Petrified Forest

NATIONAL MONUMENT · *ARIZONA*

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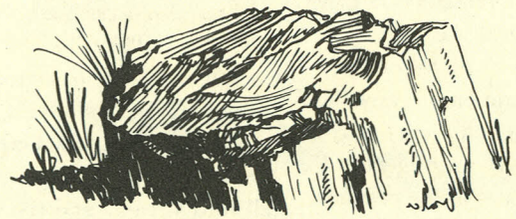
Historic Events

1540 First exploration of the Southwest by Coronado.
1851 Petrified wood first reported in northern Arizona by Lieutenant Sitgreaves.
1853 Petrified Forest Monument area visited by Army expedition headed by Lieutenant Whipple.
1857 Camel caravan of Lieutenant Beale crossed area.
1898 to 1900 First Government investigation of the area made by Lester F. Ward, of the U. S. Geological Survey.
1906 Petrified Forest set aside as a national monument by President Theodore Roosevelt.
1906 John Muir discovered, explored, and named the Blue Forest.
1911 Agate Bridge supported by stone pillars; replaced by present reinforced concrete beam in 1917.
1921 to 1929 Phytosaurs excavated in Blue Forest.
1930 Blue Forest and Newspaper Rock included in the monument by President Hoover.
1932 Painted Desert area added to the monument by President Hoover.
1932 Completion and dedication of Puerco River Bridge, making area accessible to motorists.
1933 Agate House restored and three rooms of Puerco River Ruin excavated.
1933 to 1940 Fossil leaf beds of Blue Forest discovered, explored, and described.
1940 Painted Desert Inn and Museum completed.

United States Department of the Interior
Oscar L. Chapman, *Secretary*
NATIONAL PARK SERVICE, Newton B. Drury, *Director*

Petrified Forest

NATIONAL MONUMENT



Arizona

Petrified Forest National Monument contains the greatest and most colorful concentration of petrified wood known in the world. It is a part of the National Park System owned by the people of the United States and administered for them by the National Park Service of the Department of the Interior. The monument contains 85,303 acres of federally owned land.

Within the monument are six separate "forests" where giant logs of agate lie prostrate on the ground and where numerous broken sections and smaller chips and fragments form a colorful ground cover.

The area is a part of the Painted Desert of northern Arizona, a region formed of banded rocks of many hues carved by wind and rain into a landscape fantastic in color and form. Here and there are beds of shale containing perfectly preserved fossil leaves of plants of a remote age. Occasionally the bones of giant reptiles and amphibians are washed from their burial places in the rocks.

PREHISTORIC INDIANS LIVED IN PETRIFIED FOREST

The ruins of pueblos built by Indians in pre-Columbian times, from 800 to 1,400 years ago, are scattered on nearly every mesa throughout the monument. Low mounds, strewn with blocks of sandstone and bits of broken pottery, mark the fallen walls of these ancient homes. Sometimes these dwellings, such as the Agate House in the Third Forest, were built of blocks of petrified wood, and smaller fragments of this material were chipped into arrowheads, knives, and scrapers. These Indians were undoubtedly related to the other pueblo builders and cliff dwellers of the times, and the modern Hopi and other Pueblo Indians are thought to be their descendants. Many petroglyphs (pictures carved into the surface of the rock), are found on the sandstone rocks throughout the area. Newspaper Rock, north of the Blue Forest, is the best example of this work of these early Indians.

HISTORY

We have no knowledge of the petrified forests from the early Spanish explorers. Apparently the first man to report the "stone trees" was Lieutenant Sitgreaves, an Army officer who explored parts of northern Arizona in 1851, soon after Arizona was acquired by the United States.

The petrified forests remained largely unknown, however, until the starting of the settlement of northern Arizona in 1878 and until the Atlantic and Pacific, now the Santa Fe Railway, was completed across northern Arizona in 1883. During the following years the existence of the petrified forests was threatened by souvenir hunters, gem collectors, commercial jewelers, and abrasive manufacturers. Entire logs were blasted to obtain the quartz and amethyst crystals often found within the logs, and much agate was carried away for making jewelry. The most serious threat, however, came with the erection of a stamp mill near the forests for the purpose of crushing the petrified logs into abrasives. Alarmed, the citizens of Arizona, through their territorial legislature, petitioned Congress to make the area a national park "so that future generations might enjoy its beauties, and study one of the most curious effects of nature's forces."

Accordingly, Lester F. Ward, of the United States Geological Survey, was instructed to investigate the area. As a result of his findings, Petrified Forest National Monument was established by President Theodore Roosevelt on December 8, 1906, under authority of the Act for the Preservation of American Antiquities.

THE GEOLOGIC STORY

The Forests.—About 160 million years ago, in Triassic time, northern Arizona is believed to have been a lowland where shifting streams spread sand and mud over the plains. Scientists believe that the growing forests were located upstream, possibly as much as a hundred miles to the west and southwest of the present petrified forests. The principal tree was similar to modern pines, but was more closely related to the Araucarian pines of South America and Australia. Two other kinds of primitive trees are also occasionally found.

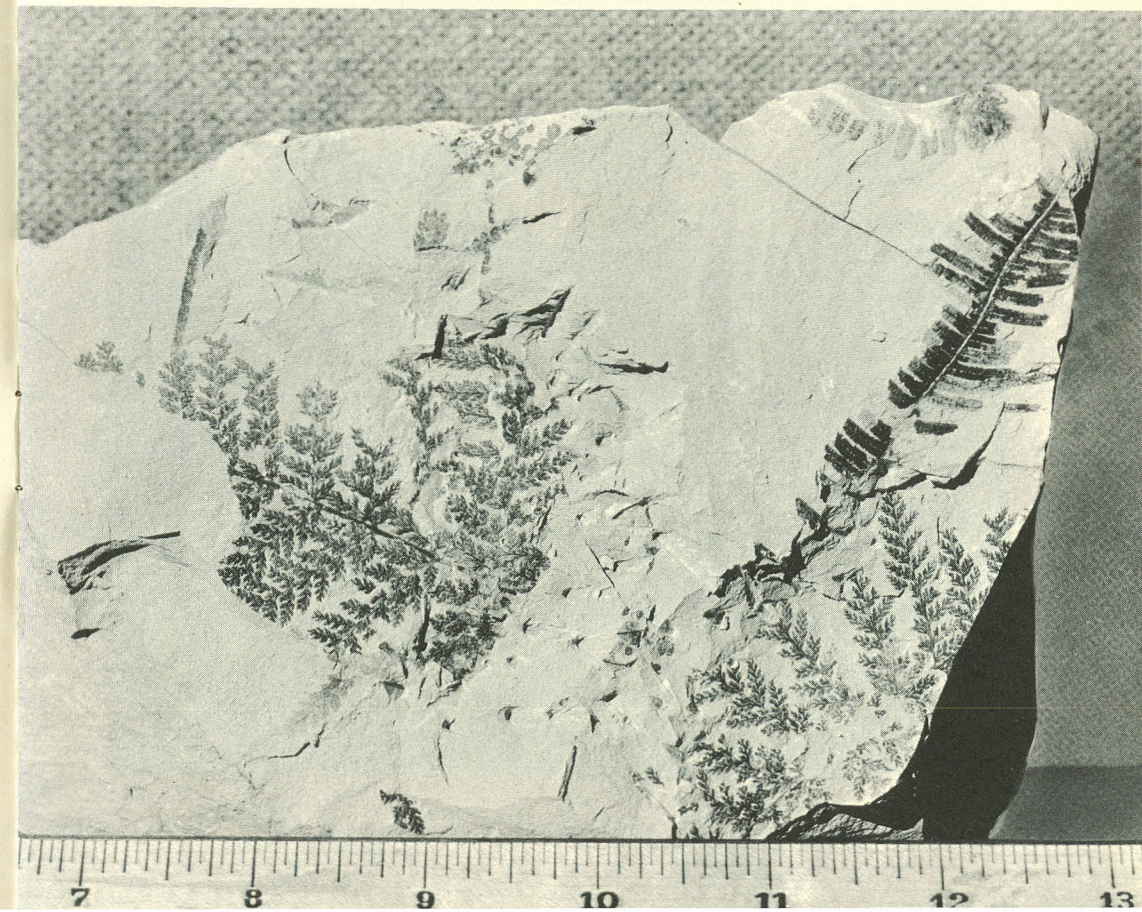
The Trees Were Buried.—Natural processes, occasionally hastened by destructive fires and ravages of insects, are believed to have killed the trees. Certainly, many of them decayed on the ground, but others fell into streams and rivers and came to rest in bays or on sand bars where rapid burial by mud and sand prevented their decay. The deposits in which these trees were buried were eventually turned to hard sandstones and shales and are now called the Chinle formation. The Chinle deposits were themselves buried at least 3,000 feet beneath layers of sand and silt spread by shallow seas.

The Logs Petrified.—The sediments in which the logs were buried contained a large amount of volcanic ash, which is high in the mineral silica. This silica was picked up by ground water, carried into the wood, and deposited in the cell tissue of the log. As the mineral filled the log solidly, it formed the present petrified log, which is by volume less than 5 percent wood, the balance being the mineral deposit. The various color patterns as we see them today were caused by oxides of iron and manganese. This particular type is known as agatized wood. Cavities in the logs were often filled or lined with quartz crystals.

How the Forest Was Brought to Light.—Since the forest was buried there have been several periods of great mountain making. Forces from deep in the earth thrust the

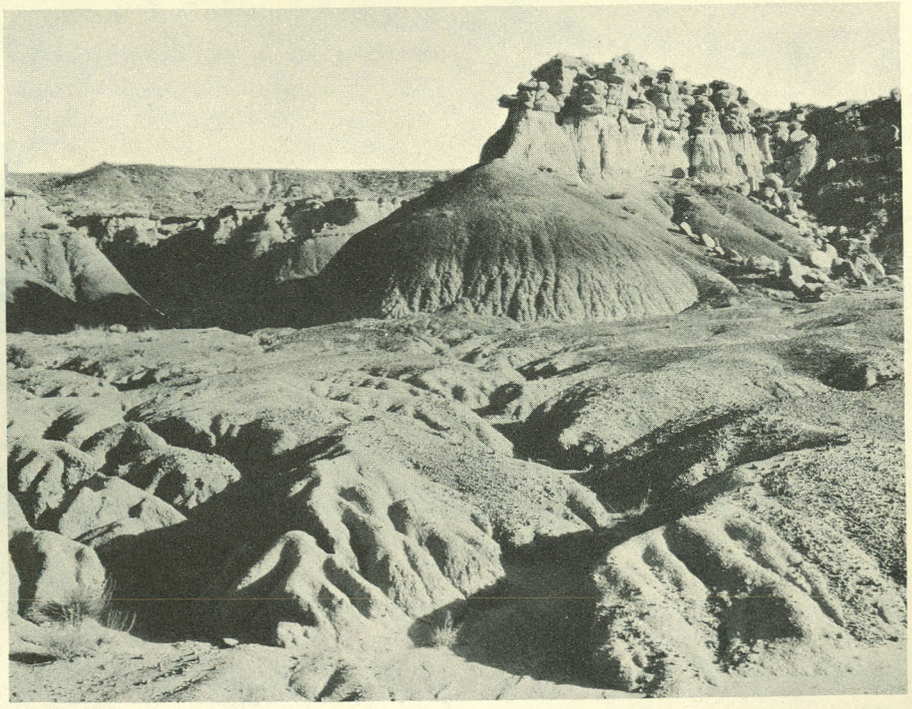
THE LOGS WERE BROKEN BY EARTH MOVEMENTS

FOSSIL FERNS FOUND IN SHALE, BLUE FOREST AREA



ONE OF THE LARGEST PETRIFIED LOGS

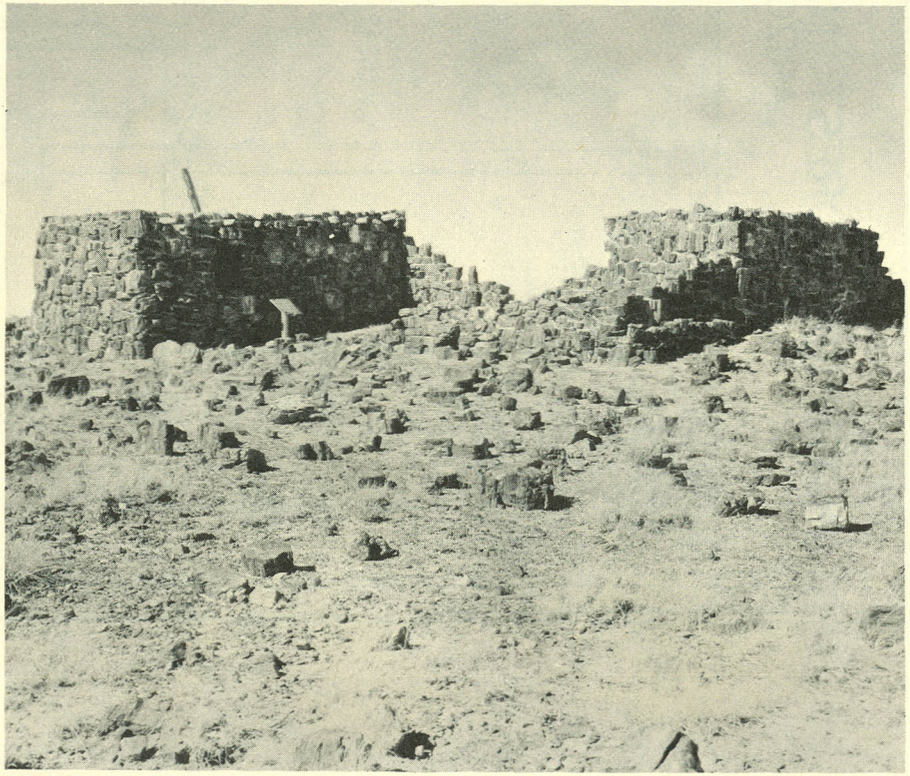
BADLAND FORMATIONS IN THE THIRD FOREST

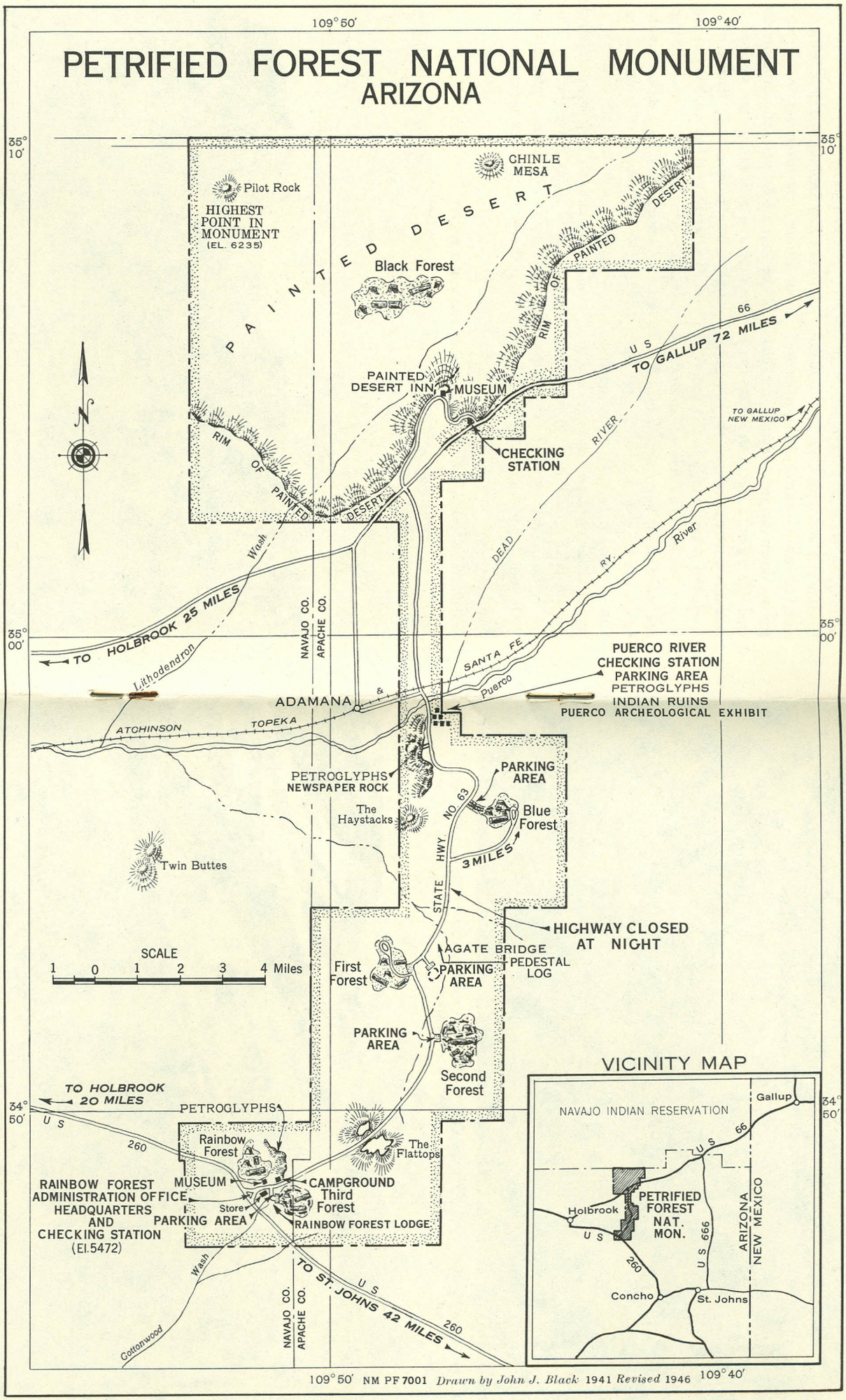


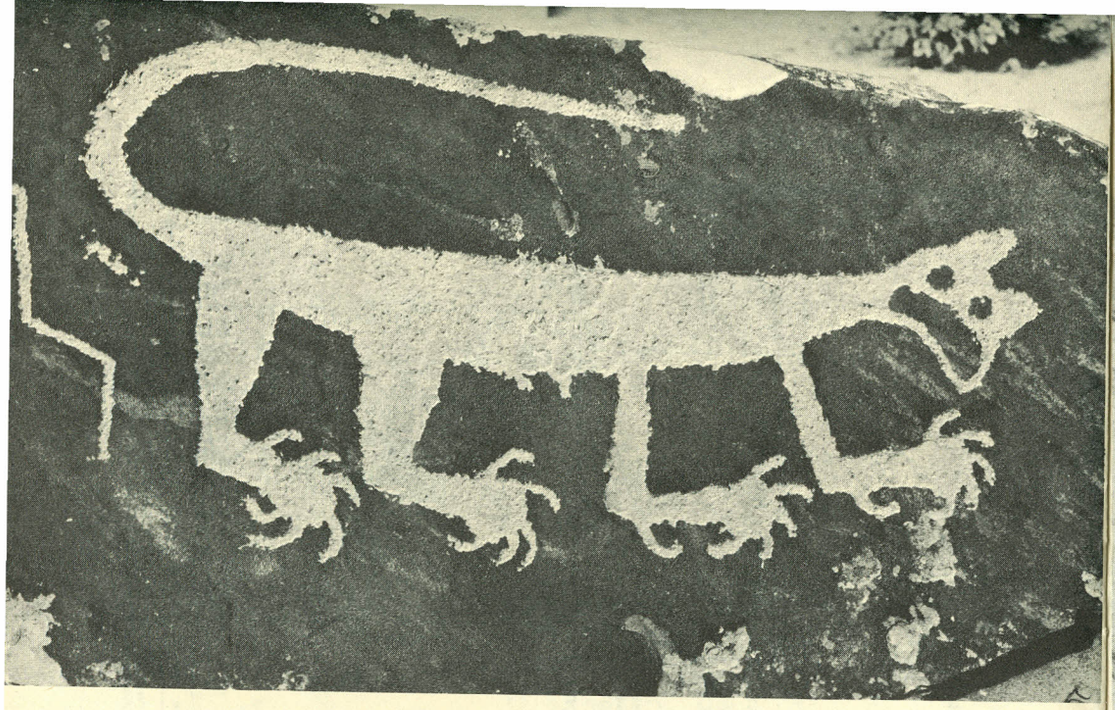
Rockies and Sierras upward several thousand feet, with the result that the land between these ranges was lifted far above its former position near sea level. As a result of this great mountain growth, certain areas became arid and desertlike, and soon the forces of erosion—wind and rain— started tearing down the great deposits that covered this region. Large river systems were established and carried away the loose mud, sand, and gravel which finally found its way to the sea. Thus the sediments that once covered the forest were removed, and finally the layers in which the logs were buried were cut by canyons and ravines, revealing the great petrified logs and the many bands of colored rock that make up the Painted Desert. As the logs wash from the hillsides, they break into sections which accumulate in piles at the base of the cliffs. At the present time only a small portion of the petrified forests is exposed, for logs occur below the surface of the ground to a depth of about 300 feet.

Broken Log Sections.—A most conspicuous feature is the manner in which some of the logs are broken into more or less even sections as if sawed into stovewood lengths. This is an entirely natural phenomenon which, it is believed, was started by earth shocks and pressure while the logs were still buried and tightly enclosed in the rocks. The logs may have broken as the area was lifted from sea level, or they may have cracked from the unevenly distributed weight of the rocks above the logs. The original cracks were small, tight, and inconspicuous. As the logs are exposed to

AGATE HOUSE IN THE THIRD FOREST




109° 50′
109° 40′
PETRIFIED FOREST NATIONAL MONUMENT
ARIZONA
35° 10′
35° 00′
34° 50′
CHINLE MESA
Pilot Rock
HIGHEST POINT IN MONUMENT (EL. 6235)
PAINTED DESERT
Black Forest
RIM OF PAINTED DESERT
PAINTED DESERT INN
MUSEUM
U S 66
TO GALLUP 72 MILES
TO GALLUP NEW MEXICO
CHECKING STATION
RIVER
DEAD
RY
River
Wash
TO HOLBROOK 25 MILES
NAVAJO CO.
APACHE CO.
Lithodendron
SANTA FE
&
ATCHINSON
TOPEKA
ADAMANA
Puerco
PUERCO RIVER
CHECKING STATION
PARKING AREA
PETROGLYPHS
INDIAN RUINS
PUERCO ARCHEOLOGICAL EXHIBIT
PETROGLYPHS
NEWSPAPER ROCK
PARKING AREA
The Haystacks
Blue Forest
HWY NO 63
3 MILES
Twin Buttes
STATE
HIGHWAY CLOSED AT NIGHT
SCALE
1 0 1 2 3 4 Miles
First Forest
AGATE BRIDGE
PARKING AREA
PEDESTAL LOG
PARKING AREA
Second Forest
TO HOLBROOK 20 MILES
U S 260
PETROGLYPHS
Rainbow Forest
The Flattops
RAINBOW FOREST ADMINISTRATION HEADQUARTERS AND CHECKING STATION (El. 5472)
MUSEUM
Store
PARKING AREA
CAMPGROUND
Third Forest
RAINBOW FOREST LODGE
Wash
Cottonwood
TO ST. JOHNS 42 MILES
U S 260
NAVAJO CO.
APACHE CO.
VICINITY MAP
NAVAJO INDIAN RESERVATION
Gallup
U S 66
Holbrook
PETRIFIED FOREST NAT. MON.
U S 260
U S 666
ARIZONA
NEW MEXICO
Concho
St. Johns
109° 50′ NM PF 7001 Drawn by John J. Black 1941 Revised 1946 109° 40′



PETROGLYPH OF A MOUNTAIN LION FOUND IN PETRIFIED FOREST. THIS PETROGLYPH IS NOW ON DISPLAY AT MONUMENT HEADQUARTERS

NEWSPAPER ROCK

AGATE BRIDGE

weathering, these cracks are opened and extended until the logs are separated into sections from one to several feet long.

The Painted Desert.—Both the color and the intricate land forms of the Petrified Forest areas and Painted Desert intrigue the spectator. These badlands get their color from the ancient volcanic deposits of that region, and the surface forms are typical of desert erosion.

The material from which the badlands were sculptured originally was deposited layer upon layer as volcanic ash, probably of drab color. The decomposition of the ash which released silica for petrification converted the ash into the claylike rock, called *bentonite*. When pure, the bentonite is nearly white, but in the Painted Desert it is stained all shades of red, orange, maroon, blue, purple, and yellow by iron minerals that also had their sources in the volcanic ash.

Bentonitic beds in arid or semiarid regions erode into badlands. The bentonite absorbs water like a sponge, swells, and disintegrates into a fine mud. As a result, the torrential summer rains that fall in northern Arizona rapidly cut the banded, bentonitic beds into sharp, conical hills, turreted ridges, and sharp, interbranching canyons and ravines. When dry, the bentonite is hard and strong and is thus able to preserve these intricate badlands forms during the long periods between rains. Locally, a hard

PETRIFIED LOGS IN THE RAINBOW FOREST

sandstone caprock may prevent rapid erosion of the shales beneath to form an abrupt-sided, table-topped butte or mesa. The resistant capping of the rim of the Painted Desert is composed of ancient volcanic rock.

INTERPRETIVE SERVICE

All visitors are invited to see the Rainbow Forest Museum. Its exhibits include many outstanding examples of polished petrified wood, fossils, minerals, charts, and a diorama explaining the formation of the petrified forests and the badlands. Other exhibits may be seen at the Puerco Archeological Exhibit and at the Painted Desert Museum.

During the summer months a short talk is given periodically in the Rainbow Forest Museum; and, as circumstances permit, guided tours through the Rainbow Forest are conducted by ranger naturalists.

All of these services are free of charge.

TRAVEL INFORMATION

Excellent paved approach roads make Petrified Forest National Monument easily accessible by car. U S 66, crossing the area near the Painted Desert, is the approach from the east. Travelers from the southeast, south, and west enter the monument from U S 260. The monument highway connects these two main arteries of travel and leads through the more interesting parts of the monument.

The monument can be visited throughout the year.

Railroad Travel.—The Santa Fe Railway passes through the monument. Travelers by rail may obtain privately operated cars in Gallup, N. Mex., and Holbrook and Winslow, Ariz., for tours through the monument.

ACCOMMODATIONS AND SUPPLIES

A small campground at the Rainbow Forest, equipped with tables, shade, and water supply, is available for the free use of campers.

The nearest towns where cabin, hotel, store, and garage facilities are available are Holbrook, Ariz., 20 miles west; Gallup, N. Mex., 92 miles east; and St. Johns, Ariz., 42 miles southeast. Distances are from monument headquarters.

Meals, gasoline, curios, and other tourists' supplies may be obtained at the Painted Desert Inn, on the Painted Desert Rim Drive, and at the Rainbow Forest Lodge, near the south entrance to the monument.

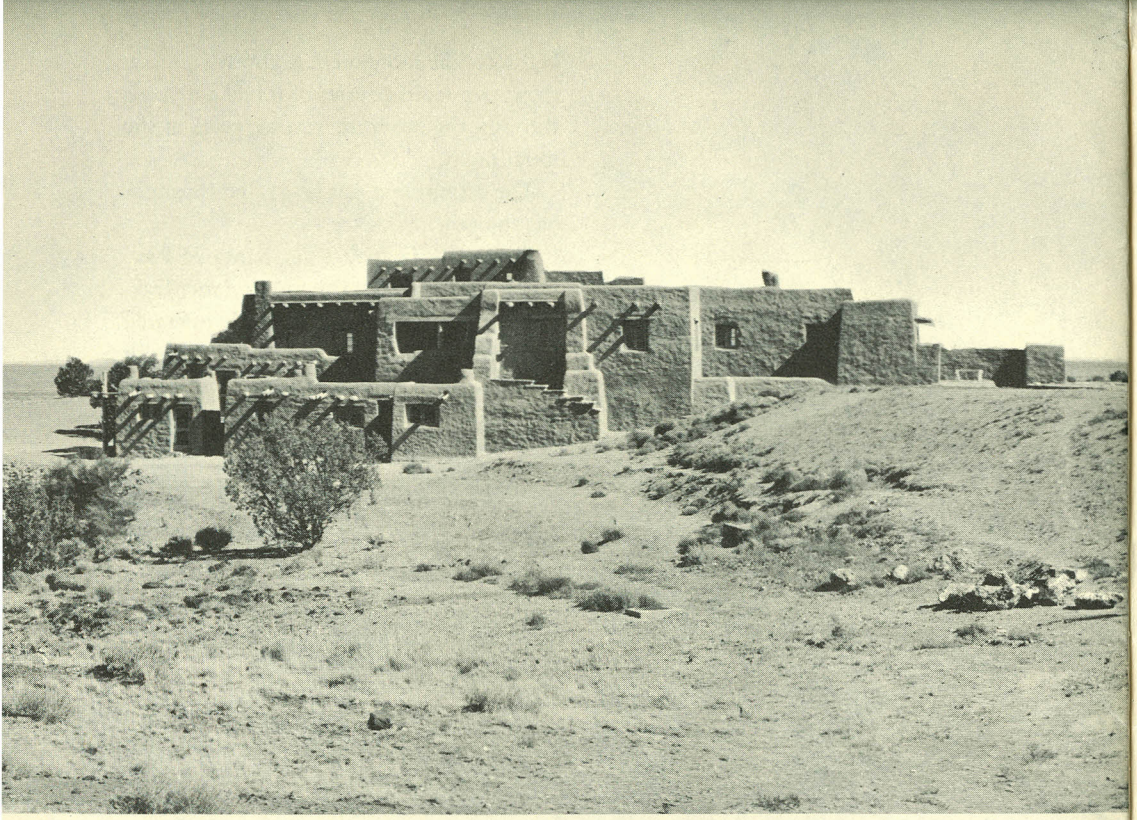
GUIDE FOR VISITORS

(Follow This Guide Through the Monument)

From U S 66—Read down

From U S 260—Read up

Painted Desert Rim Drive.—Take road from U S 66 to rim. Distance back to U S 66, via rim, about 5 miles. Beautiful view of Painted Desert. Volcanic rock has formed this rim or escarpment. Museum of Indian Arts and Crafts in basement of Painted Desert Inn.



PAINTED DESERT INN

Painted Desert and Black Forest.—Formed by wind and water. Once a semi-tropical jungle of coniferous trees, rushes, and ferns, inhabited by great reptiles and amphibians. Floods covered the region with layers of mud and sand. Trees and bones absorbed minerals; turned to stone. Mountains uplifted the region; erosion washed away mud and sand; trees and bones are now washed out of the hills. Erosion cutting across the many colored beds of shale and sandstone produces the "Painted Desert."

Puerco River Ranger Station.—(To enter monument.) Secure automobile permit, 50 cents. While here visit Puerco Indian Ruin back of ranger station. Short trail—5 to 19 minutes. Ruin indicates 150 to 160 rooms. Built 800 to 900 years ago. Few rooms excavated. (To leave monument.) Get clearance.

Newspaper Rock.—Side road ¼ mile. Fine trail—12 to 15 minutes. Remarkable prehistoric Indian "writings" (petroglyphs) probably 800 to 900 years old. Made by chipping through outer dark sandstone surface with sharp tool, probably of petrified wood. Many interesting figures, symbolic designs, and characters are present on these rocks. They have never been interpreted, but may be clan symbols, trail markers, or of ceremonial significance.

Lower Blue Forest Drive.—Fine side road—one-half mile to parking area. Typical badlands exposures.

Blue Forest Connecting Trail.—Gravel trail—1 mile long—50 to 60 minutes. Leads to Upper Blue Forest Parking Area, where driver can meet anyone walking across trail. Logs on 3 levels. The only forest with pink logs. Remarkable "chip" piles. Blue shale beds—typical badlands—contain numerous fossils (leaves, bones, and teeth).

Upper Blue Forest Drive.—Good graveled road—3 miles to parking area. Fine panoramic view of Blue Forest badlands and Puerco River Valley. Conglomerate capped mesa. Head of Blue Forest Connecting Trail.

Agate Bridge Trail—5 to 10 minutes.—Petrified log forms natural bridge. Log 111 feet long; span about 40 feet. Erosion of sandstone by rain water has produced this bridge. Most noted petrified log. Log has never fallen; support only recently installed. Pedestal Log a short distance south.

First Forest.—Fine side road—8 to 10 minutes. Highly colored, broken logs very abundant, eroding from conglomerate bed that caps mesa.

Second Forest.—Good trail—20 to 25 minutes. Peculiar white, silicified logs; logs showing fire scars; carbonized material present. Hollow logs show crystals in place. Many logs blasted years ago for these crystals.

Third Forest and Agate House.—Paved trail—25 to 40 minutes. Finest long log area—some 150 to 160 feet. Panorama Knoll gives good view. Agate House side trail to prehistoric Indian dwelling recently excavated and partially restored; built of petrified wood 800 to 900 years ago.

Rainbow Forest.—Start from museum on all paved trail—15 to 20 minutes. Logs show beautiful bands of color. Old Faithful, one of the largest logs, at top of trail. Mather Memorial on side trail. Chert pebbles contain invertebrate fossils.

Rainbow Forest Museum.—Exhibits include beautiful polished sections of agatized wood, fossil reptiles, and amphibian skulls, bones, and teeth. Charts tell story of the Petrified Forest: where the trees grew; how they were buried; how minerals in the ground turned them to stone; how mountains uplifted the region; how erosion has since uncovered the logs. A diorama shows how this region appeared in Triassic time when the forest was growing. Rare fossil fern and cycad leaves are exhibited. The particular type of fossil pine or conifer is explained. Charts show geology of the region; animals and plants that lived when the forest grew; how the rainbow colors formed. Map of petrified wood distribution in the United States and samples from other States. Various publications are on sale.

U S 260 Ranger Station.—(To enter monument.) Secure automobile permit, 50 cents. Drive carefully. (To leave monument.) Get clearance and information on roads.

THE RANGERS ARE HERE TO ASSIST YOU AS WELL AS TO PROTECT THE MONUMENT AREA—WHEN IN DOUBT ASK A RANGER—*THANK YOU*

CONSERVATION OF THE PETRIFIED WOOD

PLEASE HELP PROTECT THIS FOREST FROM VANDALISM

PETRIFIED FOREST NATIONAL MONUMENT WAS ESTABLISHED TO PRESERVE AND KEEP INTACT THIS UNUSUAL DEPOSIT OF PETRIFIED WOOD SO THAT FUTURE GENERATIONS WILL HAVE THE SAME OPPORTUNITY TO ENJOY IT AS THE VISITOR OF TODAY. PLEASE HELP US TO DO THIS BY NOT INJURING, DESTROYING, OR REMOVING SPECIMENS OF PETRIFIED WOOD OF ANY SIZE WHATSOEVER FOUND WITHIN THE MONUMENT BOUNDARIES, OR BY DEFACING, DESTROYING, DISTURBING, OR MARKING ANY RUINS, PICTURES, PETROGLYPHS, OR OTHER WORKS OF PRIMITIVE OR PREHISTORIC MAN.

Your cooperation in the observance of these regulations will make it unnecessary for us to impose penalties of fines or imprisonment, or both, as provided for under the laws of the United States Government for the protection of Petrified Forest National Monument.

At first glance it might appear that there is an unlimited supply of petrified wood and that this regulation prohibiting its removal is drastic, but it must be remembered that petrified wood is not being formed by nature in this area today. When a piece is removed it is gone forever and can never be replaced. All of the wood would be gone within a few years if each of the 350,000 yearly visitors took away a few pounds. **OTHERS HAVE LEFT IT HERE FOR YOU TO ENJOY, PLEASE DO THE SAME FOR THOSE WHO FOLLOW YOU.**

PETRIFIED WOOD WHICH YOU SEE OFFERED FOR SALE IS OBTAINED FROM PRIVATE LANDS OUTSIDE OF THE MONUMENT BOUNDARIES. Only polished petrified wood which has been purchased from wood dealers operating outside of Petrified Forest National Monument may be procured from monument concessioners.

Please cooperate in maintaining and protecting this monument.

The following items, which through their observance will tend to make your trip and that of your neighbors more enjoyable, are listed for your guidance:

The monument is a sanctuary for all living things. Please do not molest the wild birds or animals or pick wild flowers.

You may bring your pets into the monument on leash, crated, or otherwise under physical restrictive control.

Camping and picnicking are permitted at the headquarters picnic area only.

Unless adequately sealed, cased, broken down, or otherwise packed to prevent their use while in the park, firearms are prohibited, except upon written permission from the superintendent.

Both amateur and professional photographers may take still pictures in the monument and amateur photographers and bona fide news reel cameramen may take motion pictures, but professional photographers using motion picture cameras should obtain a permit from the superintendent.

All accidents should be reported to the nearest ranger station.

The speed limit is 35 miles per hour. Please drive with caution and heed all traffic signs. Remember that a driver's courtesy toward others is the greatest factor in safety.

Lost and found articles should be reported to the nearest ranger station. Articles found will be mailed to the finder after 60 days if not claimed.

An annual fee of 50 cents is charged each automobile and motorcycle entering the monument.

The monument highway between the Rainbow Forest and the Painted Desert is closed at night.

For sale by the Superintendent of Documents, U. S. Government Printing Office
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REVISED 1950

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