Chapter 6: Earth's Building Blocks

THE BIG QUESTION: How can changes in rocks over time be explained by the rock cycle?

Rocks are all around you! They are in the mountains, hills, and cliffs, and they are also under the ground. Rocks can be small and smooth like pebbles in a stream, or they can be chunky bits that make up the gravel on the road. Rocks are used to make sidewalks, streets, and even buildings. Sometimes, artists carve rocks into beautiful sculptures, and people wear shiny rocks as jewelry.



Mount Rushmore designed by Gutzon Borglum and Lincoln Borglum was completed in 1941 in South Dakota, USA.

Rocks and Building Blocks

Rocks are special things! They are made of hard, non living stuff called minerals. Rocks can be made of one mineral or a mix of different minerals. Minerals come in different sizes and can make rocks feel smooth or rough.

Imagine walking up a big hill and finding different rocks. They can be different colors and feel different, too. Some may have stripes or layers, and some are hard while others break apart easily. Some have little grains, and others have big grains that sparkle in the light. Even though all the rocks look different, scientists group them into three types: igneous, sedimentary, and metamorphic.



Born from Magma: Igneous Rock

Igneous rocks are very common on Earth. They are formed when hot liquid rock cools down and becomes solid. When you think of igneous rocks, think of volcanoes.

There are two main kinds of igneous rocks. One type is formed when hot liquid rock, called lava, comes out onto the Earth's surface. The lava cools down and becomes hard like a rock. The faster it cools, the smaller the bits in the rock. Obsidian is a very smooth and shiny rock that formed when the lava cooled down very quickly. It's so smooth and shiny that it's sometimes called volcanic glass. Another type of rock, basalt, is formed from lava that took longer to cool. Basalt is usually a dark-colored rock with small bits that give it a smooth texture.

Some rocks are formed from melted rock. This happens underground. When the melted rock cools slowly, it forms a type of rock called granite. Granite has big mineral grains that we can see without any help.

The Art of Making Stone Tools

Long ago, people used rocks to make tools. In East Africa, scientists found obsidian stone tools that are almost two million years old. People in ancient times really liked obsidian. It breaks into pieces with sharp edges that are good for cutting and poking.



Ancient tool makers made very sharp cutting tools by striking a block of obsidian with another, harder rock. This made a long, thin obsidian blade flake off. The blade was fragile, but it had incredibly sharp edges. The edges of obsidian blades are much sharper than the metal scalpels used by surgeons today. The tool makers used a flat piece of obsidian. They hit off tiny flakes of rock from the edges to shape it into a sharp and strong pointed tool.

Layer after Layer: Sedimentary Rock

Sedimentary rock is a type of rock that forms from tiny bits of rock and sand, as well as pieces of once-living things. These bits collect in low areas on land and in water, and then they pile up on top of each other. After a long time, the weight of the layers squeezes the bits closer together. They also stick



together as minerals fill the spaces between them. As the bits dry, the minerals turn into solids, holding the bits together. This process changes the bits into rock over time.

Most sedimentary rocks can easily break. When you hit a sedimentary rock with a hammer, it crumbles or breaks apart. Some sedimentary rocks have fossils. Limestone is a sedimentary rock that often has the remains of small ocean creatures. Some sedimentary rocks, like

sandstone, come from sand, and others, like mudstone, come from ancient mud.

Changing Form: Metamorphic Rock

Metamorphic rocks are special. They form when other rocks get very hot and squished. The heat and pressure change the rocks' minerals. The minerals may get flat or move around to make stripes or layers. Sometimes, they even become totally new minerals!

Remember the rock called granite? When granite gets really hot and has a lot of pressure on it, it changes into a new kind of rock called gneiss. When the rock limestone is squished and heated deep below the ground, it becomes a new rock called marble.

Metamorphic rocks are formed deep inside the Earth. They are created when the rocks deep within the Earth get very hot and are pressed by other rocks. The pressure and heat come from the hot, melted rock called magma. Metamorphic rocks form when the Earth's plates move or when the hot magma moves through cracks in the Earth's surface. If the rock is changed by the heat, it becomes a metamorphic rock. If it's completely melted by the heat, then it becomes igneous rock.

Agnes Nyanhongo's Stone Sculptures

Agnes Nyanhongo started carving rock when she was very young. Her father, Claud Nyanhongo, was also a sculptor, and she learned from him. Agnes uses a special rock called serpentine to make sculptures. She polishes some parts of her sculptures but leaves other parts raw.





Playful Welcome -Green Serpentine - 19 x 11 x 6 -\$4,400.00 USD

The Rock Cycle

Rocks you see in the world around you might seem like permanent fixtures. Given enough time, however, all rocks change. They are created, destroyed, and recreated in a continuous cycle. Geologists call this ongoing process the rock cycle.

The rock cycle has no starting or ending point. You can jump in anywhere to see how it works. Let's begin with hot melted rock, called magma, coming out of a big volcano. The magma turns into hard rock, called igneous rock, when it cools down. Over many years, the sun, wind, rain, and cold weather make the rock break into smaller pieces. These pieces keep breaking down to make sand and dirt. Strong winds, water moving, and gravity slowly push the sand and dirt down the sides of the volcano and away. Moving sand and dirt from one place to another is called erosion.

Imagine that the tiny pieces of dirt and sand end up in a lake, where they sink to the bottom. Over many, many years, more layers of dirt and sand are piled on top of them. Squishing and sticking together processes eventually turn the deeply buried dirt and sand into rock.



Now, think about a rock sitting near the edge of the ground where it's very rocky. The ground moves and hits another rocky area very, very slowly. This makes the rock very hot and pushes it so much that it changes. It becomes a different kind of rock. Then, as the ground keeps moving, the rocky edges get all crumpled up. The changed rock gets pushed up onto the ground making tall things like mountains! When this happens, the rock starts to change because of air, rain, and snow.

Nature is the strongest force on Earth and is constantly changing the world around us.

One big rock moves under another rock. The rock along the edge gets hotter and hotter. It turns into hot liquid. Later, this hot liquid may come out of a volcano. Knowing about how rocks change helps scientists know about how the Earth changes.

Sources:

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