Rock covered with Moss and Lichen

3rd Grade

Earth & Space Science | Lesson Guide

Photo Description

This large rock is covered with green moss and light-colored patches called lichen. The rock sits on the forest floor surrounded by fallen leaves and grass. Over time, living things have made their home on the hard rock surface.

Scientific Phenomena

The Anchoring Phenomenon is biological weathering - the process where living organisms break down rocks over time. The moss and lichen growing on this rock are slowly breaking it apart through chemical processes. These organisms produce weak acids that dissolve minerals in the rock, creating small cracks and spaces where they can grow. This is a form of weathering that happens very slowly, taking many years to create visible changes.

Core Science Concepts

1. Weathering: Natural processes break down rocks into smaller pieces over long periods of time
2. Living vs. Non-living Interactions: Living things (moss, lichen) can change non-living things (rocks) in their environment
3. Habitat: Rocks can provide homes for small organisms like moss and lichen
4. Time and Change: Changes in nature happen over different time scales - some very slowly like rock weathering

Pedagogical Tip:

Use a hand lens or magnifying glass to help students observe the detailed textures of moss and lichen. This makes the invisible more visible and engages students in authentic scientific observation practices.

UDL Suggestions:

Provide multiple ways for students to document their observations: drawing, verbal descriptions, or taking photos. Some students may excel at artistic representation while others prefer written descriptions of what they observe.

Zoom In / Zoom Out

1. Zoom In: At the microscopic level, lichen is actually two organisms (fungus and algae) living together. The fungus produces acids that slowly dissolve rock minerals, creating tiny spaces for growth and releasing nutrients.

2. Zoom Out: This weathering process is part of the larger rock cycle where rocks are constantly being broken down and reformed. The small rock particles will eventually become soil that supports larger plants and entire forest ecosystems.

Discussion Questions

1. What evidence do you see that this rock has been changing over time? (Bloom's: Analyze | DOK: 2)
2. How might this rock look different in 100 years if the moss and lichen keep growing? (Bloom's: Predict | DOK: 3)
3. What other living things might be able to break down rocks? (Bloom's: Apply | DOK: 2)
4. Why do you think moss and lichen can grow on rocks but grass cannot? (Bloom's: Evaluate | DOK: 3)

Potential Student Misconceptions

1. Misconception: "Rocks never change because they are so hard and strong."
   Clarification: Rocks do change, but very slowly over long periods of time through weathering processes.

2. Misconception: "Only wind and water can break down rocks."
   Clarification: Living things like plants, moss, and lichen can also break down rocks through biological weathering.

3. Misconception: "Moss and lichen are the same thing."
   Clarification: Moss is a small plant, while lichen is actually two different organisms (fungus and algae) living together.

Cross-Curricular Ideas

1. Math - Measurement and Data: Students can use rulers or measuring tapes to measure the size of the rock and estimate how much it has changed. They could create a simple graph showing the different types of organisms (moss, lichen, bare rock) and their coverage percentages on the rock's surface.

2. ELA - Descriptive Writing: Have students write detailed descriptions of the rock using sensory words (rough, bumpy, damp, green). They could create a "day in the life" narrative from the perspective of a tiny moss plant growing on the rock, describing what it experiences over time.

3. Art - Texture and Observation Drawing: Students can create detailed pencil or charcoal drawings of the rock's surface, focusing on the different textures created by moss, lichen, and bare stone. They could also make rubbings by placing paper over the rock and rubbing with crayons to capture the texture patterns.

4. Social Studies - Community and Change: Discuss how the forest community depends on rocks breaking down into soil to support trees and plants. Students could explore how different landscapes (mountains, deserts, forests) are shaped by weathering over long periods of time, connecting to geography concepts.

STEM Career Connection

1. Geologist: A geologist is a scientist who studies rocks, minerals, and how Earth changes over time. Geologists examine rocks like this one to understand weathering, erosion, and how mountains and valleys form. They might visit forests to collect rock samples and observe how organisms affect rock breakdown. Average Annual Salary: $95,000

2. Ecologist: An ecologist is a scientist who studies how living things interact with their environment. Ecologists might study moss and lichen to understand how they help create soil and support forest ecosystems. They investigate how organisms like these plants change rocks and help forests grow. Average Annual Salary: $68,000

3. Environmental Scientist: An environmental scientist studies how nature works and how to protect it. They might research how weathering creates soil that prevents erosion and supports plant growth. These scientists help protect forests and understand the natural processes that keep our planet healthy. Average Annual Salary: $76,000

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

* Weathering: The process of breaking down rocks into smaller pieces
* Lichen: A living thing made of fungus and algae growing together
* Moss: A small, soft green plant that grows in damp places
* Organism: Any living thing, like plants, animals, or fungi
* Habitat: The place where a living thing makes its home
* Minerals: The natural materials that make up rocks

External Resources

Children's Books:
- Rocks and Minerals by Rebecca Hirsch
- A Rock Is Lively by Dianna Hutts Aston
- The Magic School Bus Inside the Earth by Joanna Cole