

The Geology of Yellowstone

A Biblical Guide



By Patrick Nurre

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Chapter One

A Short History of Yellowstone National Park

In 1872 President Ulysses S. Grant signed into law the establishment of the world's first national park – Yellowstone National Park. It has served as a worldwide model ever since for the setting aside of lands for historical preservation and enjoyment of the people.



But the story begins long before this. The Corps of Discovery led by Lewis and Clark in 1804 through 1806 was commissioned by President Thomas Jefferson to explore and document as much information as they could about the great Louisiana Purchase, recently acquired from France in 1803. The purchase included lands that now incorporate Yellowstone National Park. Although Lewis and Clark explored the greater Yellowstone region and much of the Yellowstone River, they never entered the region now known as Yellowstone Park. On the return trip of the Lewis and Clark Expedition, John Colter, one of the Corps of Discovery scouts separated from the Corps and spent the winter of 1807-1808 exploring the now famous national park region. John Colter is generally considered to be the first person of European descent to enter the Yellowstone country.



John Colter

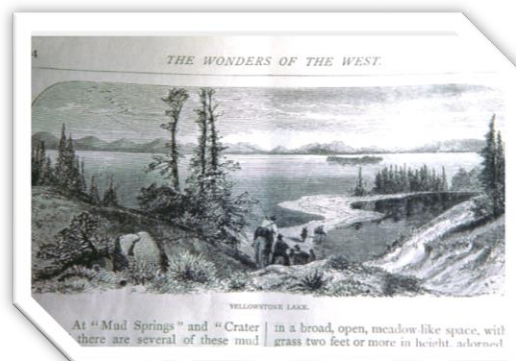
Colter returned to the eastern United States with fantastic stories about waterfalls, 'fire and brimstone,' and boiling hot pools. Many people thought he had gone crazy. His 'mythical' Yellowstone was called 'Colter's Hell.'



Colter's fantastic Yellowstone would have to wait for future discoveries to bring this wonderful place to the public attention.

There were some who were interested, though, mainly trappers and miners. The next several years saw many of these explorers come and go. They continued to bring fantastic stores of geological wonders from this isolated wilderness.

It was Dr. Ferdinand Hayden, geologist, who organized the first scientific exploration of Yellowstone, who in 1871 petitioned Congress for \$40,000 to fund the expedition. What Hayden brought back in the way of maps, samples and surveys prompted Congress to set aside this geological wonderland as a protected park.

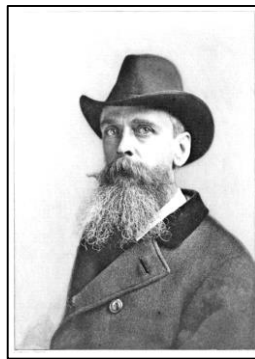


From an article by Dr. Hayden, illustrated by Thomas Moran



The Hayden Expedition – The first official expedition to Yellowstone

There were two men that Hayden had invited to be a part of the Yellowstone expedition in 1871. One was the artist Thomas Moran. The other was the photographer William Henry Jackson. It was their paintings and photographs of Yellowstone that probably did more than anything else to help in the creation of Yellowstone as a National Park. Moran's paintings have become a very popular part of telling the story of Yellowstone. And their work has become iconic.



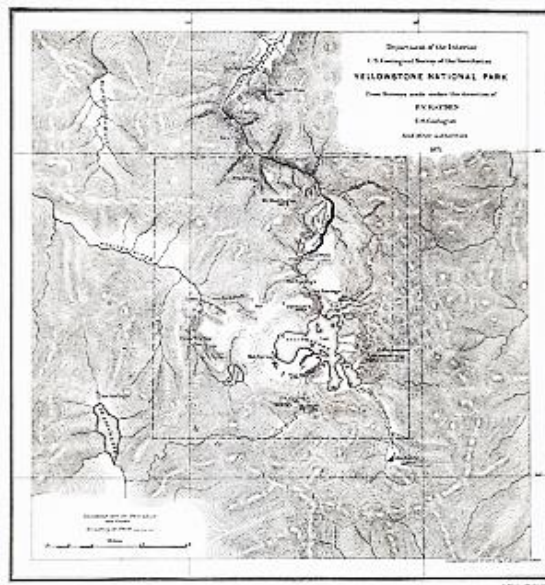
Photographer William Henry Jackson of Civil War fame
and artist Thomas Moran



Thomas Moran's *The Grand Canyon of the Yellowstone*, 1871



Jackson's photograph of Tower Fall, 1871



The first official map of the Yellowstone made under the supervision of Hayden in 1871

Just after the Park was commissioned in 1871, the United States Army was given the responsibility for managing the Park and protecting its resources. Its primary job during those early years was spent arresting and preventing poachers who had come to the Yellowstone to hunt buffalo and other game. In 1917, administration of the park was transferred to the National Park Service, which had been created the previous year.



Bison heads confiscated from poachers



Men in post exchange at Ft. Yellowstone



The first military outpost in Yellowstone was located at Norris Geyser Basin.
It is still situated there, but now serves as a museum.

After the newly established National Park Service took over administration of Yellowstone, the Union Pacific Railroad began investing in laying of tracks to Gardiner, Montana and West Yellowstone, Montana, and in building a hotel at Mammoth Hot Springs....

Chapter Seven

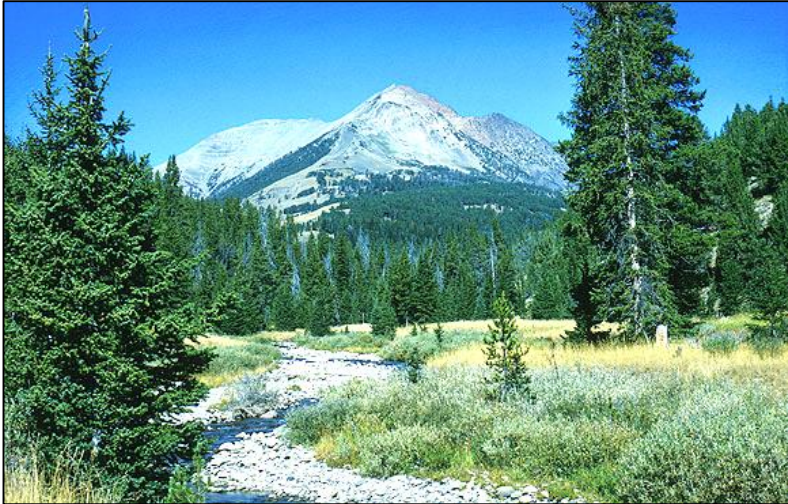
The Rocks and Minerals of Yellowstone

And now we come to probably what is the most interesting to me – the rocks and minerals of Yellowstone. The Greater Yellowstone region has more diversity of the rock types than just about any one area of the world. And the region to the northwest of Yellowstone Park has some of the most significant limestone formations anywhere.



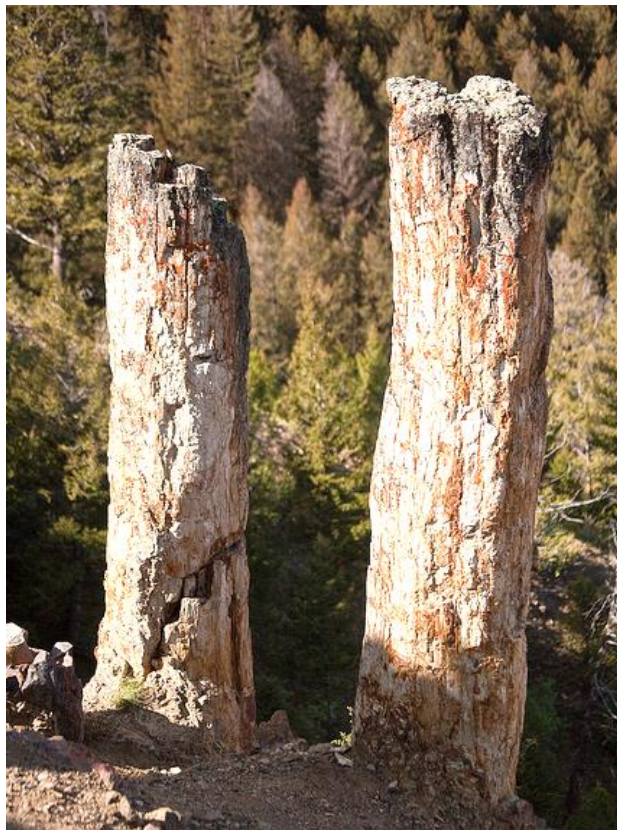
Limestone, Big Sky, Montana

The Gallatin and Absaroka Mountain Ranges, which immediately surround the north and northeast of Yellowstone Park contain the most petrified logs in volcanic ash flows in the world.



Electric Peak in the Gallatin Mountain Range, above Gardiner, Montana

The Gallatin Mountain Range contains an almost infinite number of petrified logs.



Petrified logs from the Gallatin Mountain Range, northwest of Yellowstone

The Beartooth Mountains to the north of Yellowstone are some of the most studied mountains in the world. They are filled with plutonic and metamorphic rocks, and show extreme uplift in the past.



The majestic Beartooth Mountains in Montana full of granite, a plutonic rock, and gneiss, a metamorphic rock

The Absaroka Mountains wrap around the park from the north to the southeast and are estimated to contain upwards of 9,200 cubic miles of volcanic lava, ash and tuff – the largest of any volcanic activity in the world!



Pilot Peak and Index Peak: These are part of the eroded remnants of the Absaroka Mountain Range; some of the greatest pyroclastic flows on record – 9,200 cubic miles of volcanic debris!



The volatile Madison Range with its history of earthquakes and metamorphic rocks

The Rock Types

Here is just a brief review for those who are trying to figure out the names and composition of the various rock types. Secular geologists have divided the rock types into groups by how they *think* the rocks formed. But I don't believe that is an acceptable way in light of the Scriptural view of earth history. The primary reason is that the history of most of the rocks was a thing of the past – the distant past for secular geology. No one saw the various rock formations form. No one saw the crust of the earth form. No one saw the metamorphic rocks form. No one saw the granites form. Their formation is interpreted by ideas. The prevailing idea in secular geology is a 4.6 billion year old earth. The idea from Genesis is a young earth of no more than 6,000 years old. The framework we will use in this guide will be that of Genesis chapters 1-8.

Secular geologists have traditionally divided the rock types into three groups:

1. **Igneous Rocks** – rocks geologists think were formed by fire or heat.
2. **Metamorphic Rocks** – rocks geologists think were formed over millions of years by heat and pressure deep underground.
3. **Sedimentary Rocks** – rocks geologists think were formed over millions of years of deposition, erosion and transportation of sediments.

The only rocks observed to be forming by geologists have been the volcanic rocks. What about granite? What about gneiss and schist? What about the huge limestone formations found around the world? Nope – no one has seen these rocks being formed.



The White Cliffs of Dover: a large limestone chalk formation in southern England

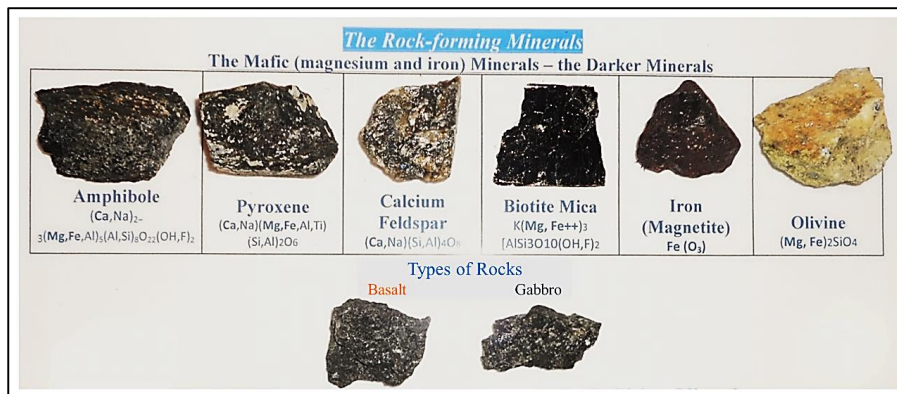
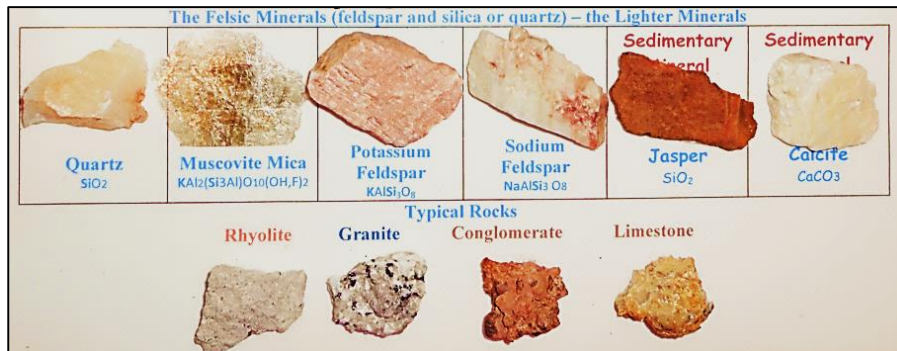
Let's take a second look at these groups in light of the young earth and global flood presented in the Book of Genesis. We will divide the rock types into the following groups:

- 1. Plutonic Rocks** – rocks that were formed initially as the foundation or basement rocks of the earth.
- 2. Volcanic Rocks** – rocks that have been and are forming as the result of volcanic activity. These rocks have all been formed during and subsequent to, the Flood. Volcanic rocks continue to be formed as remnants of the great Genesis Flood.
- 3. Metamorphic Rocks** – the word metamorphic means 'change'. These rocks appear to have been changed by some process that has stretched and rearranged the minerals into different kinds of rocks. While these could have been part of the foundation rocks created by God at the creation of the earth in Genesis chapter one, they could also be the product of the tectonic activity associated with the Flood.
- 4. Sedimentary Rocks** – rocks that have been laid down in/with/by limy mud and watery sand and clay sediments. The keys here are *water* and *mud*.

Yellowstone Park and the Greater Yellowstone Ecosystem have all of the rock types!

The Rocks of the Yellowstone Area

Rocks are made of minerals. Typically, there are 6 light and 6 dark minerals that comprise most of the rocks in the Yellowstone area.



Granite – Granite is a plutonic rock. The word plutonic comes from the Roman god of the underworld, *Pluto*. So these rocks are called ‘basement’ rocks by secular geologists. These form the continental crust of the earth. Secular geologists also add the metamorphic rocks to this, but their formation has not been observed. Considering the Flood framework, it might be that plutonic rocks were deformed by the tectonic forces of the Flood; the plutonic rocks changed into metamorphic rocks and mixed with the plutonic rocks. This certainly appears to be the case in the Beartooth Mountains. Secular geologists date these rocks at between 2 and 3 billion years old by way of radiometric dating. They are made....