

## Photo Description



This rock has bright green moss growing all over it in thick, soft patches. The rock also shows different colors like pink, gray, and green in layers. The moss looks like a fuzzy green carpet covering most of the stone surface.

## Scientific Phenomena

The Anchoring Phenomenon this image represents is biological weathering and colonization of rock surfaces. Moss is breaking down the rock very slowly through both physical and chemical processes. The moss produces weak acids that dissolve minerals in the rock, while its tiny root-like structures (rhizoids) grow into small cracks and widen them over time. This demonstrates how living things can change Earth's surface materials and create conditions for other organisms to survive.

## Core Science Concepts

1. **Weathering Process:** Living things like moss can slowly break down rocks by producing acids and growing into cracks, changing the rock's surface over long periods of time.
2. **Habitat Creation:** Moss creates a mini-ecosystem on the rock surface, providing shelter and moisture for tiny insects, bacteria, and other small organisms.
3. **Rock Composition:** The different colored layers in the rock (pink, gray, green) show that rocks are made of different minerals and materials that formed over time.
4. **Life in Extreme Environments:** Moss can survive in places where many other plants cannot, like on bare rock with little soil or water.

### Pedagogical Tip:

Have students make observations using the "I notice, I wonder, It reminds me of" protocol before introducing scientific vocabulary. This builds their natural curiosity and connects to prior experiences.

### UDL Suggestions:

Provide magnifying glasses for students who need visual support, and encourage tactile exploration by having students feel different textures of rocks and moss samples (if available safely) to support multiple learning modalities.

## Zoom In / Zoom Out

1. Zoom In: At the microscopic level, moss doesn't have true roots but uses tiny thread-like structures called rhizoids to anchor to the rock. These structures release weak carbonic acid that slowly dissolves rock minerals, creating tiny particles that can eventually become soil.
2. Zoom Out: This weathering process happens across entire mountain ranges and landscapes, slowly breaking down mountains over millions of years and creating the soil that allows forests and other ecosystems to develop.

### Discussion Questions

1. What do you think would happen to this rock if the moss kept growing on it for 100 years? (Bloom's: Predict | DOK: 3)
2. How is the way moss gets what it needs to survive different from how a sunflower gets what it needs? (Bloom's: Compare | DOK: 2)
3. Why do you think moss can grow on rocks but grass cannot? (Bloom's: Analyze | DOK: 2)
4. What evidence do you see in the photo that shows this process has been happening for a long time? (Bloom's: Evaluate | DOK: 3)

### Potential Student Misconceptions

1. Misconception: "Moss is hurting or killing the rock."  
Clarification: Moss is not harming the rock intentionally - it's simply living and growing. The weathering process is very slow and natural.
2. Misconception: "Only water and wind can break down rocks."  
Clarification: Living things like plants, moss, and even bacteria can also break down rocks through biological weathering.
3. Misconception: "Moss needs soil to grow like other plants."  
Clarification: Moss can grow directly on rocks because it gets nutrients from rainwater and doesn't need deep roots like flowering plants.

### NGSS Connections

- Performance Expectation: 2-ESS1-1 - Use information from several sources to provide evidence that Earth events can occur quickly or slowly
- Disciplinary Core Ideas: 2-ESS1.C - Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe
- Crosscutting Concepts: Patterns - Patterns in the natural world can be observed and used as evidence
- Crosscutting Concepts: Cause and Effect - Events have causes that generate observable patterns

### Science Vocabulary

- \* Weathering: The slow process of breaking down rocks into smaller pieces over time.
- \* Moss: A small, soft green plant that can grow on rocks and trees without needing soil.
- \* Minerals: The different materials that rocks are made of, like tiny crystals of different colors.
- \* Ecosystem: A place where living and non-living things interact with each other.
- \* Erosion: When small pieces of weathered rock get moved to new places by wind or water.

## External Resources

### Children's Books:

- Rocks Hard, Soft, Smooth, and Rough by Natalie M. Rosinsky
- The Magic School Bus Inside the Earth by Joanna Cole
- National Geographic Readers: Rocks and Minerals by Kathleen Weidner Zoehfeld

### YouTube Videos:

- "Weathering and Erosion for Kids" - Simple explanation of how rocks break down over time with animated examples (<https://www.youtube.com/watch?v=2q8y3jNXYWs>)
- "All About Moss - Science for Kids" - Educational video showing different types of moss and where they grow (<https://www.youtube.com/watch?v=Xj8VqQSgTuE>)