

UO Campus Scavenger Hunt

Clues and Walking Directions

STOP 1: Museum Courtyard

Clue: find an object in the courtyard that is modeled after a visitor from outer space.

Answer: Replica of Willamette Meteorite, also called "Tamahnawus"

Discussion Questions:

Have students touch the meteorite and determine that it is a replica (*no climbing please*). Scientists believe it did not fall from the sky to Oregon because there was no impact crater around the meteorite. Instead, it probably landed much farther north, perhaps in Canada.

- How could the meteorite have been transported to the region? (Remember, it was not moved by people!)
- What was the weather like during the Ice Age?
- What happened to all the ice and snow when the climate warmed?
- What other changes might the Ice Age Floods have caused to the earth?
- Who do you think should own the real meteorite?

Background Information:

Toward the end of the last Ice Age, 20,000 – 15,000 years ago, glacial ice dammed the Clark Fork River in the Northern Rockies. It created glacial Lake Missoula, some 2,000 feet deep and 200 miles long. When the ice dam broke, a 2,000-foot wall of water surged across Idaho, through eastern Washington, along the Columbia Gorge, and into the Willamette Valley. Scientists believe this process happened as many as 40 times over the course of 5,000 years. Floodwater created temporary lakes and waterfalls, carved channels, carried boulders, and deposited sediment along its path. The Willamette Meteorite is believed to have traveled to the Willamette Valley on a glacier or with floodwaters during the Ice Age.

The Willamette Meteorite is believed to be the inner iron core of a planet that shattered in a space collision billions of years ago. It weighs nearly 16 tons and is the largest meteorite ever found in North America, and the sixth largest in the world. Erosion from wind, rain, and sun likely caused the openings on the flattened side.

The meteorite was important to the Clackamas tribe for thousands of years before European Americans settled in Oregon. In 1902, a farmer named Ellis Hughes stumbled across the meteorite in the field next to his land near West Linn. He realized it was valuable and devised a plan to secretly move the meteorite to his property. It took three months to drag it across wooden tracks with a truck.

Once it was on his property, Hughes charged members of the public \$0.25 to see the meteorite. When his neighbors, the Oregon Iron and Steel Company, learned the meteorite had been taken from their land, they filed a lawsuit to recover it. They were granted possession, but Hughes filed an appeal. He argued that since there was no impact crater around the meteorite, the meteorite had not fallen on the land owned by Oregon Iron and Steel and therefore did not belong to them.



The Oregon Iron and Steel Company was eventually awarded the meteorite and placed it on exhibit at the 1905 Lewis and Clark World's Fair in Portland, Oregon. In 1906, a philanthropist from New York, Mrs. William Dodge, purchased the meteorite from Oregon Iron and Steel for \$21,600. She donated it to the American Museum of Natural History (AMNH) in New York, where it is still on display.

In recent years, the descendants of the Clackamas tribe, now part of the Confederated Tribes of the Grand Ronde, have tried to regain ownership of the meteorite. In 2000, AMNH and the Confederated Tribes of the Grand Ronde agreed that the meteorite will remain at the museum, but will be available to tribal members for an annual ceremony. For more information on the Willamette Meteorite, visit http://www.amnh.org/rose/meteorite_agreement.html.

MOVING ON, walking time: 10 minutes

- Exit the courtyard north (toward 15th Ave)
- Turn west (left) and walk up 15th Ave toward Agate St and Hayward Field
- Continue west (straight) on 15th Ave

STOP 2: Columnar Basalt Fountain

Clue: Basalt is one of the most common rocks found in Oregon. These rocks cooled and cracked to form what type of basalt?

Answer: Columnar basalt

Discussion Questions:

- Why are there so many volcanoes in Oregon?
- What can you guess about Oregon's geologic history?



Background Information:

Basalt is a common igneous (volcanic) rock formed from the rapid cooling of basaltic lava. The columns form due to stress as the lava cools. The lava contracts as it cools, forming cracks. Once the crack develops it continues to grow. The growth is perpendicular to the surface of the flow. Most columns are straight with parallel sides and diameters from a few centimeters to three meters. Some columns are curved and vary in width. Columns can reach heights of 30 meters.

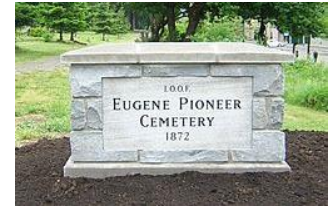
MOVING ON, walking time: 8-10 minutes

- Continue east on 15th Ave
- Cross University Street at the stop sign and turn south (left)
- Walk south to the short staircase
- Take a right at the stairs and climb up to the Pioneer Cemetery
- Turn south (left) and walk down the path
- Turn west (right) after the second tree
- Walk straight for 20 paces

STOP 3: Pioneer Cemetery

Clue: Find the grave marker for Angelina Ruggles – it is not far. The marker is granite and is very clean. Look at the other markers around it. What other types of rock are used? What has happened to them?

Answer: There are three different kinds of rock used as headstones: granite, marble, and sandstone. The marble and sandstone have eroded and grown moss.



Discussion Questions:

- Can you find examples of marble headstones? What has happened to the words and pictures on the stone? (Look for the headstone of Charles Lowry next to that of Angelina Ruggles)
- Which of the headstones is oldest? From what do you think it is made?
- How does the sandstone feel? How does the granite feel?
- Why might the granite headstone be preferred to the sandstone headstone?
- What type of rock is granite if it comes from volcanoes?

Background Information:

The Independent Order of Odd Fellows established the Pioneer Cemetery in 1873. Founded in England and passed on to the United States, the Odd Fellows is a group that “gives aid to those in need and ... pursues projects to benefit mankind.”

Early headstones in America were made of slate or sandstone. Marble was the next material to become popular, but was too easily eroded by natural forces like wind, rain, and the sun. Granite is the material most used today.

Granite is an igneous rock, formed from molten rock that cools and hardens beneath the Earth’s surface. Different colors of granite occur when the mineral makeup of the stone varies. For example, pink granite forms when there is a high concentration of pinkish-colored alkali feldspar. Grey granite is composed of alkali feldspar with an off-white coloring.

MOVING ON, walking Time: 10 minutes

- Proceed back down the cemetery steps and turn north (left) on University St.
- Follow University St straight and cross 13th Ave at the intersection of the EMU amphitheater and Columbia Hall.
- Turn east (right) and walk straight.
- Pass Columbia Hall and turn north (left) just before the Volcanology building.
- Follow the path north (straight) and walk down the steps to the fountain courtyard.

STOP 4: Volcanology Courtyard & Fountain

Clue: Find a fossil that was once a tree. What happened to it?

Answer: A large piece of petrified wood sits on the southwest side of the courtyard, just to the left of the stairs used to descend into the area. This wood is petrified.



Discussion Questions and Activity:

- Feel the petrified wood. Do you think it is heavy or light?

- What process has changed the wood to stone?
- Can you think of some other things that can become fossilized?
- What are some other ways fossils can form?
- Can you find examples of the basalt rock seen at the columnar basalt fountain?

Have students stand on the green circles embedded in the courtyard, close their eyes and listen. At each circle location, the fountain sounds different. Students can move to different circles and listen to the fountain.

Background Information:

Petrified wood, like other kinds of permineralization fossils, forms when minerals fill in the space of the living material. This process must occur where the object is protected and not exposed to oxygen, usually under sediment in a lake or a bog. The process takes thousands of years.

The fountain, called Cascade Charley, was created in 1991 by Alice Wingdall. Cascade Charley can be enjoyed by looking and listening.

MOVING ON, walking time: 2 minutes.

- Walk down the steps on the northeast side of the courtyard
- Proceed into Cascade Hall

STOP 5: Cascade Hall Rock, Mineral, and Meteorite Cases

Clue: Consider the prefix “geo,” as in “geology.” Can you think of some other words that begin with “geo?” (Geography, geocaching, geometry)
What might “geo” mean in these words? Find a specimen on display that has the prefix “geo” in its name. Why might it have that name?

Answer: “Geo” means earth. There are two geodes on display, one is quartz and the other is amethyst. Geode means, “earth shaped.” Geodes are named for their rounded shape and hidden inner characteristics.



Activity:

There are multiple display cases throughout the building. Allow students to browse the cases as time permits. (visit <http://geology.uoregon.edu/about-us/displays/> for images of the displays)

- First Floor: mineral, meteorite, and volcanology cases
- Second Floor: bread crust bomb, petrography (magnified images of minerals) displays.

Background Information:

Geodes are round or oblong rocks that have crystal interiors. Scientists don’t understand exactly how geodes form, but most experts agree on this theory: geodes form in the open spaces in sedimentary or volcanic (igneous) rocks. Groundwater carrying minerals seeps into the hollow area. The minerals form a tough inner layering and grow into crystals. The volcanic or sedimentary “host” rock surrounding the geode wears away and exposes the geode.

MOVING ON, walking time: 2 minutes

- From the second floor, go out the door across the hall from the bread crust bomb

- Walk across the bridge and down the steps along the fountain
- Cross the courtyard and walk down the same steps used to go into Cascade Hall, but this time turn east (right) and continue onto the paved path and stop at the benches

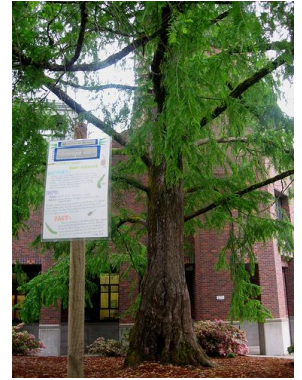
STOP 6: Metasequoia Tree

Clue: A deciduous conifer is a tree that produces cones, but also sheds its leaves in the fall. Find an example of a deciduous conifer.

Answer: Metasequoia, or dawn redwood, tree.

Discussion Questions:

- Should the Metasequoia be considered a native plant of Oregon?
- Can you think of other deciduous trees? How about conifers?
- How was Oregon different at the time the Metasequoia was common?



Background Information:

According to fossil evidence, the Metasequoia lived in Oregon about 30 million years ago. Scientists thought it had long been extinct until living Metasequoia trees were discovered in China just 60 years ago. The tree has since been re-introduced to Oregon. Metasequoias are deciduous conifers; they produce cones and shed their leaves in fall. The Metasequoia is the state fossil of Oregon.

For more information on the Metasequoia, visit: <http://oregonstate.edu/dept/ldplants/megl.htm>, or http://www.oregonfossilguy.com/state_fossil.php

MOVING ON, walking Time: 10 minutes

- From the Metasequoia tree, walk south up the path to 13th Ave.
- Turn east (left) on 13th and walk to Agate Street.
- Turn south (right) on Agate Street. Follow Agate Street to 15th Avenue.
- Turn east (left) on 15th Avenue.
- The museum is on the right hand side.

RETURN TO THE MUSEUM

