

Coal Vein Trail

"I grow very fond of this place, and it certainly has a desolate, grim beauty of its own, that has a curious fascination for me."

...Theodore Roosevelt

THE TRAIL

As you drive through the badlands, you see prominent layers of brick-red clay, a substance locally called "scoria". Not so obvious are the bands of black lignite coal layered in the hills. The two materials are related. When the climate was warmer and the water table lower than today, between 9,000 and 2,500 years ago, the coal veins caught fire and burned for long periods. The high temperatures baked the adjacent clays into the brick-like scoria.

The thick coal veins still catch fire periodically. While no coal is burning in the park today, the effects of a fire that burned from 1951 until 1977 can be seen along this trail.

1. FIRE AND WATER

The coal vein trail is about one mile long. It's fairly level, with a couple of moderately steep hills. Sturdy walking shoes are advisable.

As you walk the trail, you will see unusual formations, different kinds of vegetation, and interesting views. They will help explain the role fire and water played in forming the badlands.

2. LAND COLLAPSE

The shallow depression before you formed when the coal below the ground burned away. As the land above weakened, it slowly collapsed into the space created by the burning coal. Formerly, the land was level with the top step.

3. BENTONITE

The grayish-blue layer on the side of the hill is bentonitic clay. It too was formed by fire--but not by burning coal veins. Ages ago, volcanoes erupted as the Rocky Mountains were forming, spewing ash into the air. Wind and water carried this ash eastward to the Dakotas. Time, and the pressure of overlying layers of materials, transformed it into clay.

4. VEGETATION

This bowl-like depression collects rainwater. The water permits plants such as creeping juniper (*Juniperus horizontalis*) and greasewood (*Sarcobatus vermiculatus*) to flourish. Through their root systems, the vegetation stabilizes the soil below. As fire has its role in forming the badlands, so does water. The amount of water, where it collects, and the amount of evaporation all influence vegetation. Vegetation is the key component in controlling erosion in the badlands.

5. JUNIPERS

You can find three species of junipers growing in the park. Here you see the juniper in its tree form, the Rocky Mountain juniper (*J. scopulorum*). A shrub-like form, dwarf juniper (*J. communis*) grows here as well, along with the creeping juniper.

Native Americans ground juniper seeds for flour, and made a tea by steeping the needles in boiling water.

6. SEASONAL POND

In the spring, water, draining from the ravine behind this area, fills the depression in front of you. Seasonal ponds such as these are critical to many insects and amphibians in the badlands.

7. TRAIL JUNCTION

Turn to the left to see the area where the coal vein burned out in 1977.

8. BURNOUT
The coal vein fire finally ended, under the hillside ahead and to your right. About halfway up the hill to your right is another coal vein, similar to the one that burned, but much thinner.
When the coal vein was burning, visitors could see flames and glowing embers. Park naturalists occasionally led caravans to the coal vein. Some even roasted marshmallows!
9. MIND YOUR STEP
The section of trail ahead has a moderately steep slope. Take it easy!
10. OVERLOOK
Walk along the path to the left, to the edge of the hill. CAREFUL: THE EDGE DROPS OFF SHARPLY. Notice the junipers on the slope facing you. Junipers, which can't survive on the hot, dry south-facing slopes, flourish in the cooler, moist environment of north-facing slopes such as this.
11. LICHENS
What appear to be paint spots on some rocks near the post are lichens--plants composed of algae and a fungus. The algae manufacture sugars by photosynthesis; the fungus lives off the sugars and makes up the body of the plant. Because lichens are sensitive to air quality, they are being studied in the park as indicators of possible air pollution.
12. FORECAST: COOL
Notice how the temperature and humidity change as you enter the juniper-covered slope? Higher moisture levels in areas such as this create an environment in which many species of plants flourish. Park wildlife also enjoy the shade and protective cover.
13. TRAIL JUNCTION
Decision time. To finish the last leg of the trail (about 0.3 miles more) go to your left. Had enough? Turn right to go back to your car.
14. FIRE ORIGIN
The 1951 coal vein fire started near this spot. Burning coal veins are a natural process in the badlands. Spontaneous combustion, range fires, and lightning are the usual causes.
15. SCORIA
Walk up the path to the edge of the hill. CAREFUL: THE EDGE DROPS OFF SHARPLY. Red "scoria" forms the top of the ridges to the right and left. Its red color comes from the high iron content in the clay. Since scoria resists erosion better than the softer clays and silts, it protects them from washing away by forming a protective cap. A deep canyon is forming where these softer layers are cut away by the creek below.
16. SLUMPING
Notice how this hill has the appearance of flowing or sliding? The hill structure was weakened when the coal burned out from beneath it. This caused many cracks to form, allowing water to erode or wash away more of the hill.
17. GRASSLANDS
Once the fires went out, the native grasses started taking over again. You may have noticed that the majority of the badlands are covered with grass, hence the name "grasslands". The average precipitation here is about 15 inches annually. This lack of moisture inhibits tree growth.
18. CRACKS
Cracks along the edges of the depression show that the area is still slowly collapsing into the cavity formed when the coal vein burned away.
19. "CLINKER"
Small pieces of scoria were cemented together by heat and pressure to form the clinker you see here. Over thousands of years, the forces of water, wind, and temperature will slowly break down the formation.

Fire and water have each played a role in shaping the badlands of the Little Missouri River, creating the "desolate and grim beauty" so admired by Theodore Roosevelt. This park, dedicated to his memory, preserves this fascinating land for us and for our children.