Kids' Guide to Tri-Cities Rocks

THE REACH
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Explore the rocks in your neighborhood to learn about Tri-Cities ancient history. Spoiler: it involves gigantic floods and lots of lava!

The land's history is written on the rocks, so the shapes, textures, colors, and patterns you observe will reveal many stories. This guide will give you a start on interpreting what the rocks in the Tri-cities area can tell you about how they formed. But it's just a starting point. There's a list of resources at the end to help you find out more.

It's fine to identify rocks and leave them where they are. But if you want to keep some, make sure you have permission to collect them.

Yard Rocks

Look for these rocks around buildings, parks, and yards. Since they were likely placed there by people, you won't know exactly where they came from, but probably not too far away.

Basalt (buh-SALT) is what much of the bedrock is made of in this area. (Bedrock is the solid rock underneath the soil, and is exposed in some places.) The color is dark gray, which changes to brown as it weathers, and naturally breaks into angular shapes. It is fine-grained, so look closely with a magnifier to see the tiny individual pieces and crystals.

If you could travel to the moon, or to Mars, you could find basalt there, too.

Basalt is cooled lava, and there is no shortage of that in the Columbia Basin. About 17 million years ago, lava began pouring out of fissures, or cracks, in the earth's crust in various locations in the Pacific Northwest. It spread out far and wide, covering huge areas of Washington, Oregon, and Idaho. These lava floods lasted, on and off, until about 6 million years ago. That's a lot of lava, and a lot of igneous rock left behind!

As the basalt slowly cooled, it cracked into regular shapes: tall columns with six sides, more or less. If you look at these columns from above, they fit together like the hexagons of a honeycomb. People have moved these columns from the places where they formed to decorate their yards or businesses (*see photo on front of book.*) Crushed basalt is also used for gravel in landscaping, around railroad tracks, and to make concrete.

This street surface has a lot of crushed basalt in it.

This concrete was made with river rocks.

You can find agates along a river, in a place where there's recently been some erosion or digging, or even on a gravel road. Many agates are translucent, meaning some light can shine through them, so it's easier to spot them on a sunny day. They may have a rough texture (*below left,*) but a broken side reveals a smooth, waxy interior (*below right*), and it can be polished in a tumbler to be very shiny (*on previous page.*)

Since agates form within the empty spaces of igneous rock, they are like miniature caves. If you find one that is not completely filled in, there may be crystal formations inside. We call this a **geode** (*JEE-ohd*). You may need to travel a bit to find geodes.

Learn more

Where to find rocks and what you may collect: www.dnr.wa.gov/rockhounding

Videos about Washington's geologic past: www.cwu.edu/nick/

How to use hardness to identify minerals: www.geology.com/minerals/mohs-hardness-scale.shtml

Join a club: www.lakesidegemandmineralclub.com

Books: *Big Black Boring Rock* by Stephen P. Reidel
Washington & Oregon Rocks & Minerals
by Dan R. Lynch & Bob Lynch
Gem Trails of Washington by Garret Romaine

Rocks "in place"

River rocks are smooth and rounded, tumbled by many years of flowing water. Before dams were built on the rivers, the water level changed dramatically through the seasons, according to rainfall and snowmelt. The rocks you now see on the riverbank could have been carried there by flooding hundreds or thousands of years ago, and could come from almost anywhere upstream. You can try to identify them by color or hardness, but in their weathered condition it is often hard to tell what minerals they are. Look for basalt, agates, granite, and a rainbow of colors. You might even find "rocks" that are not really rocks, but rock-like materials that are weathered to the same size and shape. They could be bricks, concrete, clay, or even glass. Whenever you are looking for rocks by the river, please be careful around the water.

Did you know that rivers change their course over time? Geologists think the Yakima River used to run through Badger Canyon west of Kennewick. Sediments dropped there by Ice Age floods caused it to flow through lower ground, north of Red Mountain. Geologists can tell because of the shape of the rocks found in Badger Canyon that the river used to flow there!

An **agate** (*AG*—it) is a gemstone that forms within the empty spaces or vesicles in volcanic rocks. In the Columbia Basin you can find agates from pebble-sized up to the size of an apple, though large ones are rare. They can be clear, milky white, and varying shades of orange to red, sometimes with bands or stripes. You might even find gray agates, or blue if you're lucky. The colors come from the surrounding rocks as water leaches through and fills the vesicles with minerals, usually a form of quartz. Rare "Ellensburg Blue" agates come from a particular spot further up the Yakima River from the Tri-cities.

Since basalt is cooled lava, you might find some with holes in it. That lava had bubbles of gas inside it as it cooled. The holes left behind are called vesicles. Some igneous rocks that people spread around their yards (you might call them **lava rocks**) have lots of vesicles. In the millions of years since the basalt hardened, some of those vesicles may have gotten filled in with water, and as the water slowly drains away it leaves behind minerals such as silica that were dissolved in the water. The quartz (silicon dioxide) is harder than the basalt around it, staying solid even when the basalt cracks or gets weathered around it. (See agates below)

River rocks are many different kinds of rocks that have been tumbled smooth and rounded by running water or waves in the ocean. They are often used in gardens, and are fun to paint on, or stack up into towers. (*See the river rock section below*)

Petrified Wood is the state gemstone of Washington. It is actually a fossil, one of a few that form in igneous rock. The floods of lava that created all the basalt covered everything in its path, but most likely traveled pretty slowly, about three miles per hour. Most animals were able to outrun the lava, but trees...not so much! Dead trees in wetlands or lakes became engulfed, and the cooling lava around it formed a cast with all the details of the wood grain. Over time the decomposed wood was replaced with minerals of many colors. Petrified wood can be found in many places in Eastern Washington, and there's a public collecting spot in the Saddle Mountains, part of the Hanford Reach National Monument. Lots of Tri-citizens have petrified wood decorating their yards. If you find a rock that has patterns like tree rings, wood grain, or the shapes of tree branches, it may be petrified wood.

Rocks "in place"

Look for these rocks when you're on a trail or walking along the river.

Here's what basalt looks like in place, where the lava cooled. You can see columns taller than a person.

Pieces of basalt and other rocks might have a white crust on them, especially large boulders that have been exposed to the weather for a long time. This is called **caliche** (*kuh-LEE-chee*), and naturally forms when rainwater dissolves some of the calcium in the rock and brings it to the surface, then dries in the hot sun.

Many large rocks that have been in place for a long time have **lichen** (*LIE-kin*) growing on them. These are plant-like organisms that grow very slowly, and can be many colors, including gray, black, green, and orange.

Another huge geologic event that changed the land after the lava flows was during the ice age around ten thousand years ago. Glaciers blocked a river that flows into the Columbia, and a gigantic lake filled up behind the ice. When the water broke through the ice, it caused some of the largest floods on earth to spill right through our area. Just imagine what the floodwaters carried! Rocks from the Montana mountains where the water backed up were dropped off here in the Columbia Basin as the water slowed down. The water eventually drained into the Pacific Ocean at the mouth of the Columbia River, but it backed up behind Wallula Gap and sat here for a week or so, forming what we call Lake Lewis. Icebergs landed here as the water drained away, then slowly melted, leaving piles of rocks and dirt. These look very different from the basalt that makes up the bedrock here so we call them **erratic** (*eh-RAT-ik*), which means unpredictable.

Erratics can be granite (*GRAN-it*), granodiorite (*gran-oh-DIE-oh-ite*), quartzite (*KWORT-site*), sandstone, diorite (*DIE-oh-ite*), argillite (*AR-jil-ite*), slate, rhyolite (*RYE-uh-lite*), schist (*shist*) and gneiss (*nice*). Granite and similar igneous rocks have larger grains and crystals than basalt, and speckles of white, black, pink, and gray. If they were carried by the ice age floods, they will have broken off of mountains and still be jagged and somewhat sharp. If they are smooth and rounded, they have probably been worn down over a long time in running water. They could have been carried by a river, even if you don't see a river next to it now.

Examples of Ice Age Flood erratics on display at the REACH Museum *on loan from Bruce Bjornstad*