

ENVIRONMENTAL ATLAS OF ABU DHABI EMIRATE

Lesson Plan: Sedimentation

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Lesson Plan Content:

This lesson plan and slide presentation is to be used in conjunction with:

- 1 x sedimentation teacher briefing
- 1 x sedimentation teacher fact sheet
- 1 x sedimentation class work sheet

Lesson Overview:

Students will gain an understanding of sedimentation, sedimentary rocks and fossils.

Estimated Time Requirement:

One 60 minute session.

Learning Objectives:

Students will be able to:

- > understand the sedimentation process
- > understand the formation of sedimentary rocks
- > understand the formation of fossils
- > create their own sedimentation bottle

Skills:

This lesson plan can aid students to demonstrate:

- > Classifying skills
- > Communicating skills

> Observing skills

Preparation prior to the lesson:

Before commencing the lesson, download and read through the teacher briefing, fact sheet, work sheet and this presentation so you are fully conversant with the content and key terms. Also, ensure that the work sheet activity is possible to undertake in your classroom environment.

Lesson Sequence:

Here is a sequence of the lesson with suggested timings:

Preparation (5mins)

Inform the students that today they are all going to learn about sedimentation and fossils and take part in some fun activity. Elicit from the students some of the things they already know about fossils.

Presentation (25mins)

Using a projector to present to the class, progressively run through the slides to impart all the key points about sedimentation.

Activity (25mins)

Having completed the presentation, undertake the participation and discussion

exercise contained in the work sheet. This activity enables students to discover in a hands on manner, the process of sedimentation.

Assessment (5mins)

Ask students to write and/or illustrate what they did during this lesson and what they learned from their participation in the activity.

Close of Lesson

Closure: Ensure each group has completed the practical session and labelled their bottles with their names and they are left safely for view of sediment settling in 1 week's time.

Extending the Lesson: Encourage students to do some research at homes on sedimentary rocks and how people have used them as a resource.

Source of Lesson:

Abu Dhabi Global Environmental Data Initiative.

All supporting material can be downloaded freely at: www.environmentalatlas.ae

Classroom Presentation: Sedimentation

What is sediment?

It is matter that is carried by water or wind and deposited on the surface of the land or the seabed and may in time become consolidated into rock.



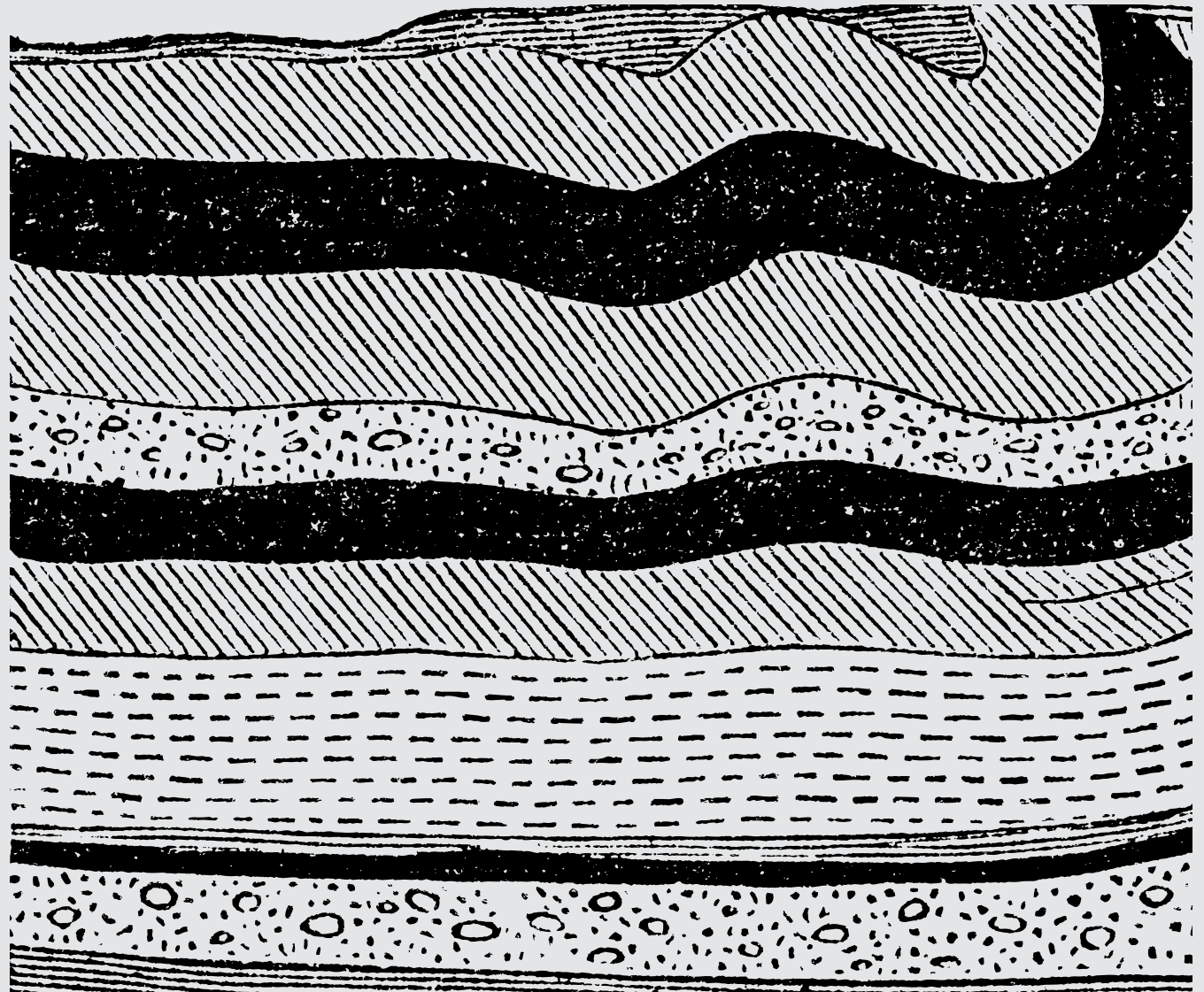
What is sedimentation?

Sedimentation usually happens in low-lying areas such as oceans, where successive layers of sediment gradually gathers little by little.



What is sedimentation?

These layers start from sands carried by rivers or blown by the wind, mud and marine sands and the remnants of dead organisms such as molluscs.

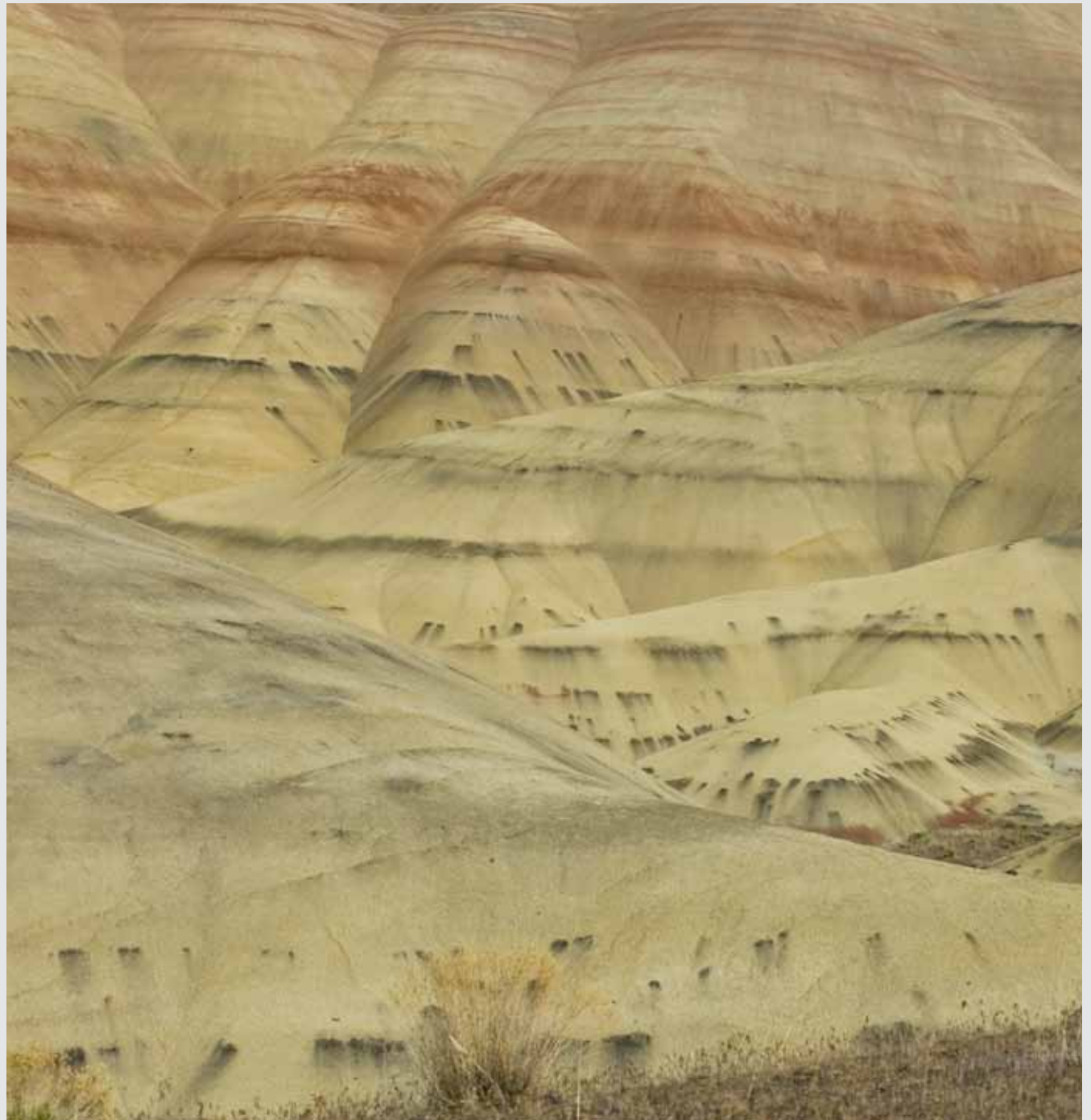


What is sedimentation?

As their thickness increases, the layers (strata) are compressed by the overlying weight.

This crushing and the presence of mineral fluids cements the sediments to form rocks.

These rocks record the detailed environmental history of where they were deposited.



What is sedimentation?

This process affecting the Earth's surface produces only small changes in the landscape during a person's lifetime, but over a period of tens of thousands or millions of years, the effect of these processes is really big.



What is sedimentation?

Given enough time, the erosive power of things like the wind, rainwater and water movement can reduce an entire mountain range to a featureless lowland.



What is sedimentation?

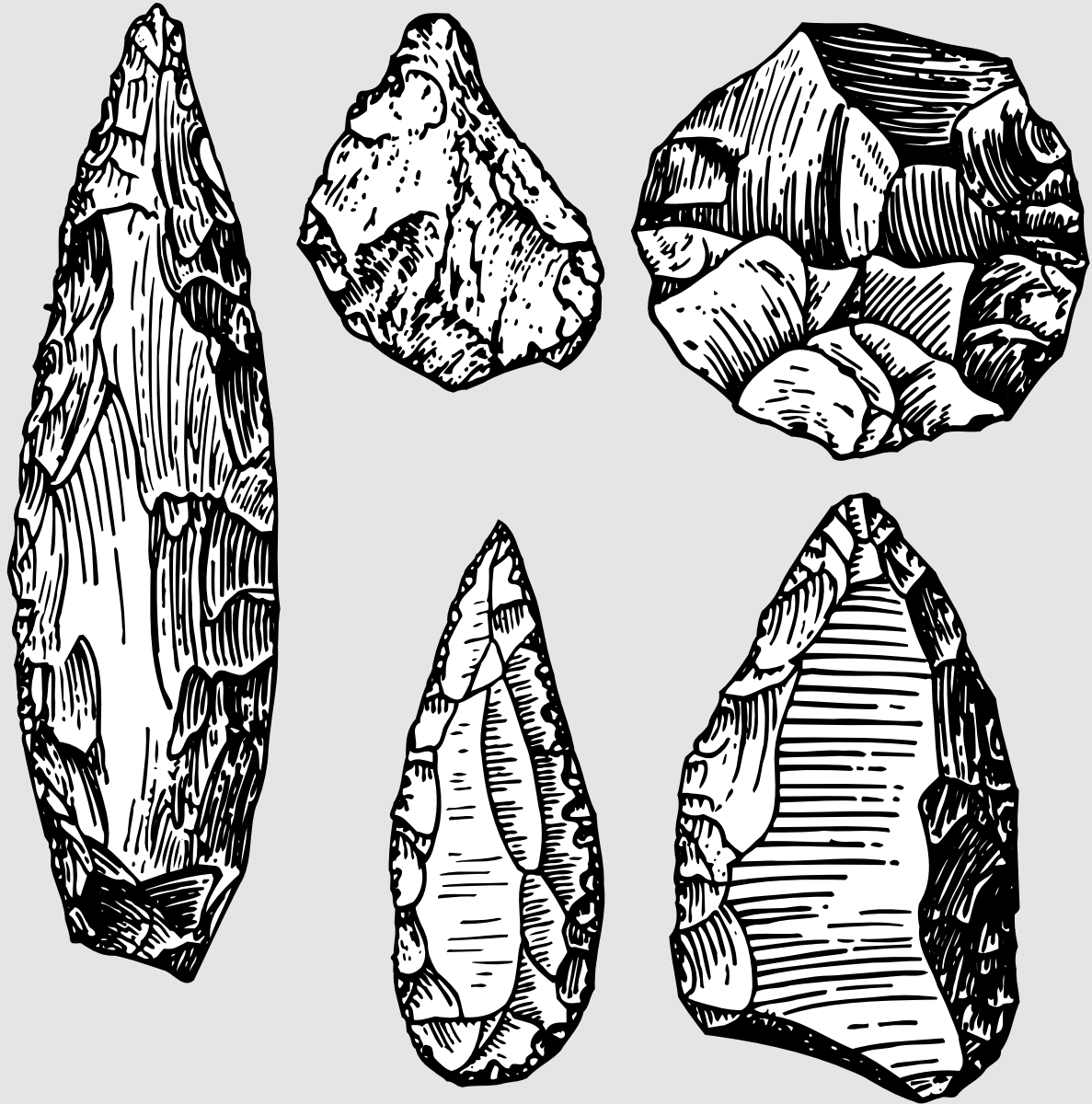
In the process, the eroded debris is transported by rivers and deposited as new layers of sedimentary rock.

A series of sedimentary rock layers may be thousands of metres thick.



Sedimentary Rocks

Sedimentary rocks have been an important feature in the development of industry, society and culture.



Sedimentary Rocks

People have used materials from sedimentary rocks since the Neolithic Age; flint and chert played an important role in the development of tools, arrowheads, and axes.



Sedimentary Rocks

The sedimentation process has also contributed to the formation of the many oil and gas deposits across our region.



What are sedimentary rocks made of?

Sedimentary rocks can be made of a number of substances:

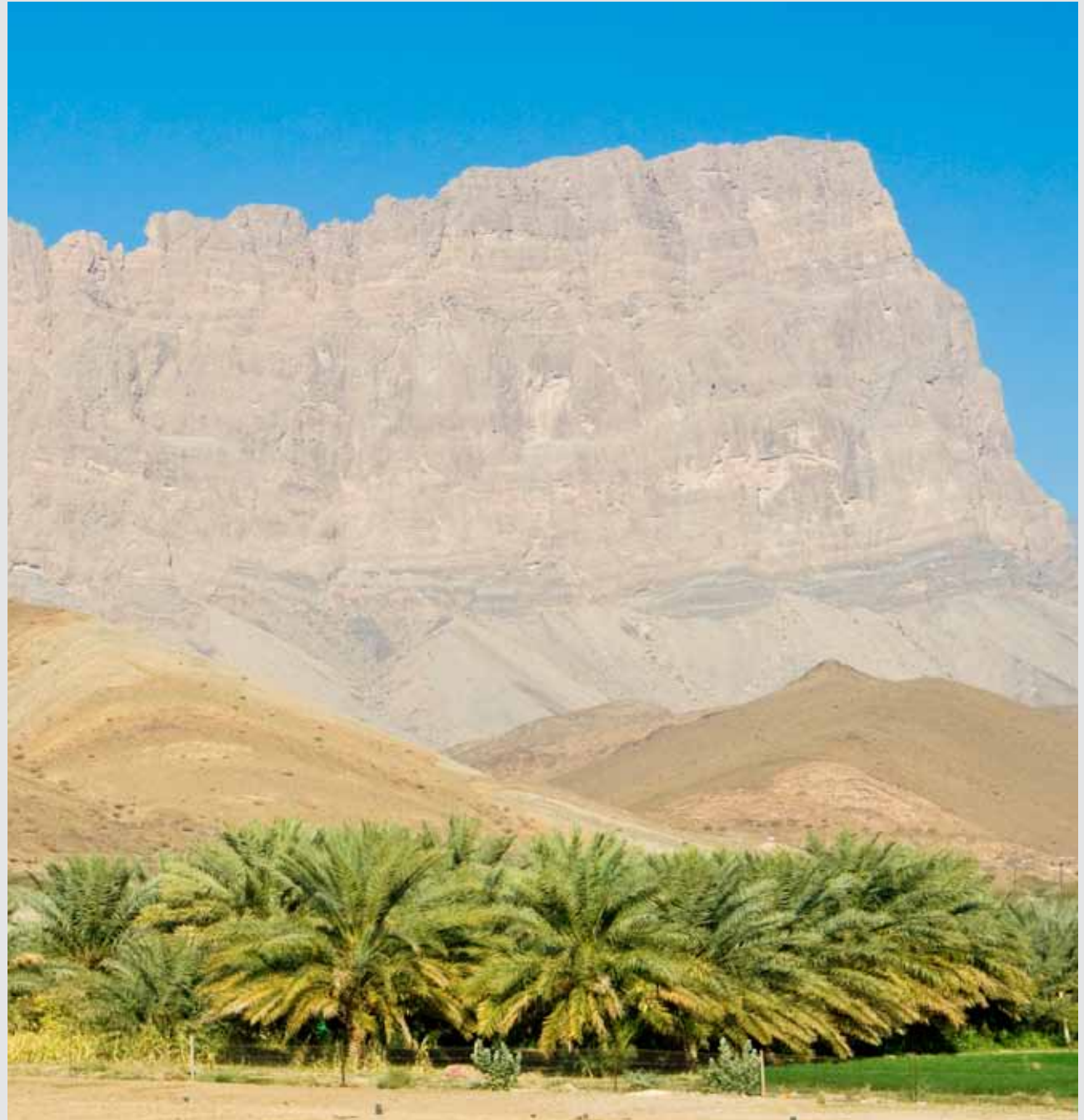
1. Pieces of other rocks and minerals, such as gravel in a river channel, sand on a beach, or mud in the ocean.
2. Minerals such as salt in a saline lake or gypsum in a shallow sea.
3. Organic materials such as remains of living things.



Why are Sedimentary Rocks Important?

They preserve a record of ancient landscapes, climates and mountain ranges as well as the history of the erosion of our region.

Many fossils are found in sedimentary rocks younger than 600 million years and provide evidence of the evolution of life through time.

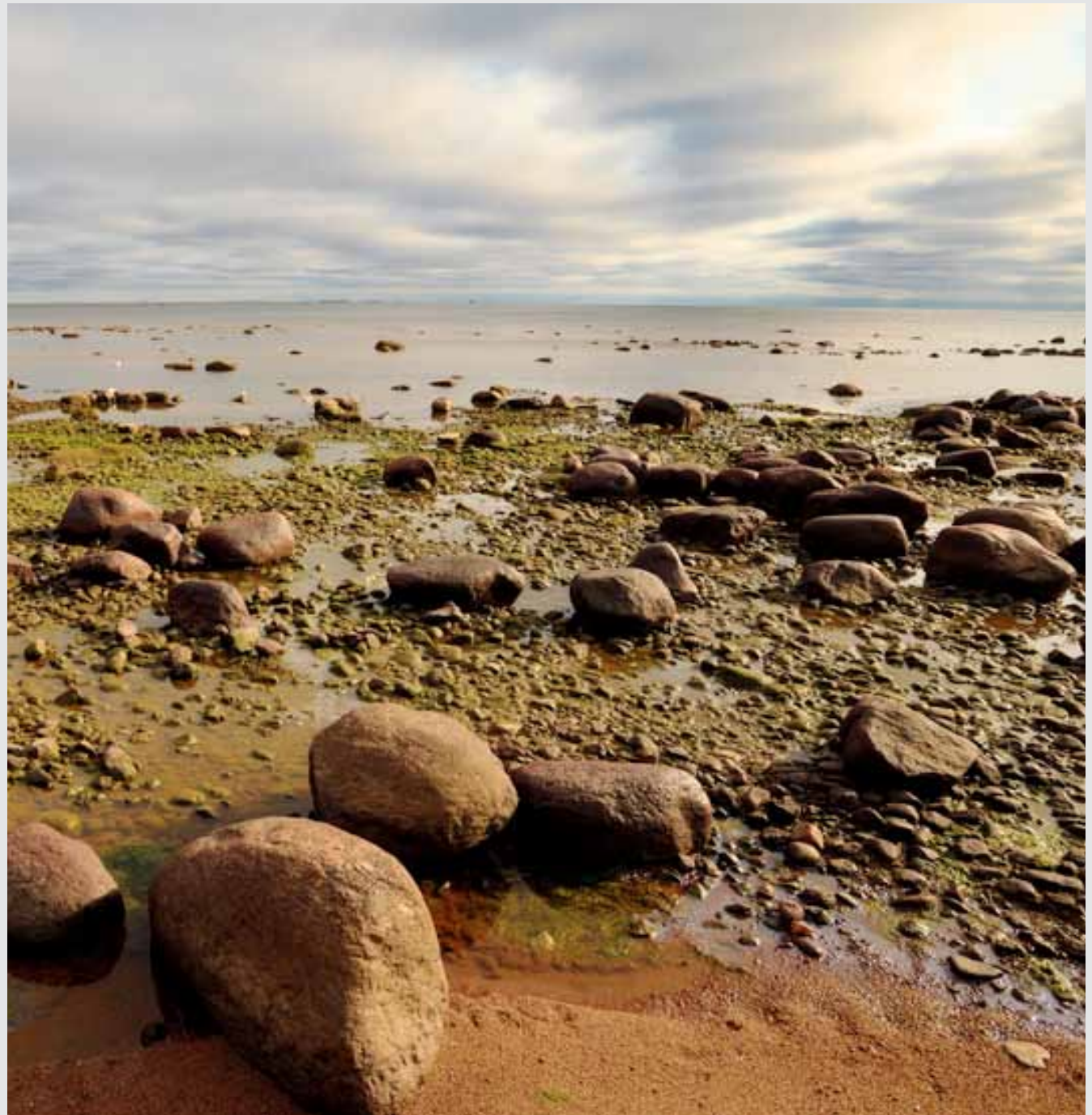


The Sedimentation Process

Step 1 - Weathering

This is the interaction between the weather and the rocks exposed at Earth's surface.

The weather can break down the rock and it is the first step in making sedimentary rock.

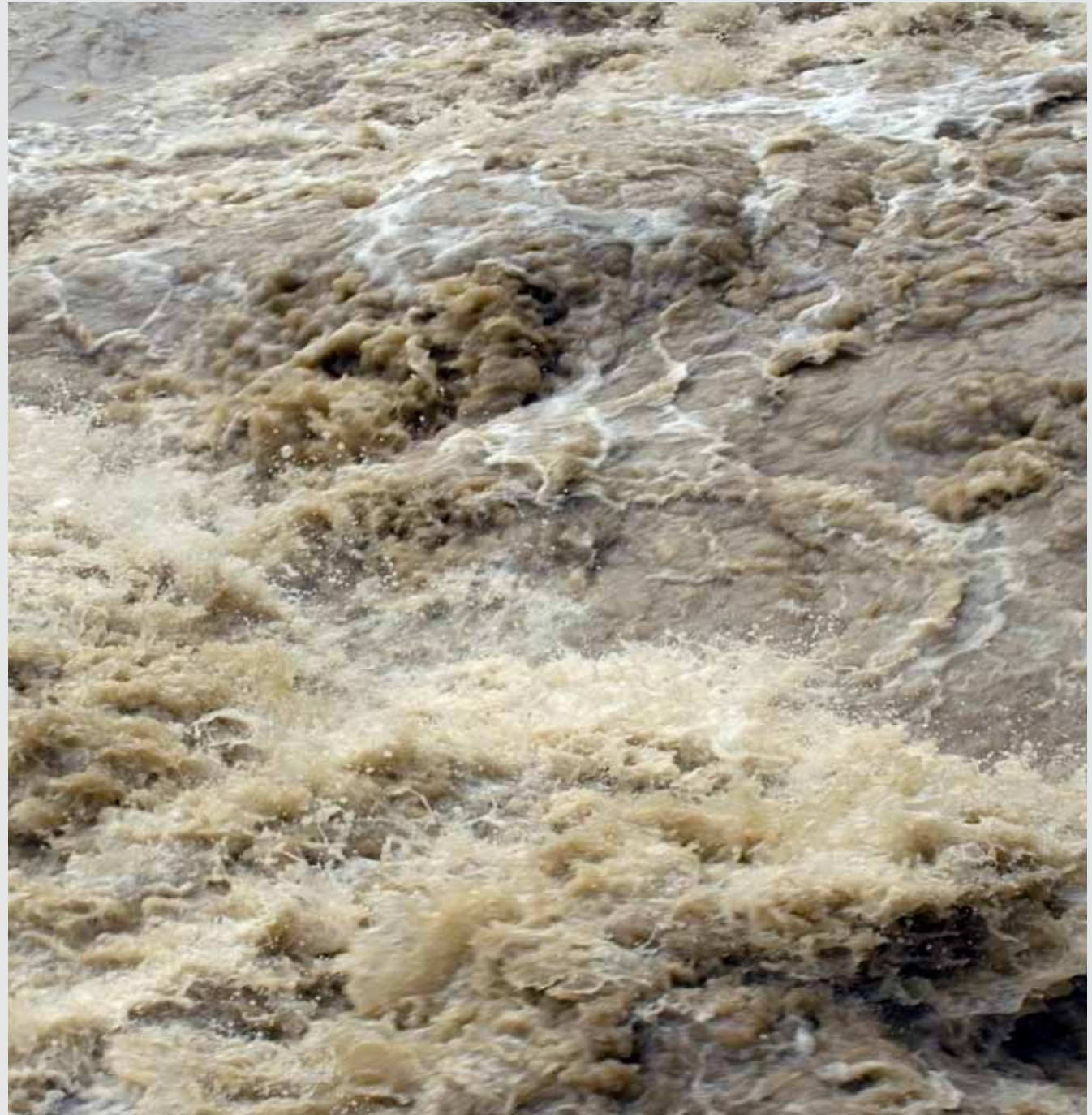


The Sedimentation Process

Step 2 - Travel

Running water is the most effective form of moving sediment.

All rivers carry large quantities of sediment toward the sea.



The Sedimentation Process

Step 3 - Deposition

One of the most important factors in the formation of sedimentary rocks is the place where the sediment is left to settle.

Scientists call this process deposition.

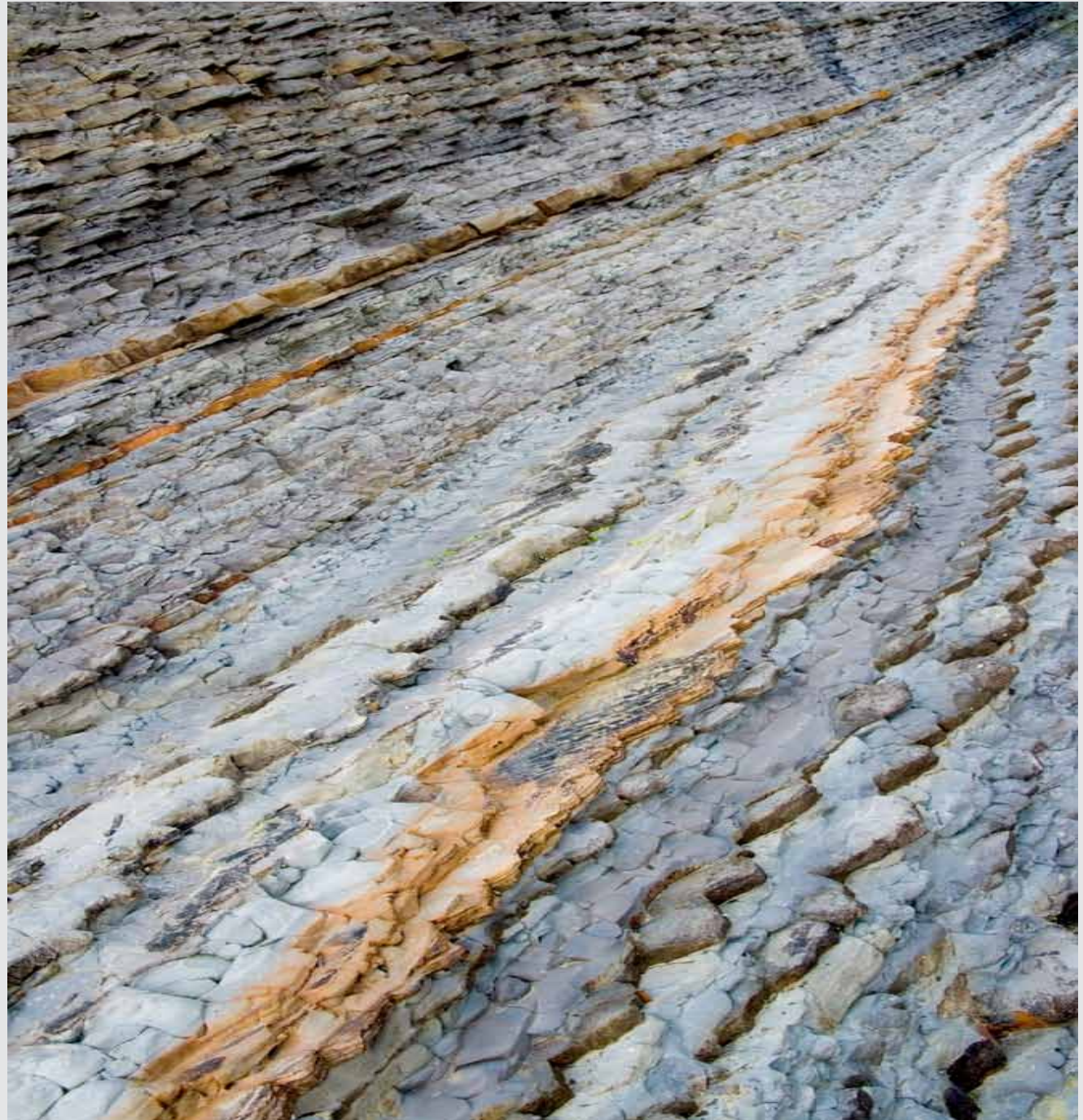


The Sedimentation Process

Step 4 - Compaction & Cementation

Compaction happens when the weight of overlying material, which continually gathers in a sedimentary environment, squeezes the sediment buried beneath into a tight solid.

Cementation happens when minerals such as calcite and quartz, carried by water, seep through small holes in the layers and makes all the pieces hold together.



Fossils

People have found fossils of leaves, seeds, and cones of plants that lived millions of years ago, as well as fossil bones, shells, claws, teeth, and even whole skeletons.

People have also discovered fossil footprints, eggs, nests, and droppings, which give insight into how living things moved or behaved.



Fossils

Fossils can form in different ways, but some fossils form when a living thing dies and gets buried. Over time, the soft parts get eaten by bacteria or other organisms.

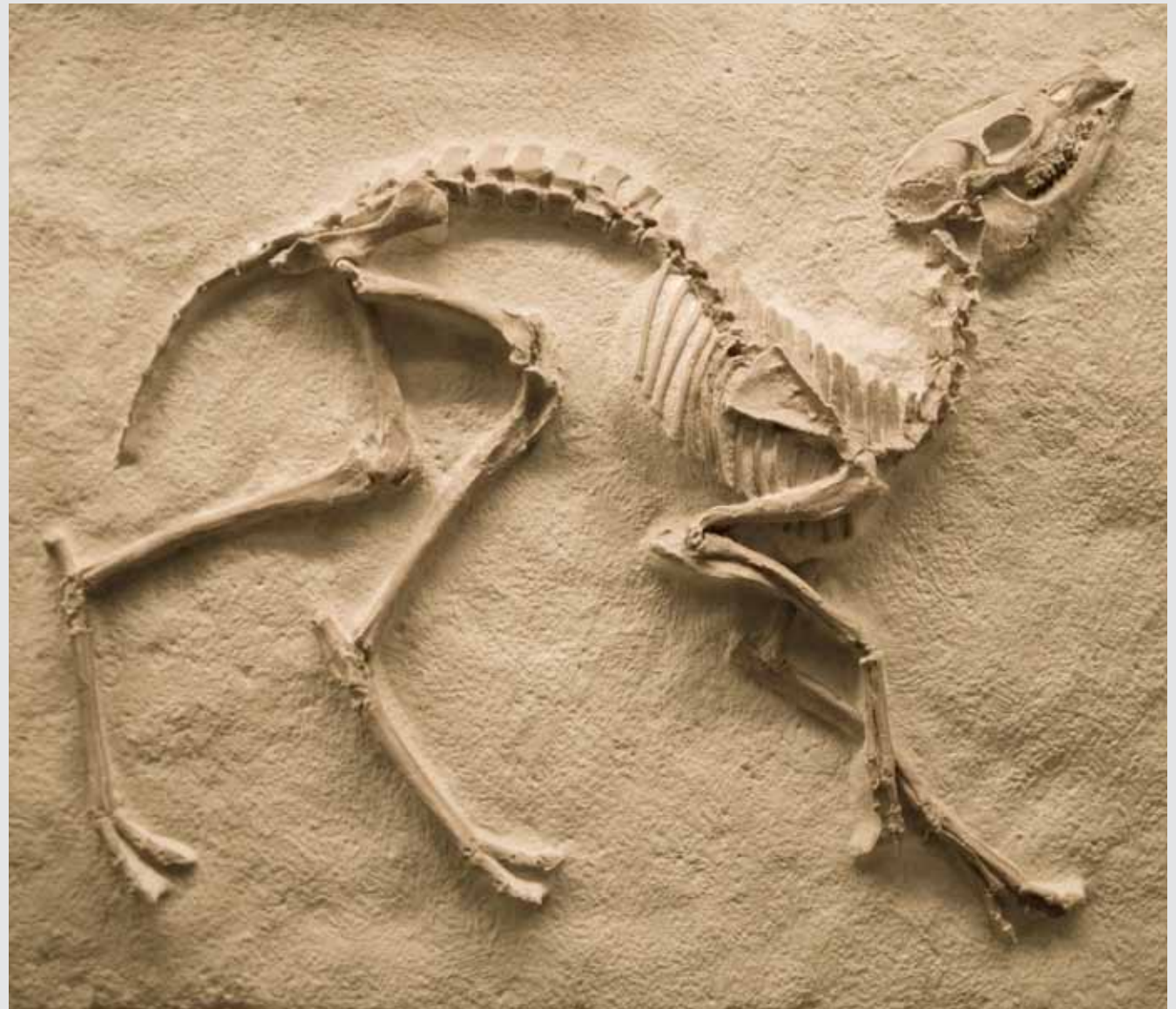


Fossils

The soft parts break down, and the hard parts, such as shells, teeth, bones, or claws, are left behind.

Over millions of years, layers of sediment pile on top of these remnants, creating pressure, which helps turn the lower layers into rock.

Water can seep into the area and bring in minerals that slowly replace the hard parts and create a slow chemical change that turns the hard parts into a fossil.



Fossils

Slowly, erosion causes the top layers to wear away and the fossil can be found.

Many fossils are found in riverbeds or on cliff sides, where water has eroded an area for thousands of years



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