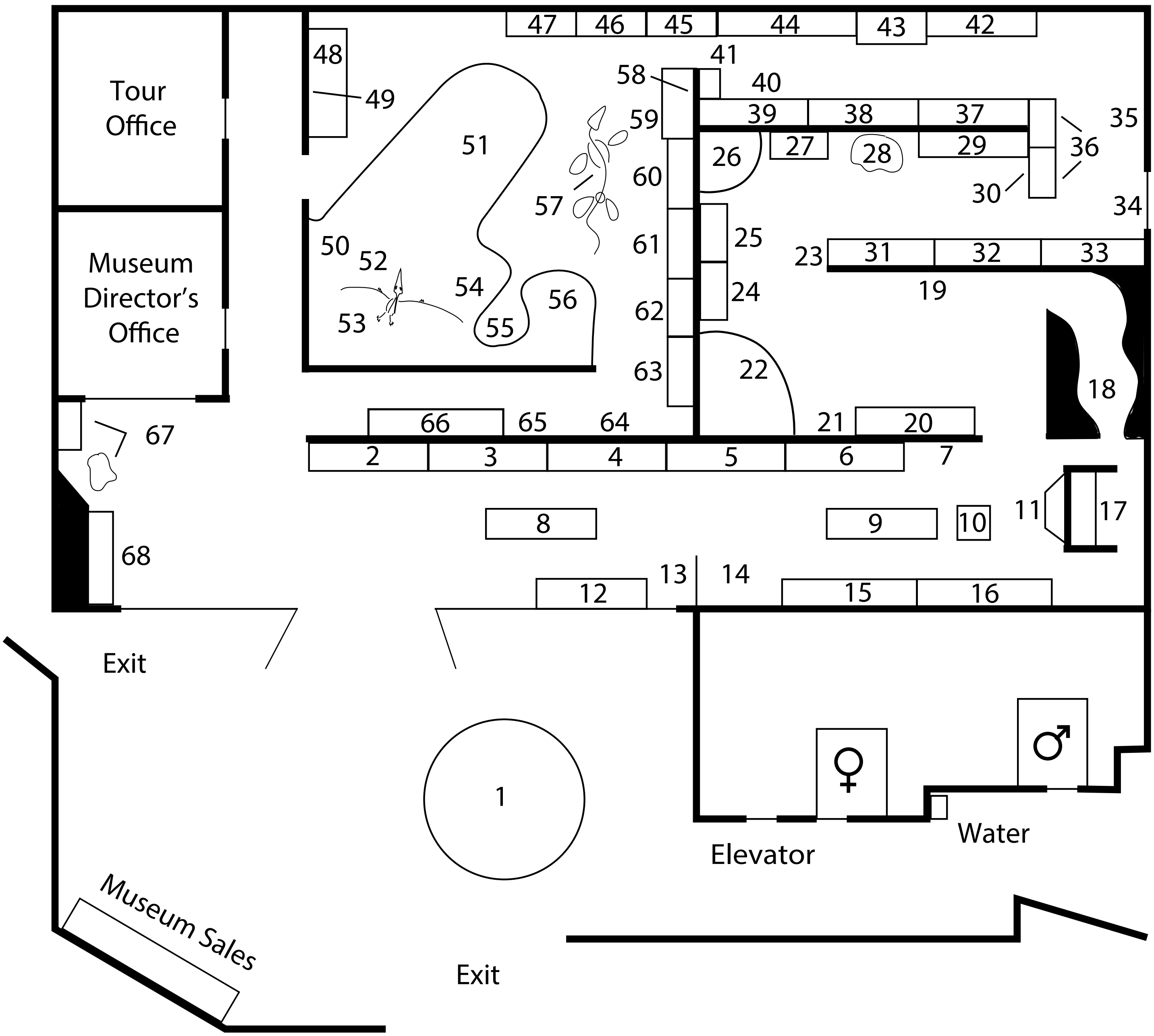
UW GEOLOGY MUSEUM

Self-Guided Tour

Photography by Kyp Bellinger

Welcome to the University of Wisconsin Geology Museum!

As you explore our exhibits, check the upper left-hand corner of our display cases for numbers that go along with this guide.



Geology is the study of the Earth: from rocks and minerals to earthquakes and volcanoes. Some geologists study other rocky parts of our Solar System, like asteroids, Mars, and the Moon. Our museum also has objects from another science - paleontology - the study of ancient, non-human life.

The Earth

Exhibit 1

If our planet were shrunk to the size of this globe, it would be less bumpy than the skin of an orange. Here the mountains and valleys are exaggerated so you can see them better.

What else can we shrink?

If the moon was shrunk the same amount as our globe, it would be the size of a beach ball and would be orbiting about four bus lengths away.

The International Space Station would be 2.5 inches off the surface of the globe and would be smaller than the period at the end of this sentence.

Now, say you could gather up ALL of the globe's water, salty and fresh - from the oceans, rivers, lakes, ice and even underground - and make one big water drop. That blob would be 7.8 inches across - a little smaller than a soccer ball. The amount of water that humans can use for drinking and bathing is much smaller - about the size of a pea.

Since we can't cut the Earth in half (and, to date, the deepest drill hole only pierces 7.6 miles into the crust) most of what we know about the interior of our planet is learned from data gathered after earthquakes and other seismic events.

The ground you walk on, the peak of the highest mountain, and the rocks in the deepest part of the ocean are all part of the Earth's **crust**. Compared to the rest of the Earth, the crust is very thin, like the shell of an egg.

The **mantle** is hotter than the crust, so even though it is made up of rock, it can slowly flow - like hot silly putty.

The **core** is made of metal - just like the heavy iron meteorites inside the museum.

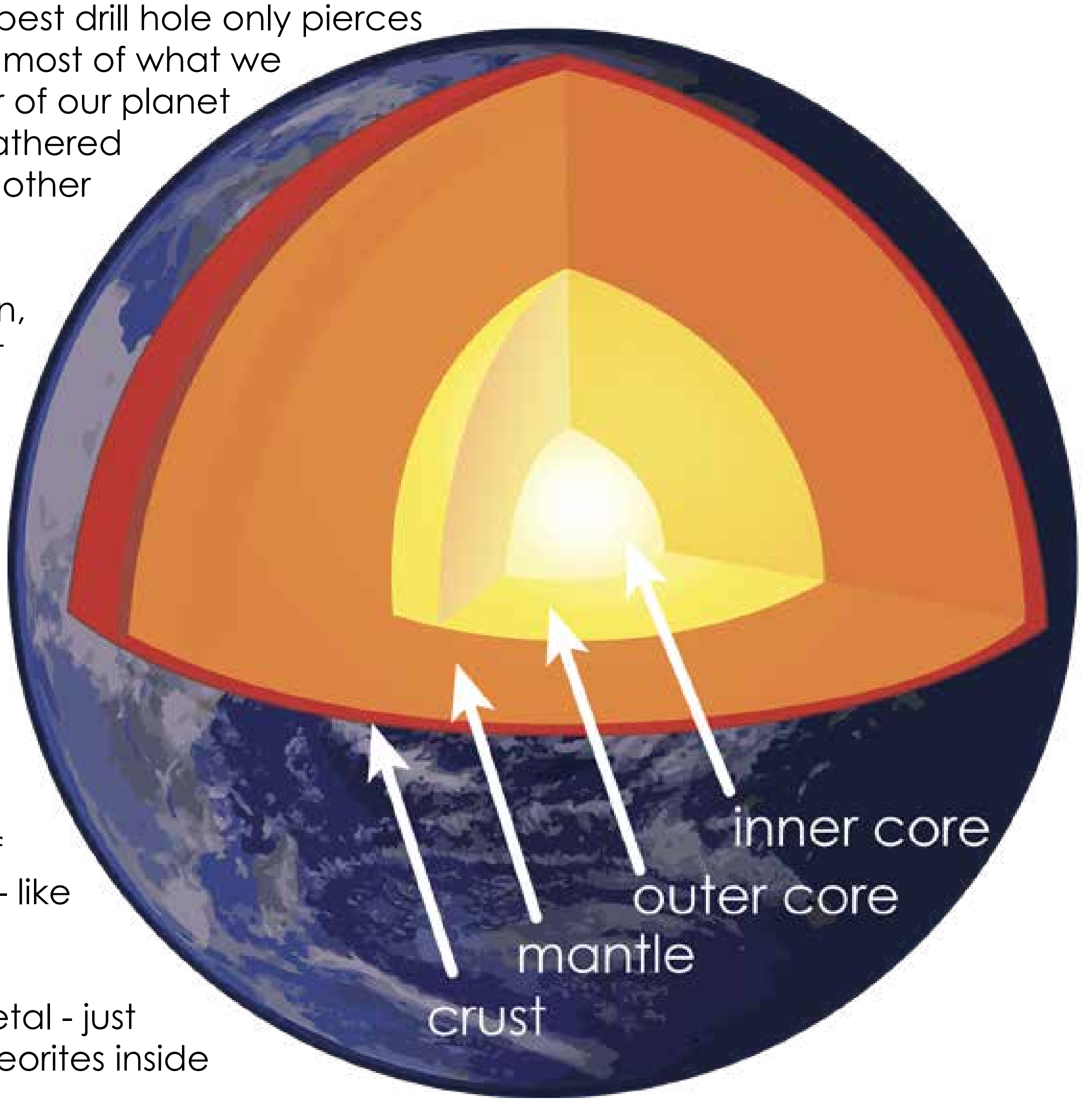


Plate Tectonics

The Earth's crust is broken into large pieces geologists call "tectonic plates". When we look at the patterns of where earthquakes happen and where mountains, volcanoes and ocean trenches are, we see they are at the edges of these plates.

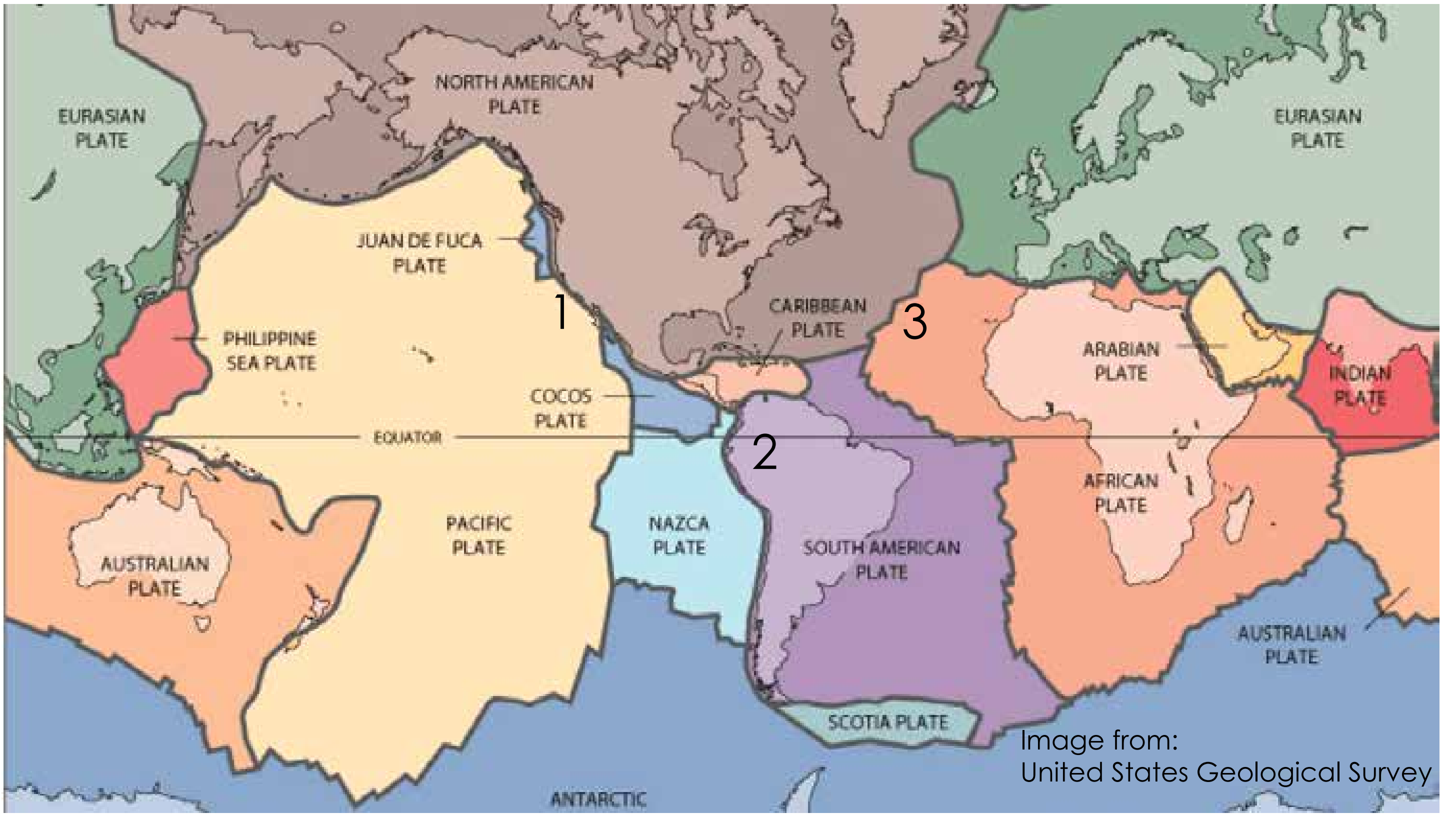


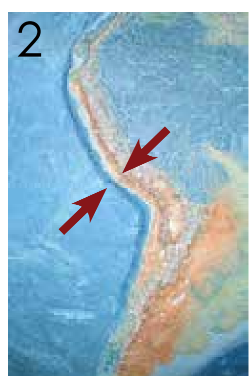
Image from:
United States Geological Survey

Can you find these spots on our globe?

The arrows show which way the Earth's crust is moving.

San Andreas Fault

Many geologists study this fault system in order to learn how to predict earthquakes better.



Andes Mountains

The world's tallest volcanoes are part of this mountain chain.

Mid-Atlantic Ridge

This is the longest mountain range on Earth even though most of it is underwater.

Minerals

When you walk through the museum's front doors, most of the cases are filled with mineral specimens. There are about 5,700 known minerals and of those 150 are considered common. Each mineral has a combination of properties (its color, hardness, shape, etc) that help us tell them apart.

You use minerals every day, from various metals in your cellphone (gold, copper, aluminum, and silver) to the sparkles in your toothpaste (mica). All of these ingredients have been dug out of the ground from mines around the world.

Halite, Exhibit 5

Cube-shaped halite is more commonly known as rock salt, and is the same as the salt you put on your food. In parts of the world there are layers hundreds of feet thick that formed when ancient seas evaporated, leaving the salt behind.

This shiny, soft metal streaks through the rocks that surround Lake Superior. Artifacts recovered from the area indicate that people of the Old Copper Culture began making tools like spearpoints, knives, fishhooks, and axes as long as 8,500 years ago. This is some of the oldest evidence on earth for humans using copper.

Copper, Exhibit 4

Galena, Exhibit 6

The dolomite in Southwestern Wisconsin contains this heavy, lead-rich mineral called galena. The Ho-Chunk, Meskwaki, and Sauk people collected it from the surface and dug it out of the surrounding rock for 1,000 years before European settlers arrived in the area. When these deposits became more widely known in the 1820's, thousands of miners (mostly from Cornwall, England) moved to the area in America's first mineral rush. At that time, lead was more valuable than gold and was used in lots of products. Most of Wisconsin's lead was turned into lead shot, or bullets.

Rocks

We can tell rocks apart based on what minerals they are made of and also how they form.

Did it cool and harden from melted rock, like lava or magma? Then we call it **igneous**. This name comes from the Latin word for "fire".

Is it made of mud or sand that is stuck together? When sediment piles up on a beach, river, or lake the little pieces can get cemented together after they are buried. These **sedimentary** rocks are where fossils can be found.

Perhaps it is an igneous or sedimentary rock that got heated and squeezed, which made the minerals rearrange or perhaps change into new minerals. These rocks often look squished, smeared out, or folded and are called **metamorphic** rocks. The name means the rock has gone through a change, similar to the metamorphosis of a caterpillar into a butterfly.

Basalt, Exhibit 15

What does it take to melt a rock? Temperatures that are at least twice as hot as a normal kitchen oven can get to. You can tell from the ropy texture of this rock that it was flowing as it cooled and hardened as part of a lava flow. This is the same type of rock that makes up the Hawaiian Islands and the bluffs along the north shore of Lake Superior.

Conglomerate, Exhibit 16

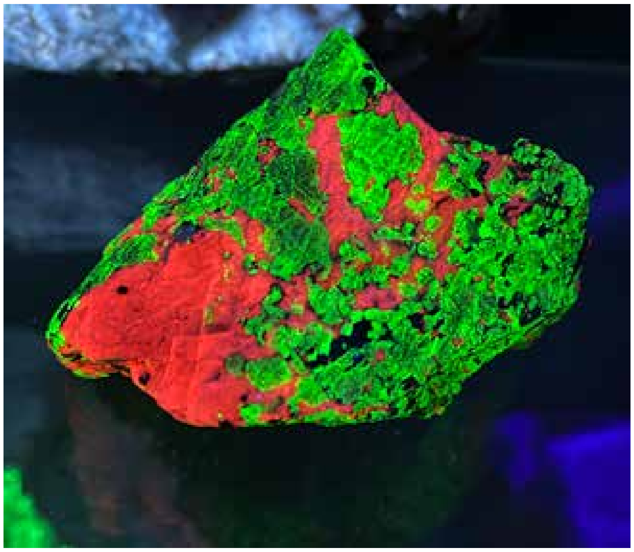
Sedimentary rocks are those that form from sediment (like mud and sand) that piles up, is buried, dries out and gets cemented together. In this case, the sediment was actually small rounded rocks. This type of rock typically forms as pebbles and gravel are carried by water, like in a stream. A rover on Mars has discovered conglomerate there, which is more evidence that the red planet once had liquid water on it.

Schist, Exhibit 15

What does it take to fold a rock? Heat (but not so much that it melts!) and pressure together can transform a rock in a process geologists call metamorphism. These squeezed rocks are clues left behind from where mountains used to be.

Black Light Display

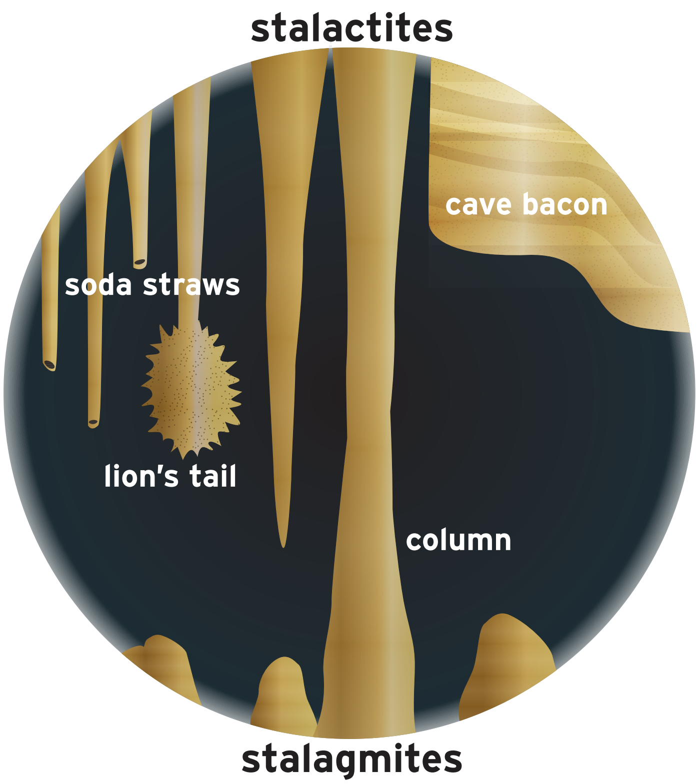
Exhibit 17



When light hits an object, like your hand or friend's face, some of the light is absorbed and some bounces off and goes into your eyes. Sometimes minerals are able to absorb a small amount of light and then, an instant later, release a small amount of light that has changed slightly. That change temporarily shifts the color, often giving it a bright, neon glow. This absorbing and then releasing of light is called **fluorescence** and is a rare property – the vast majority of minerals don't do this. While there are examples of animals (sharks, frogs, platypuses) and plants (dandelion, bee balm, *Coreopsis*) that fluoresce, the name of this phenomenon comes from a mineral, fluorite.

Our Cave

Exhibit 18



Wisconsin is home to over 400 known caves. This exhibit gives you a peek into what one of them would look like. Formed as water dissolves rock underground, these cavities then are often decorated over time with a variety of formations. From delicate "soda straws" dangling over your head, to massive stalagmites protruding from the cave floor, all of these formations slowly get bigger as drips of water leave behind thin layers of the mineral calcite. By studying the chemistry of caves and their decorations we are able to learn about past climate conditions on Earth.

Deep Time

Geologists use the language of deep time, talking about rocks and fossils that are millions or billions of years old. But what is the difference between one million and one billion?

One **million** seconds lasts almost twelve days.

One **billion** seconds? Nearly 32 years!

The Earth and our Solar System formed 4.56 billion years ago. By finding and studying old rocks and fossils, we are able to learn how different Earth was in the deep past.

Acasta Gneiss, Exhibit 20

Our planet's crust is always slowly shifting, grinding, and being pushed into the depths of the Earth where it gets "recycled". This means there aren't many places with rocks that are billions of years old.

Despite these challenges, there are some very ancient masses of rock around the world. The oldest known rocks are from the Acasta Gneiss (pronounced "nice") which is 4.04 billion years old and in northern Canada.

Trendall Stromatolite, Exhibit 24

For the vast majority of Earth's existence, the only life forms have been microscopic. We know this because of stromatolites – thin layers of sediment trapped by sticky microbial mats that pile up and harden over time. Stromatolites can be found all over the world, including Wisconsin. Here you can see some of Earth's most ancient stromatolites at 3.4 billion years old. These are from Australia.

Finding and Cleaning Fossils

Exhibit 34

Many of the fossils that you see in this museum were found and dug up by museum personnel. To find fossils, we spend a lot of time thinking about what we want to find, looking at maps to figure out where we might find them, and getting permission to go look there. Then we spend a few weeks each summer actually out “in the field” looking for and excavating fossils.

Getting fossils out of the ground is only the first step. In our Fossil Preparation Lab (Exhibit 34) museum workers spend dozens of hours carefully cleaning the rock away to expose the whole fossil. The most commonly used tools are called “air scribes” which are pen-sized, air-powered jackhammers. Once the specimens are cleaned off they are studied, put on display, or stored for future research.

Fossils

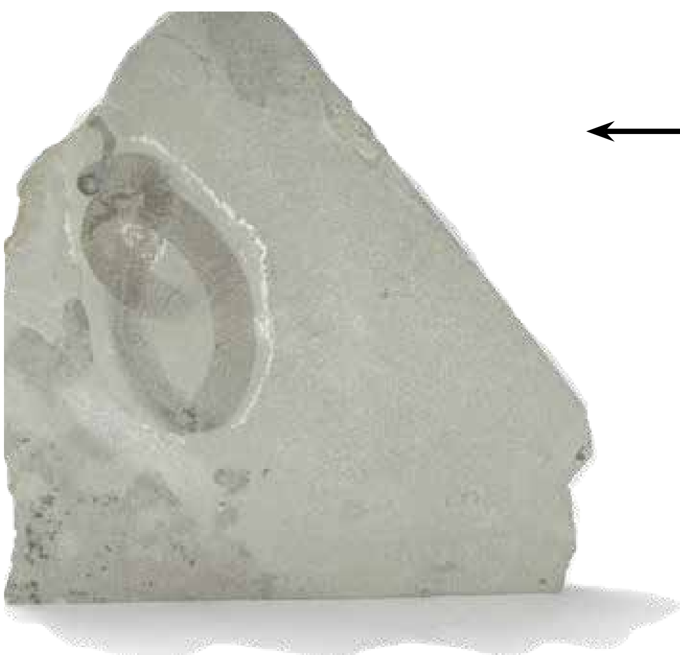
Broadly, a fossil is what is left over from something that was alive a long time ago. Usually when a plant or animal dies, it decomposes or rots away. While hard parts of a skeleton (like bones and teeth) have the best chances of not completely rotting away, they still do most of the time.

However, this museum is full of special examples where something was preserved – a bone, tooth, leaf, shell, footprint, even poop.

Fossils can form in a variety of ways. Sometimes minerals seep into bone or wood and strengthen or replace parts, making it more likely to last through time. Other times a leaf, worm, or other lifeform will get buried quickly and squashed – leaving behind only a thin layer of carbon. No matter how they are preserved, fossils provide us clues about plants, animals, and even bacteria that have called Earth home in the past.

Trilobite, Exhibit 42

These extinct sea creatures are related to modern bugs, shrimp, and horseshoe crabs. As a group, they thrived on Earth for around 270 million years and were incredibly diverse with over 17,000 known species. Most were about 2 inches long like this one, but the biggest (Isotelus rex) measured in at 28 inches from end to end and the smallest (Acanthopleurella stipulae) was tinier than a sesame seed.



Worm, Exhibit 25

Some places around the world have incredibly well-preserved fossils from creatures that only have soft-parts in their bodies - like this worm. One of these special locations is here in Wisconsin, the Waukesha Lagerstätte ("lah-ger-shtet-en"). These kinds of fossils, from creatures that typically don't get preserved, can help us have a more complete picture of past ecosystems.

Fossils

Mastodon tooth, Exhibit 62

Woolly mammoths may look very similar to mastodons on the outside, like big shaggy elephants, an important difference between them is found in their mouths. Both creatures were herbivores, but the shape of their teeth gives us clues as to what kinds of plants they ate. This single mastodon tooth is laying on its side; the chewing part is on the right and the root (which holds the tooth into the jaw) is on the left. These big, bumpy teeth were great for crushing crunchy foods, like shrubs, twigs, and pine needles.

When plants were relatively new on land, bacteria and fungi had not yet evolved to decompose them well. That meant that dead plants – wood and leaves – piled up and didn't rot away. These layers turned into massive deposits of coal known around the world from this time period. In fact, geologists even named it the "Carboniferous Period" for all of the carbon that was left behind from the plants.

Fern, Exhiibit 29

Space Rocks

The oldest rocks on Earth are not from here; they are leftovers from when our Solar System formed 4.56 billion years ago. It is from these rocks that we know the age of the Earth. Most meteorites come from the asteroid belt, a ring of rocky debris between Mars and Jupiter. This "belt" is made from chunks of planets that broke up during the formation of our Solar System. Much rarer are the rocks that crash land on Earth but were knocked off of our Moon or Mars. Scientists are able to figure out where meteorites came from (the asteroid belt, our Moon, or Mars) by carefully studying their chemical ingredients.

Sudbury Impactite, Exhibit 21

How long does it take to make a rock? On the fast side, lava can cool in a matter of days. But the average rock typically takes thousands of years to form.

This rock is different - it formed in one day. On that day, 1.85 billion years ago, a six-mile-wide asteroid slammed into the Earth. It punched a hole through the crust, vaporized, and sent shock waves rippling away from the crater.

Debris fell out of the sky in the hours after the impact, piling up and making this unique type of rock. Look for the round "hailstones" that formed as the pulverized rock fell back to earth, even hundreds of miles from the impact.

Tissint Meteorite, Exhibit 27

This is the only piece of Mars you can see in a museum in Wisconsin. It was part of a larger rock that was knocked off of Mars by a large asteroid impact, around one million years ago. It then was seen falling through our atmosphere, landing in Morocco in 2011. Not only does this rock's chemical fingerprint match Martian rocks, but small pockets of gas inside also match the Martian atmosphere.

Trenton Meteorite, Exhibit 68

Most of the fourteen meteorites, including this one, that have been found in Wisconsin weren't seen falling to Earth. Instead they were discovered by luck. This one is made of iron and nickel – the same metals found in the core of our planet.