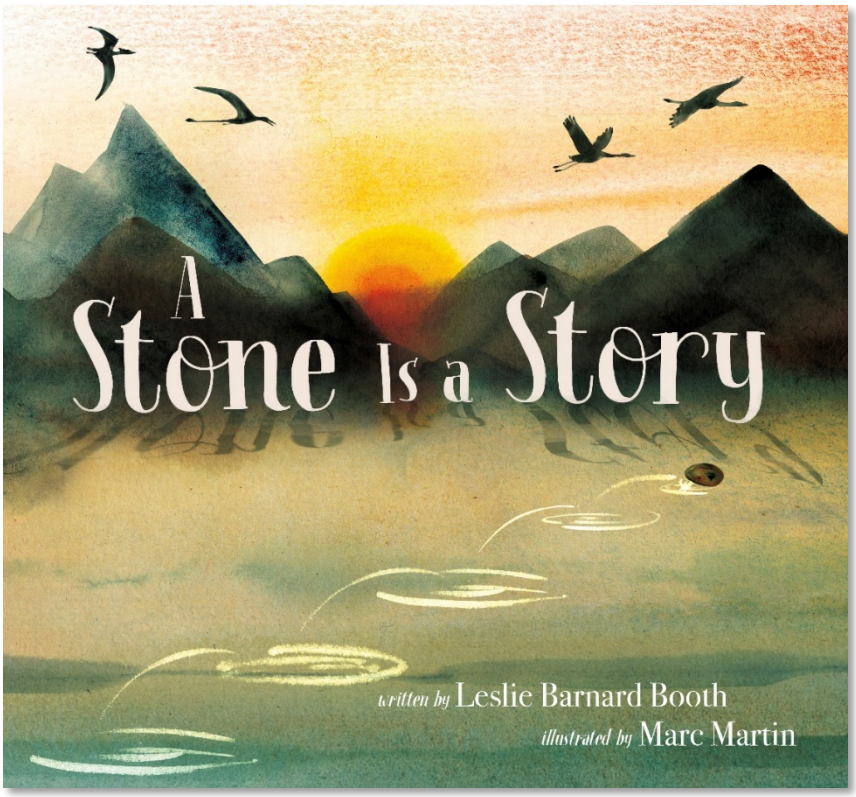
Grades 3 & 4

Mt. Everest Mystery – Fossils and Rock Layers

Educator Guide

to accompany the nonfiction picture book
A Stone Is a Story
written by Leslie Barnard Booth
illustrated by Marc Martin



Inside you will find the standards-based lesson **Mt. Everest Mystery – Fossils and Rock Layers**. This lesson focuses on Next Generation Science Standards and includes connections to reading, writing, and art. The core content can be covered in 1-2 sustained sessions or in shorter sessions throughout the week. Additional activities are provided for extended learning. All materials are meant to be adapted to your particular context; please pick and choose what is useful to you. This lesson targets third and forth grade standards, but it can be adapted for other grade levels. Printables can be found at the end of this guide and are also available separately at www.lesliebarnardbooth.com/resources-stone.

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BACKGROUND

About the book

Follow a stone's journey through time as it faces ice, water, wind, and scorching heat in this beautiful nonfiction picture book that is *Seeds Move!* meets *A Stone Sat Still*.

"Where do rocks come from?" The answer may be more incredible than you think! After all, a stone is not just a stone: a stone is a story. Embark on a journey across time to see how one stone can change and transform, from magma under Earth's crust, to the sand swept up by a rushing river, to the very heart of the tallest mountain. Watch what happens when rain, ice, and wind mold this rock into something new, something you might even hold in your hand—something full of endless possibility.

Complete with additional information about geology and the rock cycle, this lyrical and captivating story invites readers to experience the wonder of the natural world around us, and to see—in every cliff, pebble, and stone—a window into Earth's deep past.

Publisher: Margaret K. McElderry Books (October 3, 2023)
Length: 40 pages
ISBN13: 9781534496941
Grades: P - 3
Ages: 4 - 8

About the author

Photo Credit: Kristal Passy Photography

Leslie Barnard Booth grew up in the Pacific Northwest, among giant trees and rugged mountains. She attended Pomona College and later earned an MFA in creative writing and an MS in education from the University of Oregon. She lives in Portland, Oregon, and loves exploring the natural world with her family. *A Stone Is a Story* is her first picture book. Visit her at LeslieBarnardBooth.com.

About the illustrator

Marc Martin is an illustrator, artist, and book maker. He is the author and illustrator of *A River*, *Masters of Disguise*, *The Curious Explorers Illustrated Guide to Exotic Animals A to Z*, *Max*, and *Lots*, among others. Marc is based in Melbourne, Australia. You can learn more about his work at MarcMartin.com.

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LESSON: MT. EVEREST MYSTERY

Standards

Grade 3

3-LS4-1 Biological Evolution: Unity and Diversity
Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago. [Clarification Statement: Examples of fossils and environments could include marine fossils found on dry land, tropical plant fossils found in Arctic areas, and fossils of extinct organisms.] *[Assessment Boundary: Assessment does not include identification of specific fossils or present plants and animals. Assessment is limited to major fossil types and relative ages.]*
Practices: Analyzing and Interpreting Data
Analyze and interpret data to make sense of phenomena using logical reasoning, mathematics, and/or computation.
Disciplinary Core Ideas: LS4.A, Evidence of Common Ancestry and Diversity
• Some kinds of plants and animals that once lived on Earth are no longer found anywhere. • Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments.
Crosscutting Concept: Scale, Proportion, and Quantity
Natural objects and/or observable phenomena exist from the very small to the immensely large or from very short to very long time periods.

Grade 4

4-ESS1-1 Earth's Place in the Universe
Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time. [Clarification Statement: Examples of evidence from patterns could include rock layers with marine shell fossils above rock layers with plant fossils and no shells, indicating a change from land to water over time; and a canyon with different rock layers in the walls and a river in the bottom, indicating that over time a river cut through the rock.] *[Assessment Boundary: Assessment does not include specific knowledge of the mechanism of rock formation or memorization of specific rock formations and layers. Assessment is limited to relative time.]*
Practices: Constructing Explanations and Designing Solutions
Identify the evidence that supports particular points in an explanation.
Disciplinary Core Ideas: ESS1.C, The History of Planet Earth
• Local, regional, and global patterns of rock formations reveal changes over time due to Earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed.
Crosscutting Concept: Patterns
Patterns can be used as evidence to support an explanation.

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Materials

- ✓ Book: *A Stone Is a Story*
- ✓ Pencil and paper
- ✓ **Mt. Everest Mystery video**: Find it at www.lesliebarnardbooth.com/resources-stone.
- ✓ **Cliff Study printable**, 1 copy per group of 2-4 students
- ✓ **Cliff Study answer key** for teacher reference
- ✓ **Conference Questions printable**, 1 per student

Note: Find printables and answer key at the end of this guide. Extension activities may require additional materials.

Vocabulary

marine – of or related to the ocean

fossils – remains or imprints of ancient living things that have turned into rock

paleontologist – a scientist who studies fossil animals and plants

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Procedure

ENGAGE

Write on the board:

Mt. Everest Mystery: Why are there fossil seashells and other fossils of marine animals on top of Mount Everest, Earth's highest mountain?

Show **Mt. Everest Mystery video** (1 min, 11 seconds). Find it at www.lesliebarnardbooth.com/resources-stone.

Have students write a response on a sheet of paper. Tell them to keep this paper for now.

INTRODUCE

Say: *To help us solve this mystery, we're going to read an informational text together:* A Stone Is a Story *by Leslie Barnard Booth, illustrated by Marc Martin. As we read, think about what creatures you see and what their environment is like. How does the landscape and environment change over time?*

Read the book aloud to students.

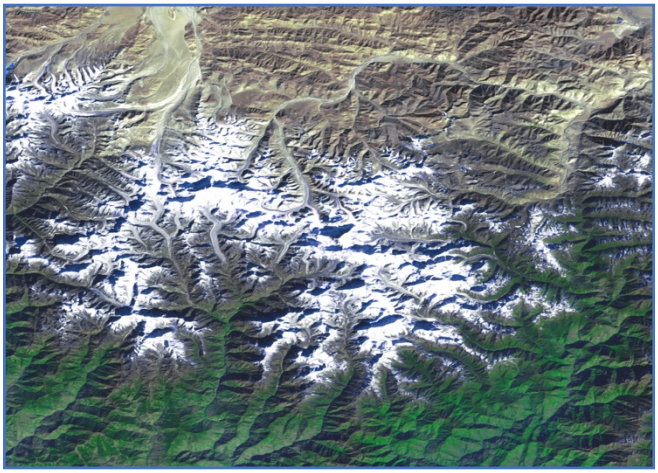

Photo Credit: NASA

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DISCUSS

After reading, ask students the following questions:

- *What was this book about? What is its main idea?* [Target answers: Rocks change over time and you can see traces of the past in rocks (pgs. 32-33).]
- *How did the environment and landscape in the book change over time?* [Target answers: First it was just a volcano with nothing growing, then there were trees and other plants and animals. There was an ocean. Later the ocean dried up and a mountain that rose up higher and higher. Then there was a city.]
- *How did the living things we saw in the book change over time?* [Target answers: There were no plants in the very beginning, then there were trees and other plants. Then there were sea creatures. Then dinosaurs, then mammals and humans.]
- *Did you see any fossils form in this book?* [Target answers: Yes, when the rock was just a piece of sand on the bottom of the ocean (pgs. 16-17) and "bits of… shell and bone" became "part of it."]

COMMON CORE STATE STANDARDS INITIATIVE
PREPARING AMERICA'S STUDENTS FOR COLLEGE & CAREER

Common Core Connections

RI.3.1	**RI.4.1**
Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.	Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
RI.3.2	**RI.4.2**
Determine the main idea of a text; recount key details and explain how they support the main idea.	Determine the main idea of a text and explain how it is supported by key details; summarize the text.

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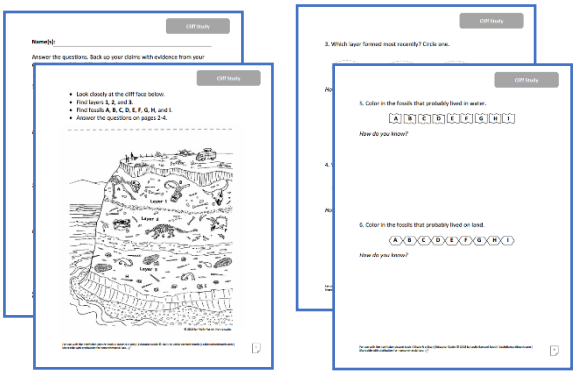
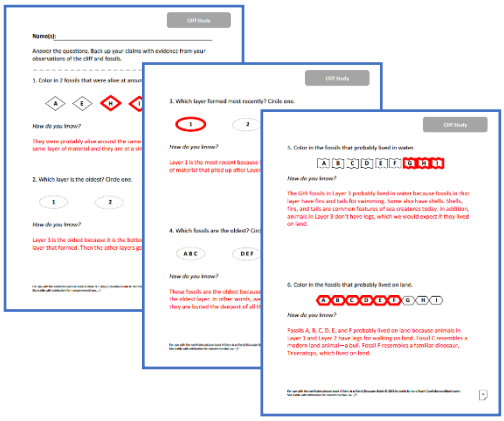
Tell students: *The events in this book took place over hundreds of millions of years. Over that long, long time, the environment changed a lot, and the kinds of creatures that lived on Earth changed a lot too. Now you are going to do what paleontologists do and look at some fossils and try to figure out what kind of environment those organisms lived in. Then we'll return to our Mt. Everest mystery and see if we can solve it.*

PRACTICE

Tell students: *You are paleontologists, scientists who study fossil animals and plants. You just found a cliff face full of fossils. Look at the cliff face. What patterns do you notice? Use evidence from what you see to answer the questions with your group.*

Divide students into groups of 2-4. Distribute 1 copy of **Cliff Study printable** to each group. The **Cliff Study answer key** is included for your reference.





As students work, walk around and ask them about their thinking. Ask them to give evidence that explains or supports their choices.

If students need more support, explain to them that sedimentary layers work like pancakes. If you've got a stack of pancakes, the **oldest** pancake is on the bottom of the stack, and the freshest, hottest, **newest** pancake is on the top.

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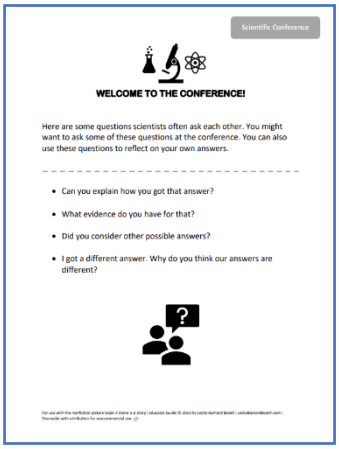
REFLECT

Scientific Conference



Explain that scientists often communicate their findings to other scientists at conferences. Tell students that you will be holding a scientific conference in their classroom today. As paleontologists, they will display the findings (their answers) from their **Cliff Study**. Then they will all get to walk around, look at each other's findings, and ask each other questions.

Say: *But what if, while you're walking around, looking at another scientist's findings, you realize you made a mistake and you want to change the answers on your Cliff Study. You can! That's part of the point of scientific conferences. When scientists talk to each other, they learn from each other.*

Have students display their **Cliff Study** worksheets with all answers complete. Hand out the **Scientific Conference printable**, one per student. Explain that this sheet shows examples of questions they might want to ask other scientists at the conference.

Now the conference begins! One group member from each group gets to walk around and view all the other groups' work for 5-10 minutes; then it's the next group members turn. The rest of the group stays with their work so they can discuss it with other students/paleontologists who may have questions or comments.

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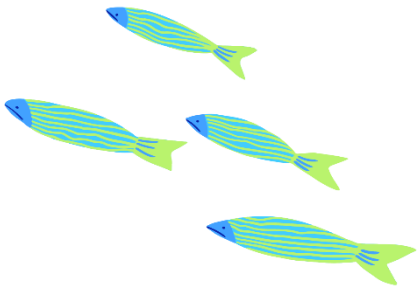
Afterward, give all groups an opportunity to reconsider their answers to the **Cliff Study** worksheet, change any answers they'd like, then turn it in.

RECONSIDER

Point to the Mt. Everest Mystery and read aloud again: *Why are there seashells and others fossils of marine animals on top of Mount Everest, Earth's highest mountain?*

Ask for possible answers. Discuss as a class. Have students get out their earlier answers to the Mt. Everest Mystery Question. Give them time to revise their answers, then ask them to turn in their work.

[Target answer: The environment has changed. A long time ago the top of Mount Everest was an ocean floor; that's why there are marine fossils there.]



Additional information you may choose to share with students: Mount Everest formed when tectonic plates rammed into each other, sending material upward. That's how rock that used to be an ocean floor rose up so high and is now a mountain—see p. 37 of *A Stone Is a Story* for more details on this process.

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EXTENSION ACTIVITY

Art Connection: Mason Jar Stratigraphy

Stratigraphy is the analysis of the order and position of buried fossils or archaeological remains. Explore stratigraphy by creating sedimentary layers in a mason jar and embedding them with fossils.

First, gather at least 3 different types of sediment for your sedimentary layers. You can purchase colorful craft sand or you can use materials you already have around the house like sand, sugar, rice, coffee grounds, lentils, or any other sediment-like material.

Now, with your students, brainstorm how to represent the following fossil groups using everyday objects: **early sea life** (like that shown on p. 16-17 of *A Stone Is a Story*); **dinosaurs** (p. 20-23); and **mammals** (p. 24-25). Page back through *A Stone Is a Story* to look closely at these creatures. Gather materials to represent them. You can use small objects such as beads, dried pasta, bottle caps, or plastic figures.

Once you have your materials, label your fossil types: **early sea life**, **dinosaurs**, and **mammals**. Talk to students about which of these fossil types is the oldest. Encourage students to refer to *A Stone Is a Story* for clues. Discuss which fossils should be in the first layer of sediment, which in the next, and which in the layer closest to the surface. (Remember, the deeper you dig, the older the fossils. Early sea life is the bottom layer, the middle layer is dinosaurs, and the top layer is mammals.)

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Assemble your sedimentary rock! First, pour about half of the first type of sediment into the jar. Explain that this sediment is being transported here over time by wind, water, gravity, and moving ice. Then drop in the early sea life fossils. Explain that animals living at this time eventually die and leave their remains behind. Add the rest of the first type of sediment to complete the layer.

Repeat with each layer. Explain that the pressure of all these layers packs the sediment down, turning it into rock. Some of the remains left behind also turn to rock (i.e., they become fossils). Learn more about this process in the backmatter of *A Stone Is a Story* (p. 36-37).

Once you're through, ask students:

- How might these buried fossils become exposed?
- If someone were to dig down through these layers, which fossils would they find first?
- Which would they find last?
- Explain that all models show some aspects of a process or phenomenon while hiding other aspects. Ask students what this model shows and what it does not show about the formation of sedimentary rock and the fossils within it. Brainstorm other ways to model this process.

More activities available at: www.lesliebarnardbooth.com/foreducators

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