### Discussion Questions

1. What evidence can you observe that tells you these two chrysalises are at different stages? (Bloom's: Analyze | DOK: 2)
2. Why might butterflies choose to attach their chrysalises to human-made structures like buildings? (Bloom's: Evaluate | DOK: 3)
3. How does the butterfly's life cycle pattern compare to other animals you know about? (Bloom's: Compare | DOK: 2)
4. What would happen to the developing butterfly if the chrysalis was damaged during the transformation? (Bloom's: Predict | DOK: 3)

### Potential Student Misconceptions

1. Misconception: The caterpillar just grows wings and becomes a butterfly gradually  
Reality: The caterpillar's body completely breaks down and rebuilds into an entirely different form during the chrysalis stage
2. Misconception: The chrysalis is like a house the butterfly lives in temporarily  
Reality: The chrysalis IS the butterfly during its transformation stage - it's not a separate container
3. Misconception: All insects go through the same life cycle stages  
Reality: Some insects like grasshoppers have incomplete metamorphosis with only three stages (no pupal stage)

### Cross-Curricular Ideas

1. Mathematics - Measuring & Graphing: Have students measure the length and width of chrysalises using rulers or measuring tape, then create bar graphs comparing the sizes of different chrysalises in your classroom observation project. They could also calculate how many days it takes for a chrysalis to transform (typically 10-14 days for some species) and create timelines showing the butterfly life cycle.
2. English Language Arts - Narrative Writing: Students can write from the perspective of a caterpillar experiencing metamorphosis. "Dear Journal, Today I wrapped myself in my chrysalis. I wonder what will happen to me..." This creative writing helps students connect emotionally to the science while practicing descriptive language and sequencing events in order.
3. Art - Nature Sketching & Color Study: Students can create detailed observational drawings of the two chrysalises, focusing on the differences between the brown empty one and the green one with yellow spots. They could also paint or draw what they imagine is happening inside the green chrysalis, expressing the magical transformation artistically.
4. Social Studies - Local Ecosystems & Community Gardens: Research butterfly gardens in your local community or region. Students can learn about native plants that attract butterflies and discuss how communities can support pollinators. This connects to understanding how humans interact with and support natural systems in their neighborhoods.

### STEM Career Connection

1. **Entomologist (Insect Scientist):** An entomologist is a scientist who studies insects like butterflies, bees, and beetles. They observe how insects live, grow, and interact with plants and the environment. Some entomologists work in museums, universities, or nature centers helping people learn about insects. Others work to protect endangered butterfly species or study how insects help gardens grow. Average Salary: \$65,000 per year
2. **Butterfly Conservationist:** A butterfly conservationist works to protect butterfly habitats and populations, especially species that are disappearing. They might restore meadows and gardens, monitor butterfly populations in the wild, or breed butterflies in special facilities to help increase their numbers. This job combines science with outdoor work and environmental protection. Average Salary: \$58,000 per year
3. **Nature Photographer/Wildlife Documentarian:** Like the photographer who took this image, nature photographers capture amazing moments in the life cycles of animals like butterflies. They use cameras and scientific knowledge to document metamorphosis, create educational materials, and help people appreciate the natural world. Some work for nature centers, magazines, or create videos for television and online platforms. Average Salary: \$62,000 per year

### NGSS Connections

- Performance Expectation: 3-LS1-1 Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death
- Disciplinary Core Ideas: 3-LS1.B Growth and Development of Organisms
- Crosscutting Concepts: Patterns and Systems and System Models
- Science and Engineering Practices: Developing and Using Models, Analyzing and Interpreting Data

### Science Vocabulary

- \* **Chrysalis:** The hard protective casing where a caterpillar transforms into a butterfly
- \* **Metamorphosis:** The process of complete change from one life stage to another
- \* **Pupa:** The life stage when an insect is inside its chrysalis transforming
- \* **Life cycle:** The series of changes an organism goes through as it grows and develops
- \* **Emerge:** To come out of something, like a butterfly coming out of its chrysalis

### External Resources

Children's Books:

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