Rock covered with Moss and Lichen

Earth & Space Science | Lesson Guide

Photo Description

This big rock sits in a forest. The rock has green moss growing on it. There are also white and gray spots on the rock. Brown leaves are on the ground around it.

Scientific Phenomena

This image shows biological weathering and succession - the process where living things like moss and lichen break down rocks over time while creating new habitats. The moss and lichen are pioneer species that can grow directly on bare rock surfaces. They produce weak acids that slowly dissolve minerals in the rock, creating tiny cracks and eventually soil. This is an anchoring phenomenon because it demonstrates how non-living things (rocks) and living things (plants) interact to change Earth's surface over long periods of time.

Core Science Concepts

1. Living and Non-living Interactions: Plants (moss) can grow on non-living things (rocks) and slowly change them over time.
2. Weathering: Rocks break down into smaller pieces through natural processes, including the actions of living things.
3. Habitat Creation: As rocks break down, they create soil where new plants can grow, making homes for animals.
4. Time and Change: Changes to Earth's surface happen very slowly, often taking many years to see differences.

Pedagogical Tip:

Use hand lenses or magnifying glasses to help students observe the different textures and colors on rocks. This builds observation skills and helps them notice details they might miss with just their eyes.

UDL Suggestions:

Provide tactile experiences by bringing in different rock samples with and without moss/lichen for students to safely touch and compare. This supports learners who benefit from hands-on exploration alongside visual observation.

Zoom In / Zoom Out

1. Zoom In: At the microscopic level, tiny root-like structures from moss and lichen penetrate rock cracks and release weak acids that dissolve rock minerals, creating chemical weathering at the cellular level.

2. Zoom Out: This rock is part of a larger forest ecosystem where weathering creates soil that supports trees, which provide habitat for animals and contribute to the water cycle through transpiration and root systems that prevent erosion.

Discussion Questions

1. What do you notice growing on this rock? (Bloom's: Remember | DOK: 1)
2. How do you think the moss got onto this rock? (Bloom's: Apply | DOK: 2)
3. What might this rock look like in 100 years if the moss keeps growing on it? (Bloom's: Evaluate | DOK: 3)
4. Why do you think some rocks have plants growing on them while others don't? (Bloom's: Analyze | DOK: 2)

Potential Student Misconceptions

1. Misconception: "Plants can't grow without soil."
   Clarification: Some plants like moss and lichen can grow directly on rocks and actually help make soil over time.

2. Misconception: "Rocks never change."
   Clarification: Rocks change very slowly through weathering, but the changes are so slow we usually can't see them happening.

3. Misconception: "Only big things like hammers can break rocks."
   Clarification: Tiny living things like moss can break down rocks too, just very slowly and gently.

Cross-Curricular Ideas

1. Math - Measurement & Counting: Students can collect different rocks and use non-standard measurements (like paper clips or blocks) to compare their sizes. They can also count how many patches of moss or lichen they see on a rock, practicing number recognition and basic data collection.

2. ELA - Descriptive Writing & Vocabulary: Students can use sensory words to describe rocks they've observed (rough, bumpy, smooth, wet, cool). They can dictate or write simple sentences like "The moss is green and soft" or create a class book titled "Our Rock Collection" with illustrations and labels.

3. Art - Nature Collage & Texture Exploration: Students can create collages using pictures of rocks, moss, and leaves, or make rubbings of rock textures with crayons and paper to explore different surface patterns. This helps them observe details while creating art.

4. Social Studies - Community Habitats: Students can investigate the habitats around their school or neighborhood, looking for rocks with moss or lichen growing on them. They can map or draw where they found these rocks and discuss how rocks and plants are part of their local community and environment.

STEM Career Connection

1. Geologist: A scientist who studies rocks and how they change over time. Geologists look at rocks all around the world to learn Earth's history and find useful materials like metals and gems. They use special tools and magnifying glasses to examine rocks carefully, just like we did with our moss-covered rock! Average Salary: $93,580 USD

2. Botanist (Plant Scientist): A scientist who studies plants of all kinds, including tiny plants like moss and lichen. Botanists learn how plants grow in different places—even on rocks!—and how they help other living things survive. They spend time outside observing plants and conducting experiments in laboratories. Average Salary: $68,140 USD

3. Environmental Scientist: A scientist who studies how living things and non-living things work together in nature. Environmental scientists learn about weathering, soil formation, and ecosystems to help protect forests and keep Earth healthy. They often work outdoors exploring forests like the one where we found this rock! Average Salary: $73,230 USD

NGSS Connections

- Performance Expectation: K-ESS2-2: Construct an argument supported by evidence for how plants and animals can change the environment to meet their needs.
- Disciplinary Core Ideas: K-ESS2.E - Plants and animals can change their environment
- Crosscutting Concepts: Cause and Effect - Events have causes that generate observable patterns

Science Vocabulary

* Moss: A small green plant that can grow on rocks and trees without soil
* Weathering: The slow breaking down of rocks into smaller pieces
* Lichen: A living thing made of fungus and algae that grows on rocks and bark
* Habitat: A place where plants and animals live and find what they need
* Pioneer: The first plants to grow in a new place where no plants lived before

External Resources

Children's Books:
- A Rock Is Lively by Dianna Hutts Aston
- Rocks: Hard, Soft, Smooth, and Rough by Natalie M. Rosinsky
- The Magic School Bus Inside the Earth by Joanna Cole