

## Photo Description



This big rock is covered with green moss and white patches called lichen. The rock sits on the ground with brown leaves around it and some green grass nearby. You can see different colors and textures growing on the rock's surface.

## Scientific Phenomena

The Anchoring Phenomenon is biological weathering and colonization of rock surfaces by living organisms. Moss and lichen are slowly breaking down the rock by producing weak acids and physically expanding into tiny cracks. These pioneer organisms can survive in harsh conditions with little soil or water, making them some of the first living things to grow on bare rock surfaces. Over very long periods of time, these organisms help create soil by breaking down rock into smaller pieces.

## Core Science Concepts

1. Living vs. Non-living: The rock is non-living matter, while moss and lichen are living organisms that need water, air, and nutrients to survive.
2. Weathering: Living things can slowly change and break down rocks over time through biological processes.
3. Habitats: Different organisms can live in the same place (like on this rock) and have different needs for survival.
4. Change Over Time: Rocks and landscapes change slowly as plants and other living things interact with them.

### Pedagogical Tip:

Use a hand lens or magnifying glass to help students observe the different textures and colors on rocks. This makes the invisible world of moss and lichen more accessible and engaging for young learners.

### UDL Suggestions:

Provide multiple ways for students to explore this concept: tactile exploration of different rock samples, visual comparison charts of living vs. non-living features, and kinesthetic activities where students act out how moss spreads across rock surfaces.

## Zoom In / Zoom Out

1. Zoom In: At the microscopic level, lichen is actually two organisms living together - a fungus and algae. The fungus provides structure and collects water, while the algae makes food through photosynthesis. Moss has tiny root-like structures that grip onto the rock surface.

2. Zoom Out: This rock is part of a larger forest ecosystem where the breakdown of rocks helps create soil for larger plants and trees. The nutrients released from weathering rocks become part of food webs that support many different animals and plants throughout the forest.

### Discussion Questions

1. What evidence can you see that living things are growing on this rock? (Bloom's: Analyze | DOK: 2)
2. How do you think this rock might look different in 100 years? (Bloom's: Evaluate | DOK: 3)
3. What do you think the moss and lichen need to survive on this rock? (Bloom's: Apply | DOK: 2)
4. How is this rock's surface different from a brand new rock? (Bloom's: Compare | DOK: 2)

### Potential Student Misconceptions

1. Misconception: "Moss and lichen are just dirt or stains on the rock."

Clarification: Moss and lichen are living organisms that grow, need water and air, and can reproduce.

2. Misconception: "Rocks never change."

Clarification: Rocks change very slowly over long periods of time through weathering, erosion, and interaction with living things.

3. Misconception: "Only big plants can break rocks."

Clarification: Even tiny organisms like moss and lichen can slowly break down rocks through chemical and physical processes.

### Cross-Curricular Ideas

1. Math - Measurement & Patterns: Have students use rulers or measuring tapes to measure rocks with moss and compare them to smooth rocks. Create simple bar graphs showing "rocks with lots of moss" vs. "rocks with little moss." Students can look for patterns in where moss grows most (shady spots vs. sunny spots).

2. ELA - Descriptive Writing: Ask students to write or dictate sentences describing what the mossy rock looks, feels, and smells like using sensory words. Create a class "Rock Journal" where students draw and label the different colors and textures they observe. Read books about rocks and forests, then have students retell the story of how a bare rock becomes covered with moss over time.

3. Social Studies - Community & Change: Discuss how different living things in nature work together, just like people work together in communities. Compare how forests change slowly over time to how neighborhoods change. Take a nature walk around your school or neighborhood to find other examples of moss and lichen growing on different surfaces.

4. Art - Texture & Color Exploration: Create rubbings of mossy rocks using paper and crayons to capture the texture. Make a collage using natural materials (leaves, twigs, moss samples if available) to recreate the layers seen on the rock. Paint or draw rocks and use real moss or lichen as inspiration for color mixing (greens, whites, and grays).

### STEM Career Connection

1. Geologist: A geologist is a scientist who studies rocks and how they change over time. Geologists examine rocks, soil, and fossils to learn about Earth's history. They might visit forests like the one in this photo to study how weathering happens and how rocks break down. Average Salary: \$93,000/year

2. Ecologist: An ecologist is a scientist who studies plants, animals, and how they live together in nature. Ecologists might study moss and lichen to understand how forests grow and stay healthy. They work to protect natural areas and keep ecosystems balanced. Average Salary: \$67,000/year

3. Environmental Scientist: An environmental scientist works to protect nature and solve problems that affect plants, animals, and soil. They might study how moss and lichen help clean the air or how weathering creates new soil for plants to grow. They help keep forests and other habitats healthy for all living things. Average Salary: \$76,000/year

### 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.

### Science Vocabulary

- \* Moss: A small green plant that grows in damp places and doesn't have roots like bigger plants.
- \* Lichen: A living thing made of fungus and algae growing together on rocks and trees.
- \* Weathering: The slow process of rocks being broken down by water, wind, and living things.
- \* Habitat: The place where a plant or animal lives and gets everything it needs to survive.
- \* Organism: Any living thing, like plants, animals, or tiny life forms.

### External Resources

Children's Books:

- A Rock Can Be... by Laura Purdie Salas
- Rocks and Minerals by Rebecca Hirsch
- Who Grew My Soup? by Tom Darbyshire