

## GLOSSARY

**GNEISS** – (Pronounced “nice.”) The most common of all metamorphic rocks. It is often composed of quartz and feldspar, as well as mica, hornblende, or both. It is commonly recognized by its banded appearance.

**GRANITE** – A common, medium-coarse grained, intrusive igneous rock.

**IGNEOUS ROCK** – Formed by the cooling of magma or the accumulation of materials ejected from volcanoes. Intrusive igneous rocks cool slowly within the Earth while extrusive igneous rocks cool when erupted onto Earth’s surface.

**METAMORPHIC ROCK** – Created when previously formed rocks undergo intense heat and pressure, making them more compact and banded.

**MINERAL** – A naturally occurring, non-living crystalline solid with a defined chemical composition and defined physical properties.

**ROCK** – Composed of minerals and classified into three groups (igneous, metamorphic, and sedimentary) based on their formation and composition.

**SEDIMENTARY ROCK** – Formed when sediments (fragments of rock, silt, sand, and clay) accumulate and are compacted and cemented into rock.

## Related Museum Exhibits

### Dinosaurs: Modeling the Mesozoic

(Blue Wing, Lower Level)

Examine fossils and life-size models to get a sense of how paleontologists compile evidence. While there, don’t miss the new exhibit area focusing on fossil-forming sedimentary rocks.

### Discovery Center

(Red Wing, Level 1)

This learning environment is designed for students age eight and under and offers an extensive collection for exploring natural history, the physical sciences, and technology. Children can test properties of minerals and handle rock specimens in the “Geology Field Station.”

### Natural Mysteries

(Blue Wing, Lower Level)

This exhibit focuses on organizing and classifying objects and challenges students to observe, compare, and sort objects in meaningful ways. Check out our specimen drawers to learn how scientists classify rocks and minerals.

# THE ROCK GARDEN

## Interesting Rocks from Interesting Places



**Take a walk in the Museum’s shady outdoor rock garden!** Examine rocks and minerals from all over the world and explore their often fiery origins. Can you find the oldest specimen? How about the one from Boston? Which one is your favorite?

After your visit, learn about fossils, classification, and other geology-related topics in *Natural Mysteries*, *Dinosaurs: Modeling the Mesozoic*, and the *Discovery Center* (details on back page).

## 1 SCHIST

**Location:** Mount Washington, New Hampshire  
**Type:** Metamorphic Rock **Age:** Approx. 390 Million Years

Geologists estimate that Mount Washington began to form about 390 million years ago, when sand deposited in alternating layers. About 375 million years ago, molten rock pushed between the layers and cooled, forming the pegmatite vein. The tremendous heat and pressure associated with mountain building folded the layers and changed the sandstone to quartzite, and the shale to schist. About 10 million years ago, the entire area was uplifted to form the Presidential Range of the White Mountains.

## 2 GRANITE

**Location:** New Hampshire  
**Type:** Igneous Rock **Age:** 360 Million Years

This is a specimen of the gray granite from which the Granite State (New Hampshire) gets its name. An intrusive igneous rock, granite is the principal type of rock in the Earth's upper crust and forms the core of many great mountain ranges. It is particularly hard because its crystals interlock when the rock solidifies from a molten state. This hardness makes granite highly resistant to erosion. Granite is frequently used to construct buildings and monuments as it is durable and capable of being polished.

## 3 IRON ORE

**Location:** Marquette, Minnesota  
**Type:** Sedimentary Rock **Age:** 600 Million Years

This jaspilite specimen consists of alternating layers of jasper and gray specularite hematite. Jasper, a form of quartz, is the principle type of silica found in petrified wood. Specularite hematite consists of small flakes that shine like mirrors. Look for clues that the rock was folded after layers of sediment had hardened.

## 4 GNEISS

**Location:** Mount Washington, New Hampshire  
**Type:** Metamorphic Rock **Age:** 400 Million Years

If you want to find out what severe weather can do to a rock, just look at this specimen from the summit of Mount Washington—at 6,288 feet Mount Washington is New England's highest peak. A mixture of heat, wind-blown sand, and ice have eroded the softer rock, leaving the harder mineral grains standing in bold relief. As a result, hard, narrow crystals of silimanite can be seen on the rock's surface.

## 5 CAMBRIDGE ARGILLITE

**Location:** Under the Museum  
**Type:** Metamorphic Rock **Age:** 300 Million Years

Cambridge argillite is a hard, fine-grained rock formed by the actions of heat and

pressure on ancient layers of mud. This is a specimen of the bedrock that underlies much of northeastern Boston, including the site of the Museum of Science.

## 6 GRANITE

**Location:** Grand Canyon  
**Type:** Igneous Rock **Age:** One Billion Years

This specimen of Precambrian granite is from the bottom of the Grand Canyon, the largest display of river erosion in the world. The orange crust you see along the edges of the rock is the result of weathering.

## 7 GRANITE

**Location:** Italy  
**Type:** Igneous Rock **Age:** N/A

This granite boulder was once a part of Mont Blanc in The Alps. At 15,780 feet, Mont Blanc is the highest peak in Western Europe. This specimen fell in an avalanche down the Italian face of Mont Blanc, landed on the Brenva Glacier, and was slowly carried downward by the ice. (Glacial movement ranges from a few inches to a few feet per day.) This rock was collected near the city of Courmayeur, Italy. It cooled and hardened slowly, which accounts for the relatively large crystals on its surface.

## 8 PETRIFIED WOOD

**Location:** Petrified Forest National Park, Arizona  
**Type:** Fossil **Age:** 200 Million Years

Two hundred million years ago, a tree that was approximately 200 feet tall grew on the shores of an Arizona lake. When it fell, it became waterlogged, and its wood fibers were gradually replaced by grains of quartz silica that had dissolved in the water. The wood has since disintegrated, but the tree's original shape and growth ring patterns have been preserved.

## 9 GNEISS

**Location:** Redwood Falls, Minnesota  
**Type:** Metamorphic Rock **Age:** Approx. 3 Billion Years

Is this the oldest rock in North America? It originates from a formation of Precambrian metamorphosed granite called Morton gneiss. The rock's wavy appearance is due to the intermittent squeezing and folding of the Earth's crust.

## 10 BERYL CRYSTAL

**Location:** Grafton, New Hampshire  
**Type:** Mineral **Age:** N/A

Beryl is a mineral that can be found in huge six-sided crystals, like this specimen. More frequently, though, it is found in crystals no more than three inches long. Rarer varieties of beryl, such as the aquamarine and the emerald, have long been valued. Ancient

Egyptians believed emeralds gave the wearer powers of prophecy. Today, beryl is important as the source of beryllium, a metal similar to but lighter than aluminum.

## 11 LAVA

**Location:** Death Valley, California  
**Type:** Igneous Rock **Age:** Approx. 60 Million Years

This is a piece of lava from a volcano that was once active in Death Valley, the lowest point in North America. Magma is hot, molten rock that exists under pressure beneath the Earth's surface. Magma that reaches the Earth's surface through vents or fissures is called lava. Pockets of hot gas produced the cavities that you see in this sample.

## 12 BASALT

**Location:** The Giant's Causeway (County Antrim, Northern Ireland)  
**Type:** Igneous Rock **Age:** 65 Million Years

Geologists cite the Giant's Causeway as an example of what happens when hot magma from beneath the Earth's surface erupts and pours over the land, cools rapidly, shrinks, then cracks into six-sided columns of basalt, an extrusive igneous rock. According to an Irish legend, a giant named Finn MacCool built The Giant's Causeway between Ireland and Scotland so that he could walk across the North Channel without getting his feet wet.

## 13 GNEISS

**Location:** Death Valley, California  
**Type:** Metamorphic Rock **Age:** 1.7 Billion Years

This specimen comes from the bottom of Death Valley. Pegmatite is similar in composition to granite, but its grains are coarser. Often large crystals of common minerals or gemstones can be found in irregular patterns throughout the pegmatite.

## 14 GRANITE

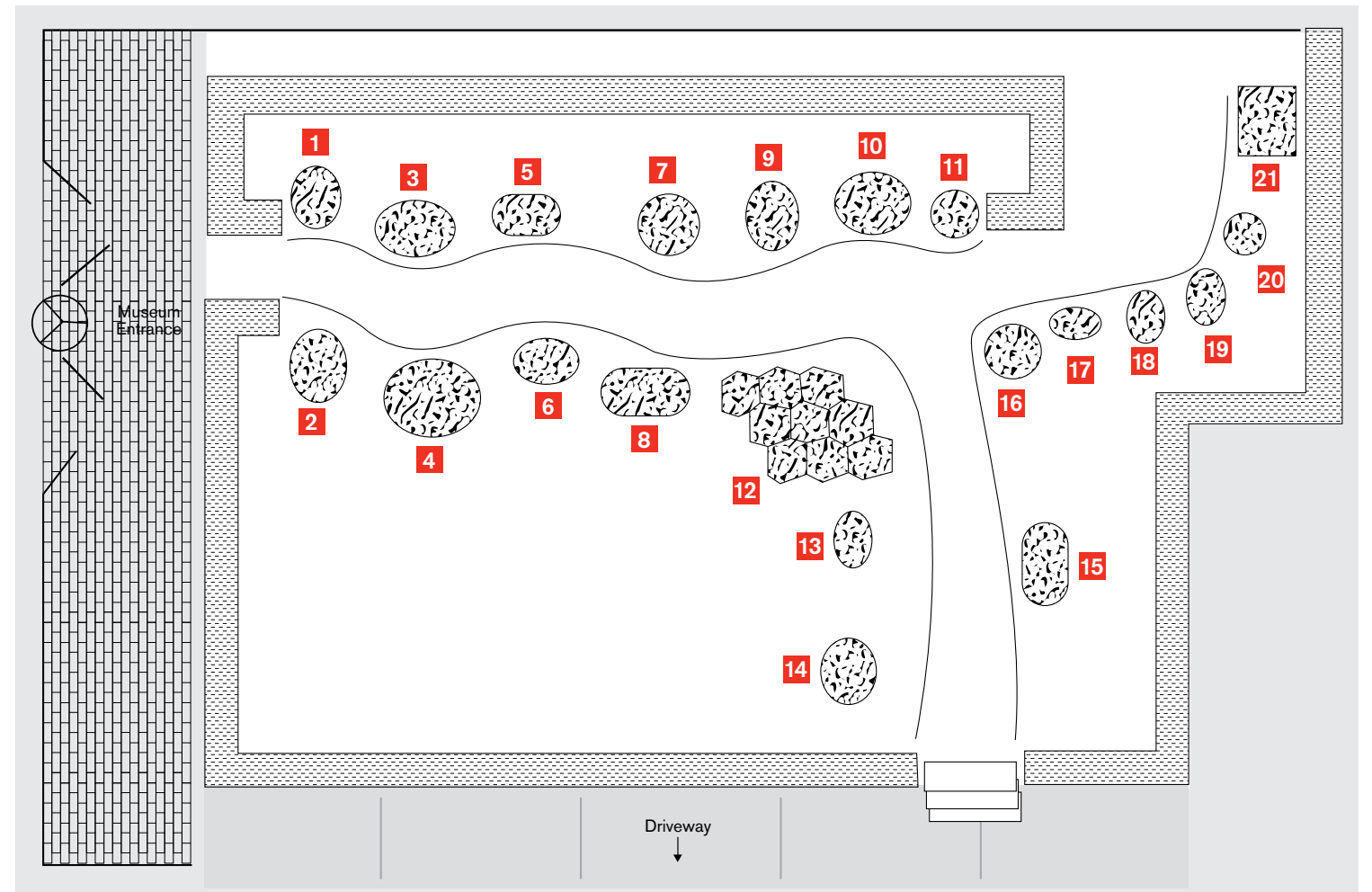
**Location:** Mount McKinley, Alaska  
**Type:** Igneous Rock **Age:** 57 Million Years

This 2,000-pound specimen comes from Mount McKinley—at 20,300 feet, the highest peak in North America. Some 57 million years ago, motion in the Earth's crust caused huge masses of rock to thrust up, forming Mount McKinley and its adjacent Alaska Range. Millions of years of erosion reduced the peak to its present shape. A glacier transported this boulder to a point 45 miles south of Mount McKinley where it was collected in 1989 by Brad Washburn (Museum founding director) and his wife, Barbara.

## 15 ROXBURY CONGLOMERATE

**Location:** Boston, Massachusetts  
**Type:** Sedimentary Rock **Age:** Approx. 600 Million Years

Sharp, angular rock fragments are often carried long distances by streams, waves, or glaciers. In the process they are smoothed



and rounded. When the resulting pebbles, cobbles, and boulders accumulate and are cemented within a finer-grained matrix, the result is an odd-looking rock, a conglomerate known as puddingstone. Puddingstone underlies much of southwestern Boston, with outcrops in Roxbury and the Hammond Pond area. Roxbury Conglomerate is the Massachusetts state rock.

## 16 GNEISS

**Location:** Squam Lake, New Hampshire  
**Type:** Metamorphic Rock **Age:** 400 Million Years

The interwoven pegmatite veins in this rock were formed when molten rock forced its way along cracks in the metamorphic gneiss and then solidified. Find the different veins and consider which vein formed first. You can also see pyrite crystals (fool's gold), deep red garnet, and a xenolith—a piece of gneiss trapped inside one of the veins.

## 17 GNEISS

**Location:** Fitchburg, Massachusetts  
**Type:** Metamorphic Rock **Age:** 400 Million Years

Gneiss is particularly abundant in New England. The tremendous heat and pressure that created this rock account for the streaks, folds, and faults. Alternating light and dark areas are characteristic of gneiss. Light layers are usually coarse and granular.

## 18 LIMESTONE

**Location:** Southern Spain  
**Type:** Sedimentary Rock **Age:** 170 Million Years

This two-ton fragment comes from the Rock of Gibraltar, whose 1,000-foot cliffs located on the Iberian Peninsula dominate the entrance to the Mediterranean Sea. The Rock of Gibraltar has played a significant role in history. Early humans lived in its caves and the Phoenicians used it as a landmark when navigating the Mediterranean. This rock is chemically similar to seashells and is formed under pressure by recrystallization of the mineral calcite.

## 19 ROSE QUARTZ

**Location:** Custer, South Dakota  
**Type:** Mineral **Age:** N/A

Quartz is one of the most common minerals in the Earth's crust, occurring in a great range of colors and varieties. Trace amounts of titanium account for the pale pink to deep-rose color of rose quartz. Like this specimen, rose quartz is usually found in large masses rather than in crystals. It is often quarried for use in jewelry, carvings, and monuments.

## 20 GRANITE

**Location:** Southern Africa  
**Type:** Igneous Rock **Age:** 3.2 Billion Years

This rock could be one of the oldest on Earth. It was taken from a vast exposed area of granite in southern Africa. Geologists have determined its age by measuring how much of the element rubidium transformed into the element strontium by radioactive decay—the more strontium present, the older the rock. The surface of this rock contains many minerals such as feldspar, quartz, chlorite, apatite, mica, and ilmenite.

## 21 GRANITE

**Location:** Aswan Quarries, Egypt  
**Type:** Igneous Rock **Age:** >600 Million Years

Egyptians have used red Aswan granite as a medium for construction and sculpture for more than 5,000 years. The Aswan Quarry, 430 miles south of Cairo, is as busy today as it was when the pyramids were built. This particular piece of granite is cut to the precise dimensions of the casing blocks that cover the surface of the Mycerinus Pyramid, built in 2450 BC. Look for the large grains of red feldspar and quartz in this specimen.