

# WHERE DO ROCKS COME FROM?

**W**here do rocks come from? This question keeps geologists busy. Even though they don't have all the answers, they know a lot about where rocks come from.

There are three big groups of rocks. All the rocks in a group have similar origins. The three groups are *igneous*, *sedimentary*, and *metamorphic*.

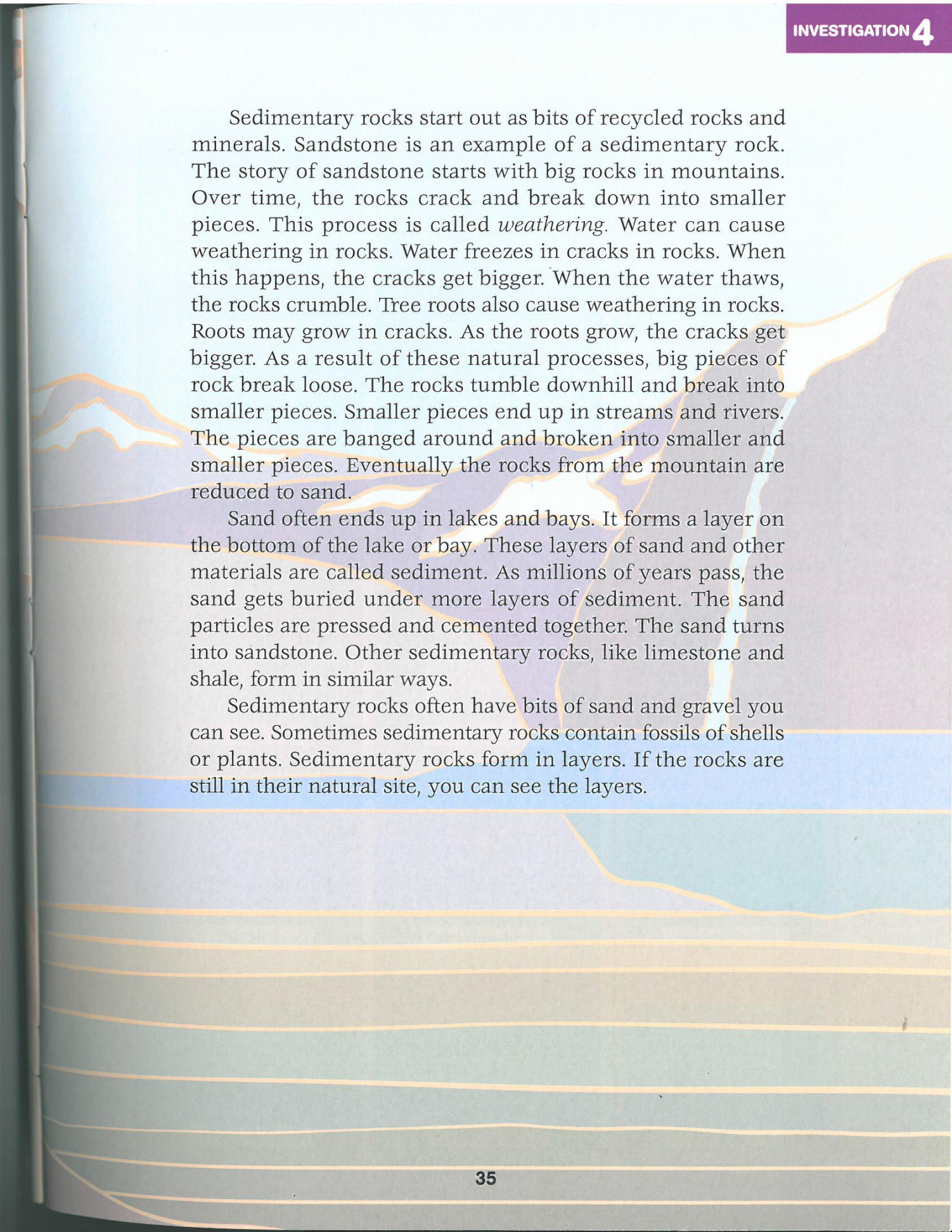
Igneous rocks start out as melted rock deep under the surface of the Earth. Sometimes the melted rock comes to the surface in volcanoes. It pours out as lava. When the lava cools and hardens, it forms new rocks.

Other times the melted rock slowly cools and hardens below the surface. Earthquakes and other changes in the Earth's surface might bring these igneous rocks to the surface years later.

Igneous rocks can be crystalline or glassy. Granite is an example of an igneous rock. If you look at a granite sample with a hand lens, you can see the crystals of quartz, feldspar, and mica.

Obsidian is also an igneous rock. Obsidian is smooth and shiny, but has no crystals.



The background of the page features a stylized illustration. At the top, there are purple and blue mountain peaks. A river flows from the mountains down towards the bottom of the page. The lower half of the page is filled with horizontal, wavy bands of various colors including shades of blue, green, yellow, and brown, representing different layers of sedimentary rock.

Sedimentary rocks start out as bits of recycled rocks and minerals. Sandstone is an example of a sedimentary rock. The story of sandstone starts with big rocks in mountains. Over time, the rocks crack and break down into smaller pieces. This process is called *weathering*. Water can cause weathering in rocks. Water freezes in cracks in rocks. When this happens, the cracks get bigger. When the water thaws, the rocks crumble. Tree roots also cause weathering in rocks. Roots may grow in cracks. As the roots grow, the cracks get bigger. As a result of these natural processes, big pieces of rock break loose. The rocks tumble downhill and break into smaller pieces. Smaller pieces end up in streams and rivers. The pieces are banged around and broken into smaller and smaller pieces. Eventually the rocks from the mountain are reduced to sand.

Sand often ends up in lakes and bays. It forms a layer on the bottom of the lake or bay. These layers of sand and other materials are called sediment. As millions of years pass, the sand gets buried under more layers of sediment. The sand particles are pressed and cemented together. The sand turns into sandstone. Other sedimentary rocks, like limestone and shale, form in similar ways.

Sedimentary rocks often have bits of sand and gravel you can see. Sometimes sedimentary rocks contain fossils of shells or plants. Sedimentary rocks form in layers. If the rocks are still in their natural site, you can see the layers.



#### INVESTIGATION 4

Metamorphic rocks start out as masses of other rocks. They can be igneous, sedimentary, or even other metamorphic rocks. These rocks can change because of heat and pressure. Heat and pressure can come from different sources. The source might be a volcano or an earthquake. The heat and pressure change the rocks into another kind of rock.

Heat and pressure can turn sandstone into quartzite. They can turn limestone into marble. They can turn shale into slate. Look closely at a metamorphic rock. Sometimes you can see the crystals that formed when the metamorphic rock cooled.

The chart on the next page shows how to sort the five rocks you used in your investigations. It includes pictures of three more igneous, sedimentary, and metamorphic rocks.