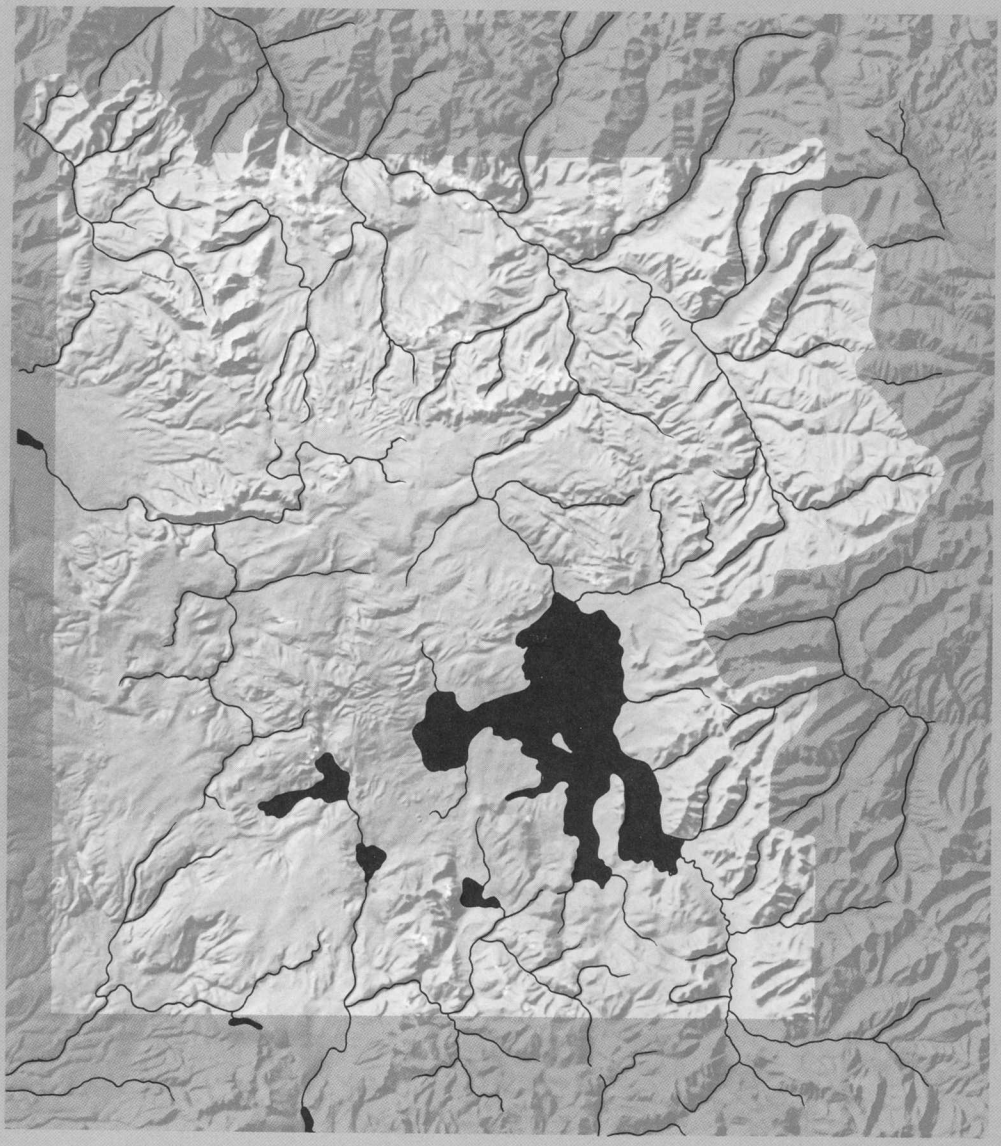
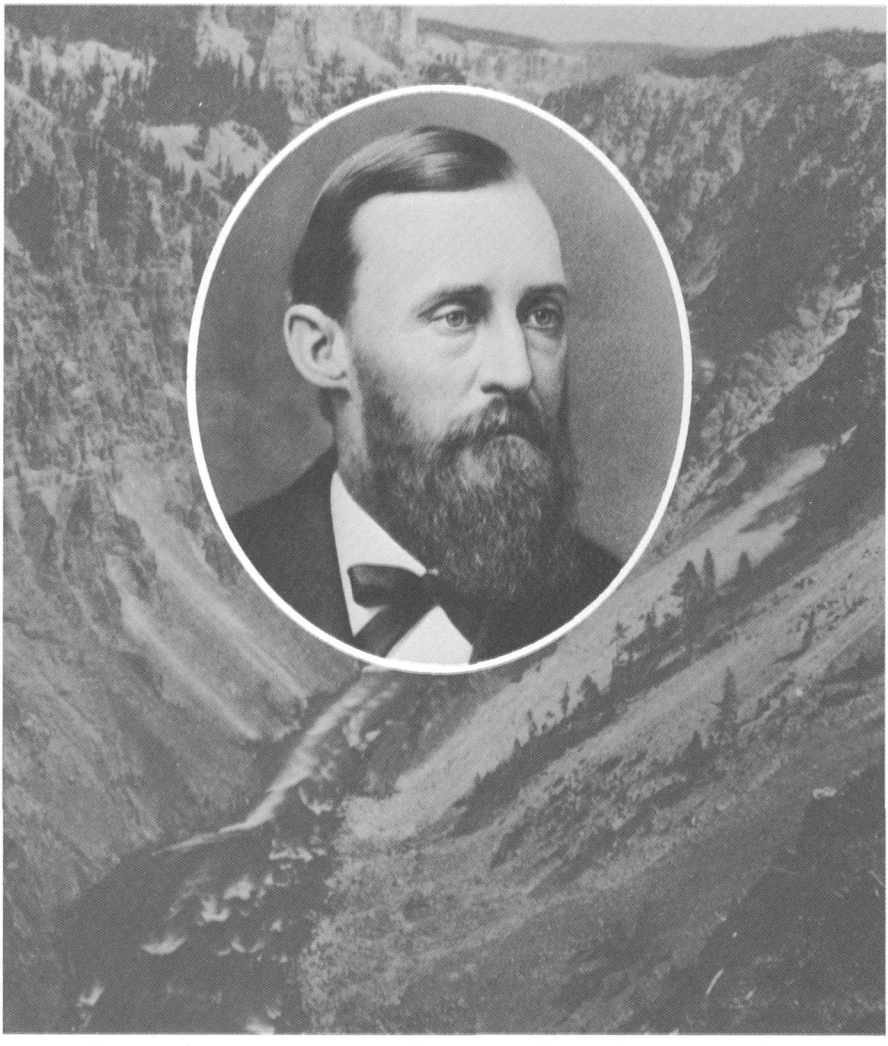
Ferdinand Vandiveer Hayden and the Founding of the Yellowstone National Park

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



Shaded relief map of Yellowstone National Park.

Ferdinand Vandiveer Hayden and the Founding of the Yellowstone National Park



For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402 - Price 75 cents
Stock Number 2401-02396

FOREWORD

Following the Civil War, the United States intensified the exploration of her western frontiers to gain a measure of the vast lands and natural resources in the region now occupied by our Rocky Mountain States. As part of this effort, the U.S. Geological and Geographical Survey of the Territories was formed and staffed under the leadership of geologist Ferdinand Vandiveer Hayden. Originally organized under the U.S. Public Land Office in 1861, the Hayden Survey (as it was most often identified) was placed under the Secretary of the Interior in 1869 and later, under the newly created U.S. Geological Survey. Its records, maps, and photographs were then transferred to the latter agency.

In commemorating the centennial of Yellowstone National Park, the U.S. Geological Survey drew upon those items deposited by Hayden to describe the early exploration of the Yellowstone area and to recount events that led to the establishment of Yellowstone as the Nation's first national park.

The Grand Canyon of the Yellowstone, an oil painting by Thomas Moran reproduced here in one color.

During the past century, over 50 million people have visited Yellowstone National Park and have marvelled at its never-ending display of natural beauty. The camper, the hiker, the fisherman, and the naturalist as well as the photographer and the artist all share the grandeur of the vast Park area. For each the Park's wilderness takes on a different meaning. Recently, scientists of the U.S. Geological Survey in cooperation with the National Park Service and aided by the interest of the National Aeronautics and Space Administration (NASA) in remote sensing, have probed the depths and farthest corners of the Park seeking answers to questions concerning the origin of Yellowstone's complex features—a question that has intrigued earth scientists since the first days of the Hayden Survey. For these scientists, the Park continues to exemplify the great restlessness of the earth throughout the ages.

Among those who played key roles in establishing Yellowstone as the Nation's first national park was Ferdinand Vandiveer Hayden. His accomplishments in 1871–72 were the highlights of a long and distinguished career in public service.

Although born in Westfield, Massachusetts, on September 7, 1829, Hayden was raised by an uncle on a farm in Rochester, New York. Following an unusually studious boyhood, he began teaching school when

Dr. Hayden in Union Army uniform during the Civil War. This was the only time Hayden actually practiced medicine.

he was 16 years old. However, he quickly became discontented with what he considered an inadequate education, and after two years of teaching made his way to Oberlin, Ohio. There, although virtually penniless, he persuaded the President of Oberlin College to allow him to enroll in medical school.

While at Oberlin, Hayden formed a close association with a young geologist named John Strong Newberry, who urged Hayden to pursue his studies under his own former teacher, James Hall of Albany, New York. Soon after, Hayden enrolled at Albany Medical College, and although he graduated as a Doctor of Medicine in 1853, it is during this time that his interest in geology was fostered under the influence of Professor Hall.

Shortly after graduating, Hayden set out on his first geological expedition under the sponsorship of Hall. Accompanied by the paleontologist Fielding Bradford Meek, Hayden headed up the Missouri River to explore the Dakota Badlands and to collect fossil specimens. Returning in 1854, he and Meek began to acquire reputations of their own and, as a team, they added significant geological information to what was known about the Nation's western frontier.

During the War between the States, Hayden practiced medicine for the only time in his career, serving with the Union Army as a surgeon. Following the War he received his first academic degree in geology when he was appointed Professor of Geology and Mineralogy at the University of Pennsylvania in 1865, a post he held mainly in absentia, for the next seven years. During this period Hayden spent much of his time studying and reporting on the geology of the Nebraska Territory and Rocky Mountain Region.

In 1869, Hayden completed a highly successful expedition through the western mountains from Denver to Santa Fe. This expedition set the pattern for those to follow, for his team studied virtually all

Hayden, mounted on his horse "Patsy", maintained a tenuous link with his professor's chair at Pennsylvania University by frequently wearing a frayed dress coat.

natural phenomena which they encountered, including wildlife, plant life, water resources and mineral deposits.

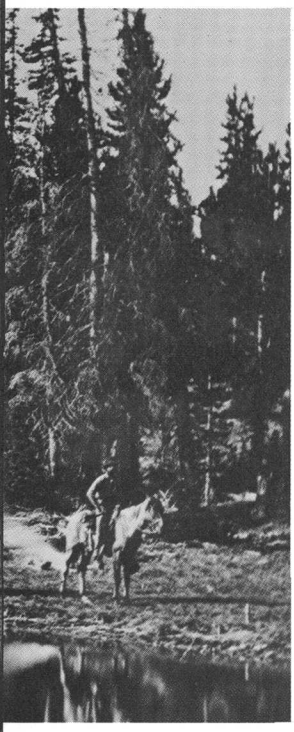
The Yellowstone area was almost the last unexplored area within conterminous United States when Hayden led his expedition into the area in 1871. Westward migration had passed it by, and even the discovery of gold in nearby Montana failed to stimulate the exploration of Yellowstone.

General James Wilkinson had reported the existence of the area to President Thomas Jefferson in 1805. Rumors about the area had reached Hayden during his lonely exploration of the upper Missouri country in the 1850's. An Army expedition under Captain William F Raynold, of which Hayden was geologist-in-charge, failed to get through the snow filled passes of the surrounding mountains, in the 1860's. This latter failure served to whet Hayden's desire to explore this region where "hell spouted up."

The Hayden Survey led by Lieutenant Gustavus C. Doane and military escort, enroute between the Yellowstone River and the East Fork.

Hayden's historic expedition into the Yellowstone area in 1871 was preceded by two expeditions which fired the imagination of those interested in that largely unknown region. The Folsom-Cook group penetrated the Yellowstone Country in 1869, followed by the Washburn-Langford-Doane Expedition in 1870. Lieutenant Gustavus C. Doane, who served as the leader of the military escort for this latter expedition, filed a detailed report which was published as a congressional document and became a landmark of the Yellowstone story. The following is taken from his report:

"We kept the Yellowstone to our left, and finding the canyon impassable passed over several high spurs coming down from the mountains, over which the way was much obstructed by fallen timber, and reached, at an elevation of 7,331 feet, an immense rolling plateau extending as far as the eye could reach. This elevated slope of country is about 30 miles in extent, with a general declivity to the northward. Its surface is an undulated prairie dotted with groves of pine and aspen. Numerous lakes are scattered throughout its whole extent, and great numbers of springs, which flow down the slopes and are lost in the volume of the Yellowstone. The river breaks through this plateau in a winding and impassable canyon of trachyte lava over 2,000 feet in depth; the middle canyon of the Yellowstone, rolling over vol-



canic bowlders (sic) in some places, and in others forming still pools of seemingly fathomless depth. At one point it dashes here and there, lashed to a white foam, upon its rocky bed; at another it subsides into a crystal mirror where ever a deep basin occurs in the channels. Numerous small cascades are seen tumbling from the lofty summits a mere ribbon of foam in the immeasurable distance below. This huge abyss, through walls of flinty lava, has not been worn away by the waters, for no trace of fluvial agency is left upon the rocks; it is cleft in the strata brought about by volcanic action plainly shown by that irregular structure which gives such a ragged appearance to all such igneous formations. Standing on the brink of the chasm the heavy roaring of the imprisoned river comes to the ear in a sort of hollow, hungry growl, scarcely audible from the depths, and strongly suggestive of demons in torment below. Lofty pines on the bank of the stream dwindle to shrubs in dizziness of distance. Everything beneath has a weird and deceptive appearance. The water does not look like water, but like oil. Numerous fishhawks are seen busily plying their vocation, sailing high above the waters, and yet a thousand feet below the spectator. In the clefts of the rocks, hundreds of feet down, bald eagles have their eyries, from which we can see them swooping still

The artist Thomas Moran as he appeared on the 1871 Yellowstone Expedition.

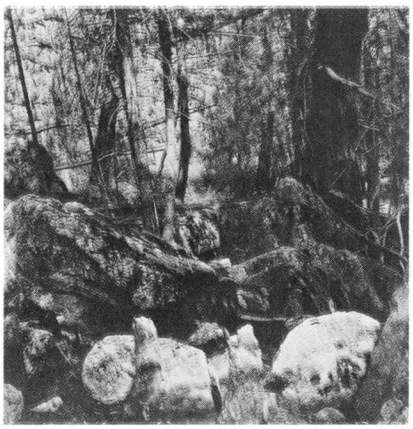
further into the depths to rob the ospreys of their hard-earned trout. It is grand, gloomy, and terrible; a solitude peopled with fantastic ideas; an empire of shadows and of turmoil."

Spurred on by these accounts, Hayden organized his Yellowstone Expedition with the support of a $40,000 appropriation from Congress. In early June 1871, a team of 34 men and seven wagons, set out from Ogden, Utah. Among the group were geologist and executive officer of the expedition, James Stevenson, mineralogist A.C. Peale, topographer Antoine Schoenborn, artists Henry W. Elliott and Thomas Moran, and photographer William H. Jackson. The latter two proved to be invaluable to the expedition, for their paintings and photographs served as dramatic and effective testimonials in favor of establishing the park.

After several weeks of travel, the Hayden expedition reached Boettler's Ranch in the Yellowstone Valley. There they were joined by the Barlow-Heap military party of engineer-explorers who planned a reconnaissance of the Upper Yellowstone. This latter group intermittently explored with the Hayden expedition during the next several weeks. The results of their explorations were published as a Senate Document which contributed to the material eventually used in helping to establish the Yellowstone National Park.

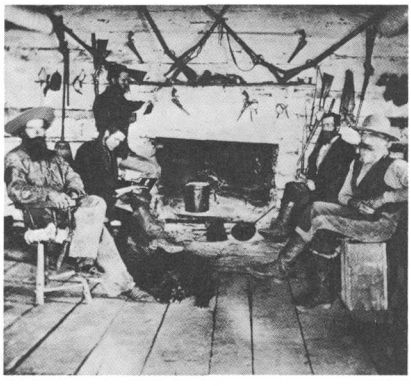
The joint Hayden/Barlow-Heap expedition departed from Boettler's on July 20, 1871. The wagons and extra supplies were abandoned at Boettler's and the remaining gear packed on mules. Progress was slow, and the difficulty of moving through the dense forest was compounded by the great number of trees felled by fires that periodically swept the region. There was always the danger of Indian attack or of being separated from the main party and becoming lost in the uncharted wilds.

The Yellowstone Basin, however, proved to be an ideal open-air laboratory because the area is foremost a geological area, containing an extraordinary variety of natural features including important clues to mountain-making and volcanic processes. Each of the scientists accompanying the expedition found unique opportunities for observation and study.



The Trail in the Woods, Gallatin Canyon.

Boettler's Ranch, in southern Montana Territory, near the Yellowstone River.



Typical interior of a northwest ranch in the 1870's.

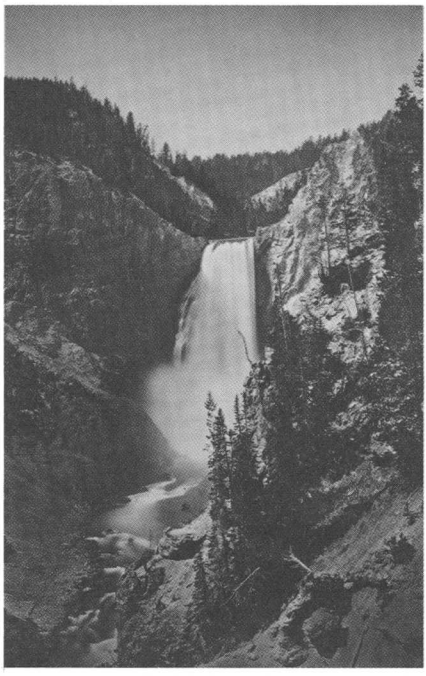
Hayden Survey camp at Boettler's Ranch. Emigrant Peak is in the distance.

Hayden recorded his thoughts as his party advanced up the River: "But the objects of the deepest interest in this region are the falls and the Grand Cañon (of the Yellowstone). I will attempt to convey some idea by a description, but it is only through the eye that the mind can gather anything like an adequate conception of them. . . . But no language can do justice to the wonderful grandeur and beauty of the cañon below the Lower Falls; the very nearly vertical walls, slightly sloping down to the water's edge on either side, so that from the summit, the river appears like a thread of silver foaming over its rocky bottom; the variegated colors of the sides, yellow, red, brown, white, all intermixed and shading into each other; the Gothic columns of every form standing out from the sides of the walls with greater variety and more striking colors than ever adorned a work of human art."

The Grand Canyon, from the Lower Falls.

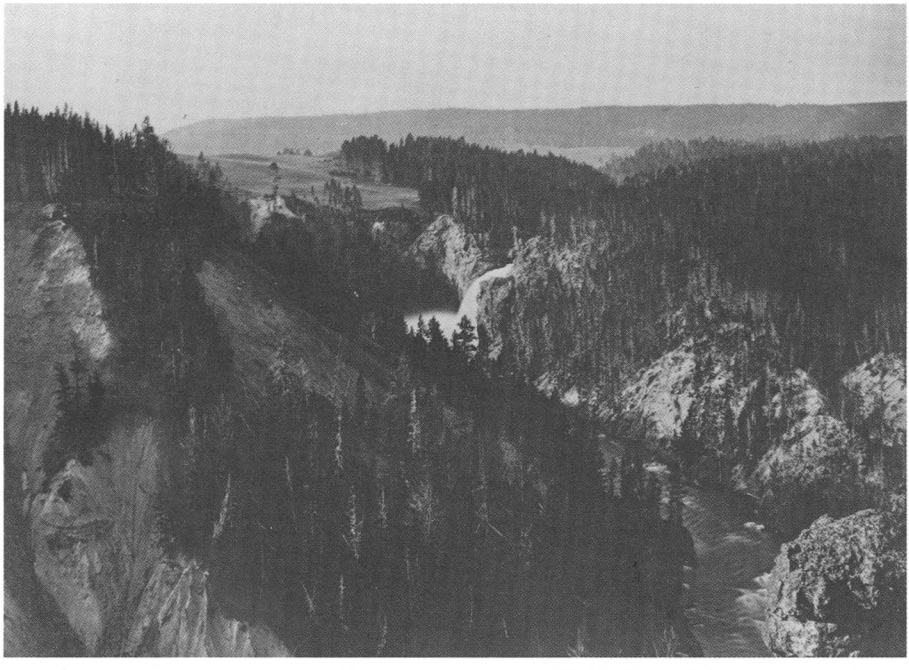
Hayden continued to describe the falls: "Standing near the margin of the Lower Falls, and looking down the Cañon . . . with its sides 1,200 to 1,500 feet high, and decorated with the most brilliant colors that the human eye ever saw, with the rocks weathered into an almost unlimited variety of forms . . . the whole presents a picture that would be difficult to surpass in nature."

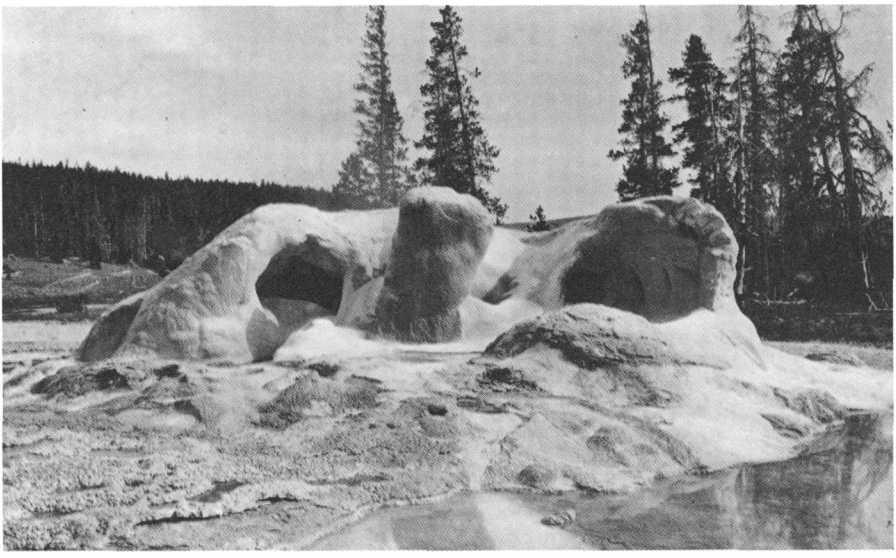
"From any point of view, the Upper Falls are most picturesque and striking. The entire volume of water seems to be, as it were, hurled off the precipice with the force which it has accumulated in the rapids above, so that the mass is detached into the most beautiful snow-white, bead-like drops, and as it strikes the rocky basin below, it shoots through the water with a sort of ricochet for the distance of 200 feet."



The Lower Falls of the Yellowstone.

The Upper Falls of the Yellowstone.

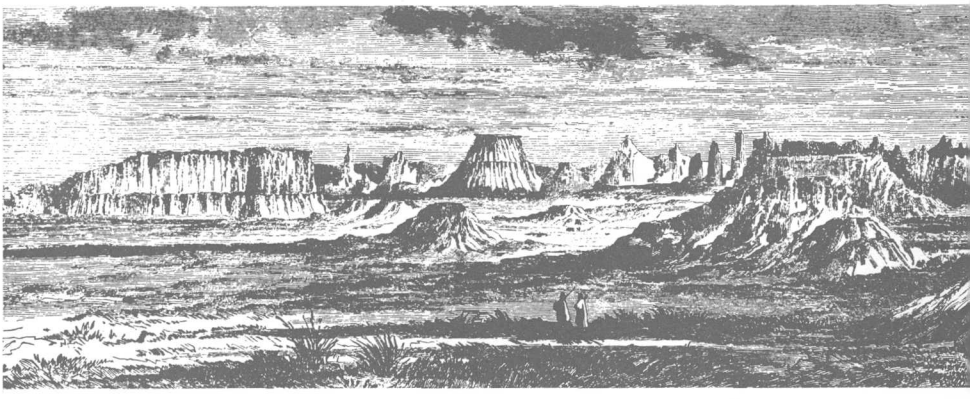




Crater of the Grotto Geyser.

Of the Yellowstone itself, Hayden said: "The river, by its width, its beautiful curves, and easy flow, moves on down towards its wonderful precipices with a majestic motion that would charm the eye of an artist."

However, not all was majestic beauty, for there was also the power and mystery of the geysers, and the grotesque forms of the hot mud springs. Hayden described these phenomena, such as one geyser he named the Grotto: "A vast column of steam issues from a cavern in the side of the hill, with an opening about 5 feet in diameter. The roaring of the waters in the caverns, and the noise of the waters as they surge up to the mouth of the opening, are like that of the billows lashing the sea-shore. The water is as clear as crystal, and the steam is so hot that it is only when the breeze wafts it aside for a moment one can venture to take a look at the opening."

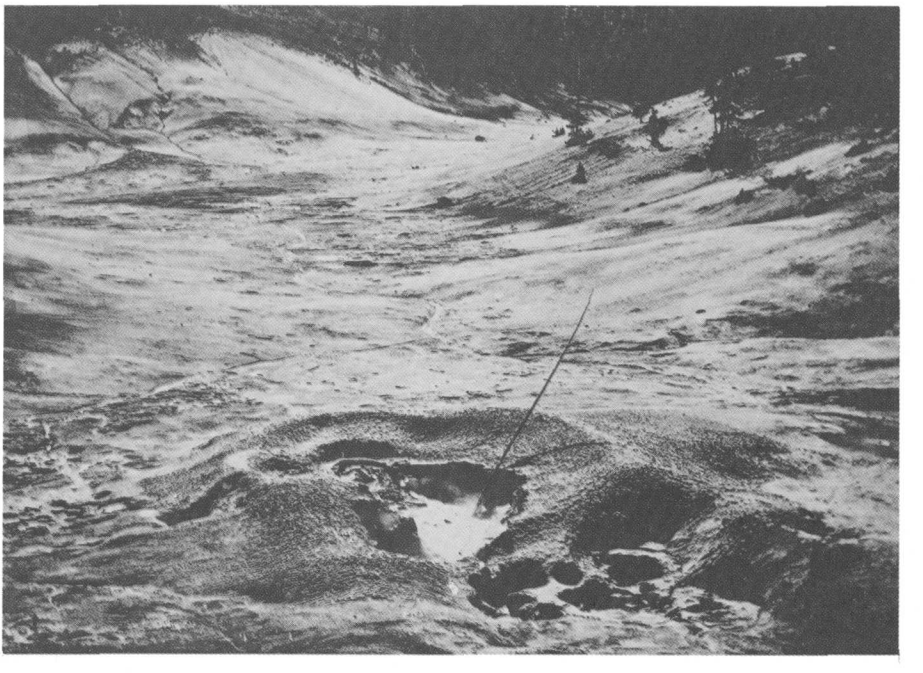


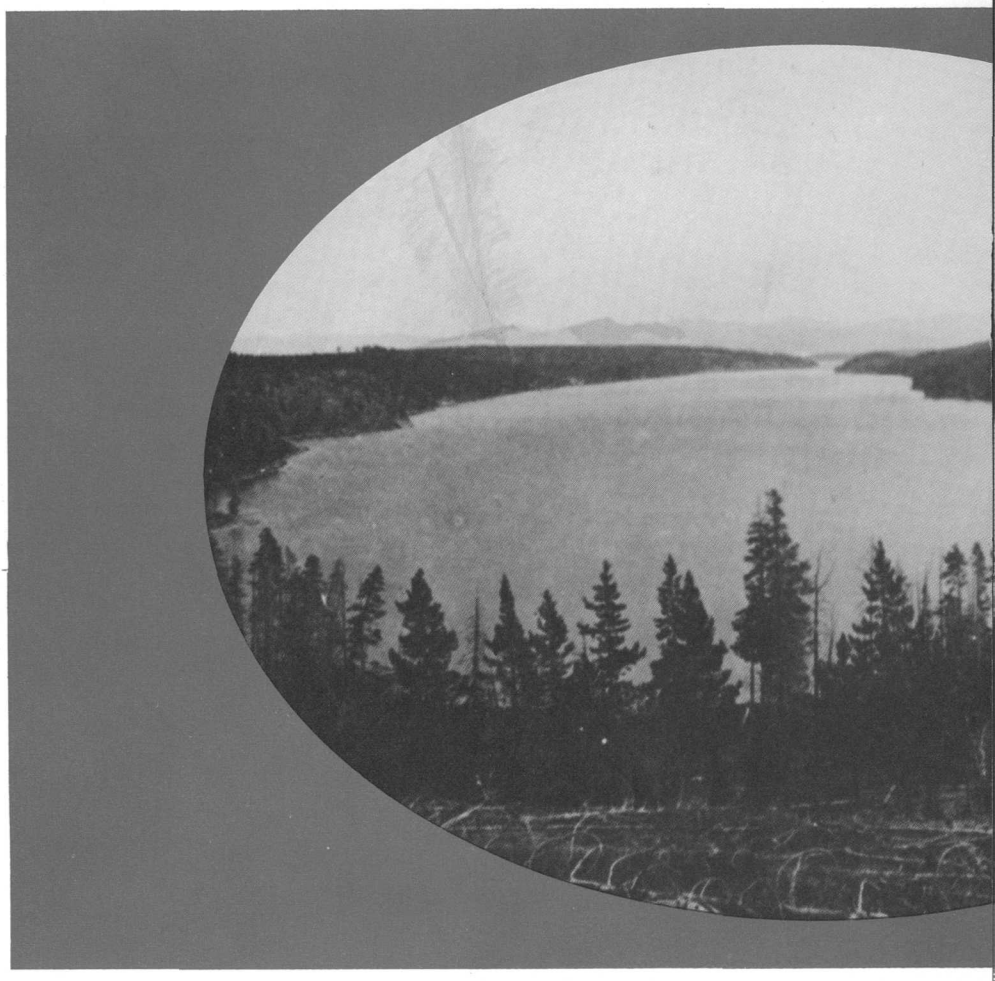
"Located higher up on the side of the hill not far from the Grotto, is the most remarkable mud-spring we have ever seen in the West. It may not improbably be called the Giants Caldron. It does not boil with an impulse like most of the mud-springs, but with a constant roar which shakes the ground for a considerable distance, and may be heard for half a mile. All the indications around this most remarkable caldron show it has broken out at a recent period. . . ."

Examining the mud-springs and geysers was hazardous business and could be a painful experience, as Hayden discovered: "The entire surface is perfectly bare of vegetation and hot, yielding in many places to slight pressure. I attempted to walk about among these simmering vents, and broke through to my knees, covering myself with hot mud, to my great pain and subsequent inconvenience."

Finally, the expedition reached Yellowstone Lake, the focal point of their exploration, causing Hayden to remark: "On the 28th of July we arrived at the Lake, and pitched our camp on the northeast shore, in a beautiful grassy meadow or opening among the dense pines. The lake lay before us, a vast sheet of quiet water, of a most delicate ultramarine hue, one of the most beautiful scenes I have ever beheld. The entire party was filled with enthusiasm. The great object of our labors has been reached, and we were amply paid for all our toils. Such a vision is worth a lifetime, and only one of such marvelous beauty will ever greet the human eye. From whatever point of view one may behold it, it presents a unique picture."

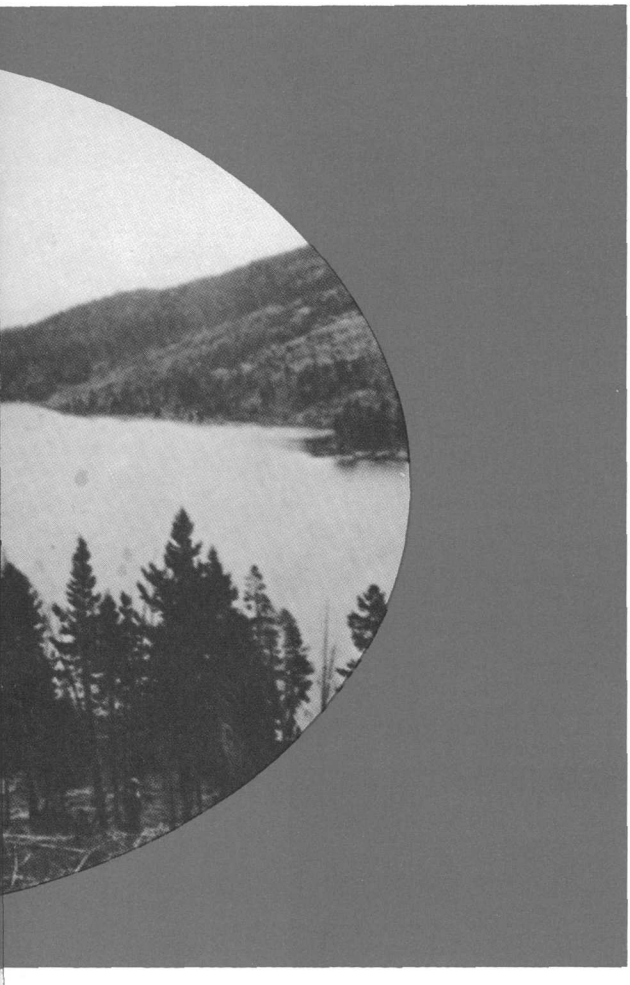
Boiling Mud Springs at Crater Hills.





Hayden's party split into groups, with some continuing to explore the perimeter of the lake, while Hayden, Schoenborn and other members of the expedition went on toward the Geyser Basin of the Firehole River. Here, Hayden and his party examined several geysers and "boiling springs" and gave them names such as Thud Geyser, Mud Puff, Architectural Fountain, Catfish, the Bathtub, Dental Cup, Punch Bowl No. 2, and Beehive. Impressed with the geologic spectacles he saw, Hayden continued to make scientific observations. Describing the Firehole River's Geyser Basin:

"South of the Thud Geyser, as laid down on the chart, there is one large basin, 150 feet in diameter, with a crater within the rim 25 feet in diameter. From this an entire mass of water is thrown up 30 to 60 feet, falling back into it, in detached globules, like silver. There is a rim around the inner crater 3 feet high. The vast column of water as it shoots up, spreads out in falling back, like a natural fountain, so that it overflows the inner rim for a radius of 10 feet. A short distance south



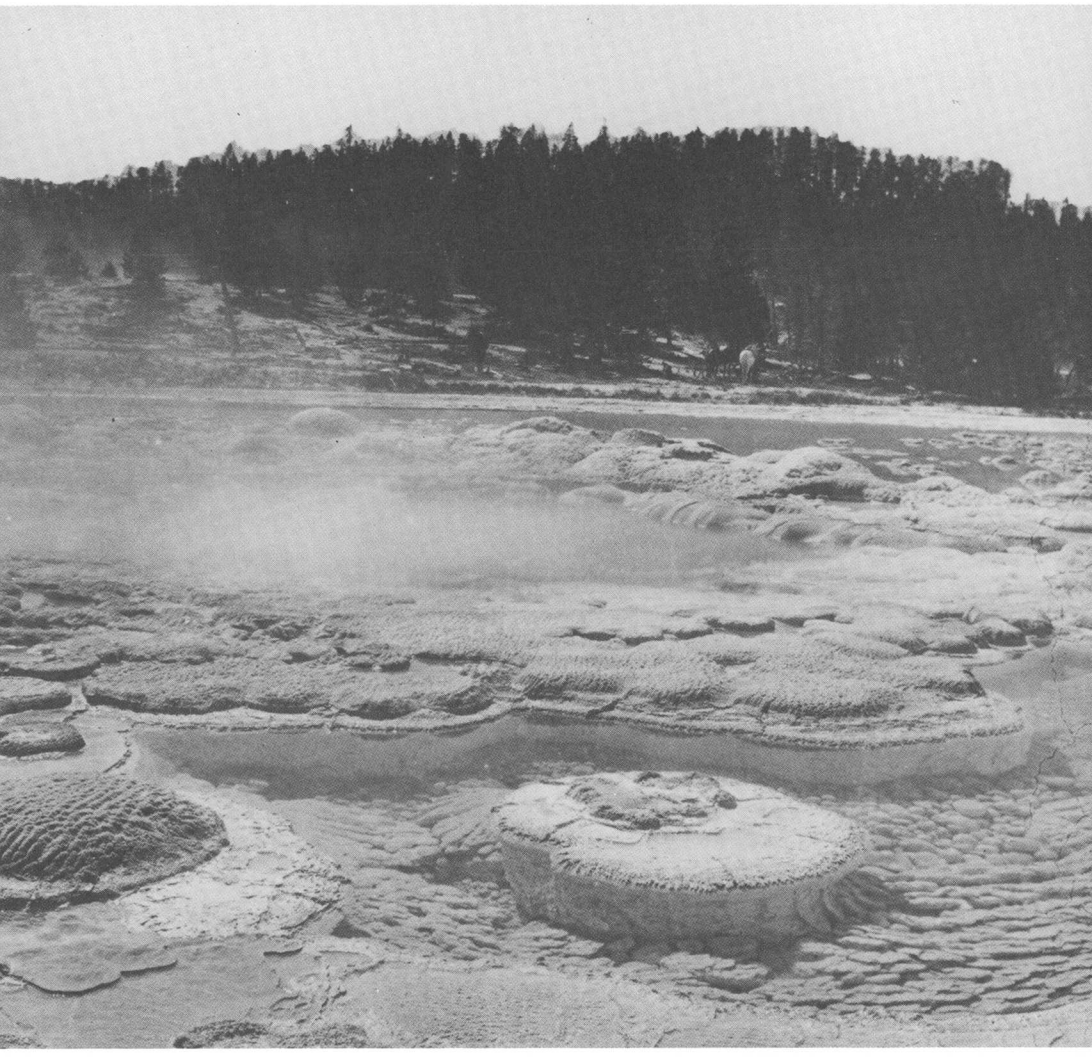
The Head of the Yellowstone Lake.

of the Fountain Geyser is one of the most remarkable mud-pots in the Firehole Valley. The diameter within the rim is 40 to 60 feet, and forms a vast mortar-bed of finest material. The surface is covered with large puffs, and as each one bursts the mud spurts upward several feet with a suppressed thud. The mud is an impalpable, siliceous clay, fine enough, it would seem, for the manufacture of the choicest ware. The colors are of every shade, from the purest white to a bright, rich pink. The surface is covered with twenty or thirty of these puffs, which are bursting each second, tossing the mud in every direction on to the broad rounded rim. There are several other mud-puffs in the vicinity, but they do not differ materially from the last, except in size. Within a few feet of the mud-springs, there is a large clear spring, 40 to 60 feet, with perhaps fifty centers of ebullition, filled with the rusty leathery deposit, and all around the basin where the waters overflow there is an extensive deposit of the iron. The temperature is 140°. About one-fourth of a mile west of the large mud-pots are some

extensive fissure-springs, one of them 100 feet long and of variable width, 4 to 10 feet. These appear to be merely openings in the crust or deposit which covers the entire surface. Quite a large stream flows from this spring. Many of the springs seem to remain full to the rim of the crater, and are in a continual state of greater or less ebullition, and yet no water flows from them. Others discharge great quantities. The aggregate of the surplus water usually forms a good sized stream, as is shown on the map. In this group are a few springs that have precipitated a small amount of sulphur, the first observed in the Firehole Valley. Silica and iron seem to be the dominant constituent in nearly all the deposits. There are numerous springs that deposit a curious black sediment like fine gun-powder, and send forth a very disagreeable odor."

Continuing explorations were carried on by some members performing detailed surveys and others pushing into the valley to explore the Upper Yellowstone River. The East Fork of the river was traversed and Mounts Doane and Stevenson were ascended. Eventually, after having spent 38 days in the wilderness, the entire party arrived back at

Mud Puffs.



Lower Firehole, Crater Fountain Geyser.

Boettler's Ranch. There they packed their wagons and after leaving retraced their route to Fort Hall. Then they travelled eastward aboard the Union Pacific to Evanston, Illinois where the party disbanded on October 1, 1871.

The most important product of the expedition, in addition to Jackson's photos, was a 500-page report by Hayden detailing the findings of his party. Hayden presented this report, Jackson's photos and Moran's sketches and paintings to Senators, Congressmen, his superiors in the Interior Department and nearly anyone else who could possibly influence the founding of a park. He also wrote articles in magazines with national circulation, and spent much personal time and effort in trying to convince Congress to establish the park.

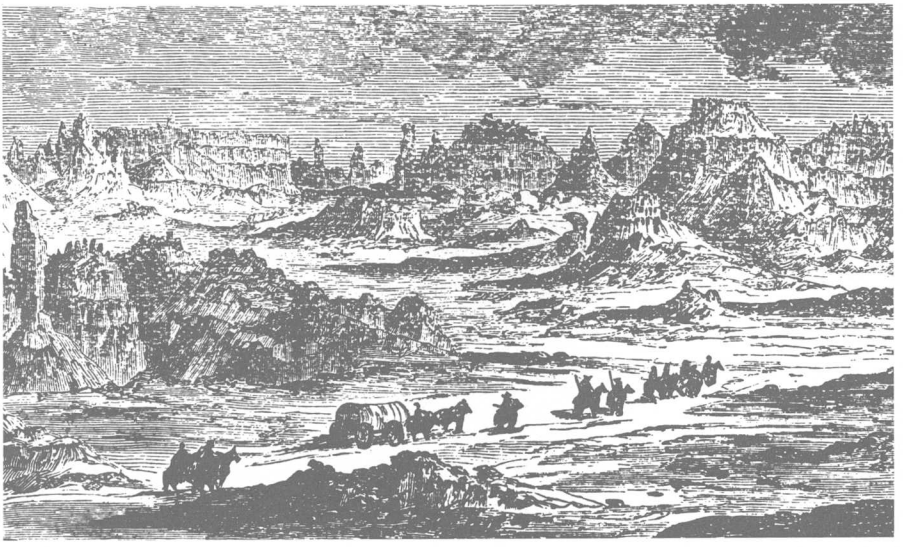
508-735 O - 73 - 3

On December 18, 1871, a bill was introduced simultaneously in the Senate, by Senator S.C. Pomeroy of Kansas, and in the House of Representatives by Congressman W.H. Claggett of Montana, for the establishment of a park at the headwaters of the Yellowstone River. The bill in each case was referred to the respective Committees on Public Lands. Upon reporting the bill back to the Senate on January 22, 1872, Senator Pomeroy advised that body, "Professor Hayden and party have been there, and this bill is drawn on the recommendation of that gentleman to consecrate for public uses this country for a public park."

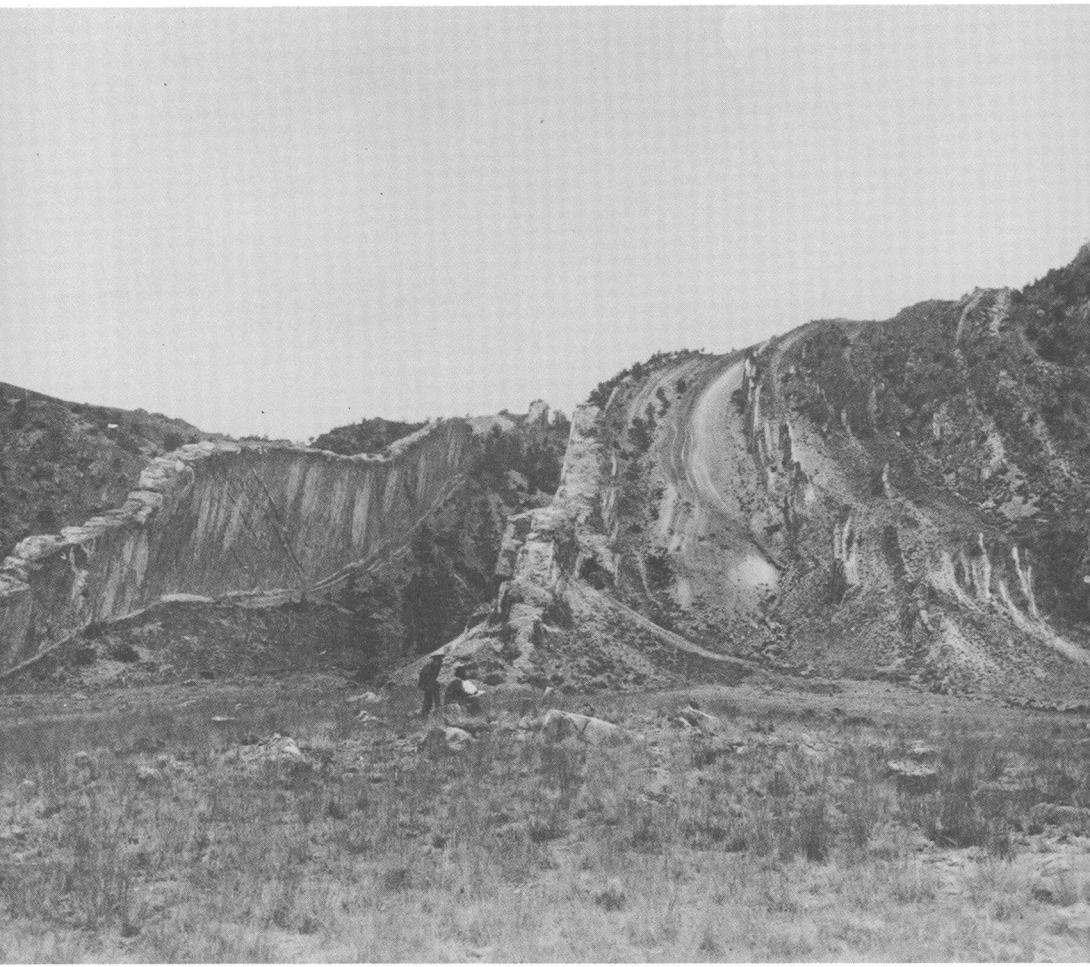
In his published report to Secretary C. Delano of the Interior Department, Hayden took the opportunity to urge final passage of the bill:

> "I have thus presented a brief history of the passage of this bill because I believe it will mark an era in the popular advancement of scientific thought, not only in this country, but throughout the civilized world.
>
> That our legislators, at a time when public opinion is so strong against appropriating the public domain for any purpose however laudable, should reserve, for the benefit and instruction of the people, a tract of 3,578 square miles, is an act that should cause universal joy throughout the land.
>
> This noble deed may be regarded as a tribute from our legislators to science, and the gratitude of the nation and of men of science in all parts of the world is due them for this munificent donation."

Hayden's influence on Congress is readily apparent when examining the detailed information contained in the House Committee on Public Lands report on the bill:



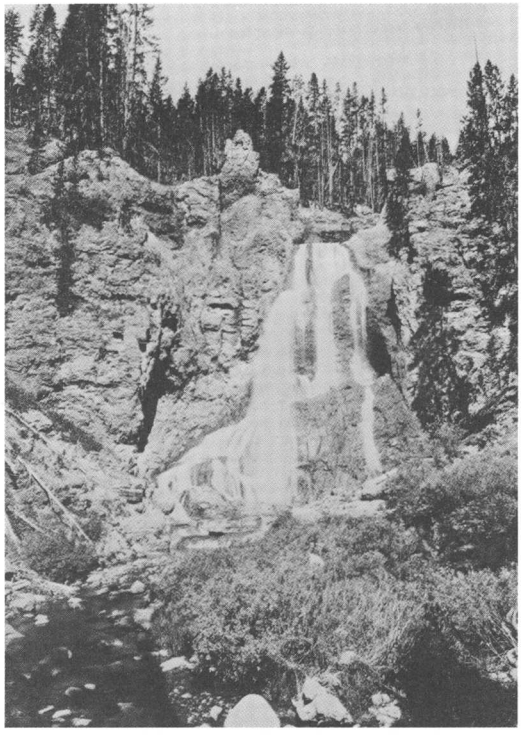
An 1863 photograph of William H. Claggett, a member of the Nevada Territorial Legislature; Mark Twain, then a reporter covering legislature affairs; and A. J. (Jack) Simmons, Speaker of the House. Eight years after this photograph was taken, Claggett introduced the Yellowstone National Park Bill in the U. S. House of Representatives.



Devils Slide of Cinnabar Mountain, ten miles above the second canyon, Yellowstone National Park Area. Figures in the photo are William H. Jackson, sketching and Thomas Moran, looking over his shoulder.

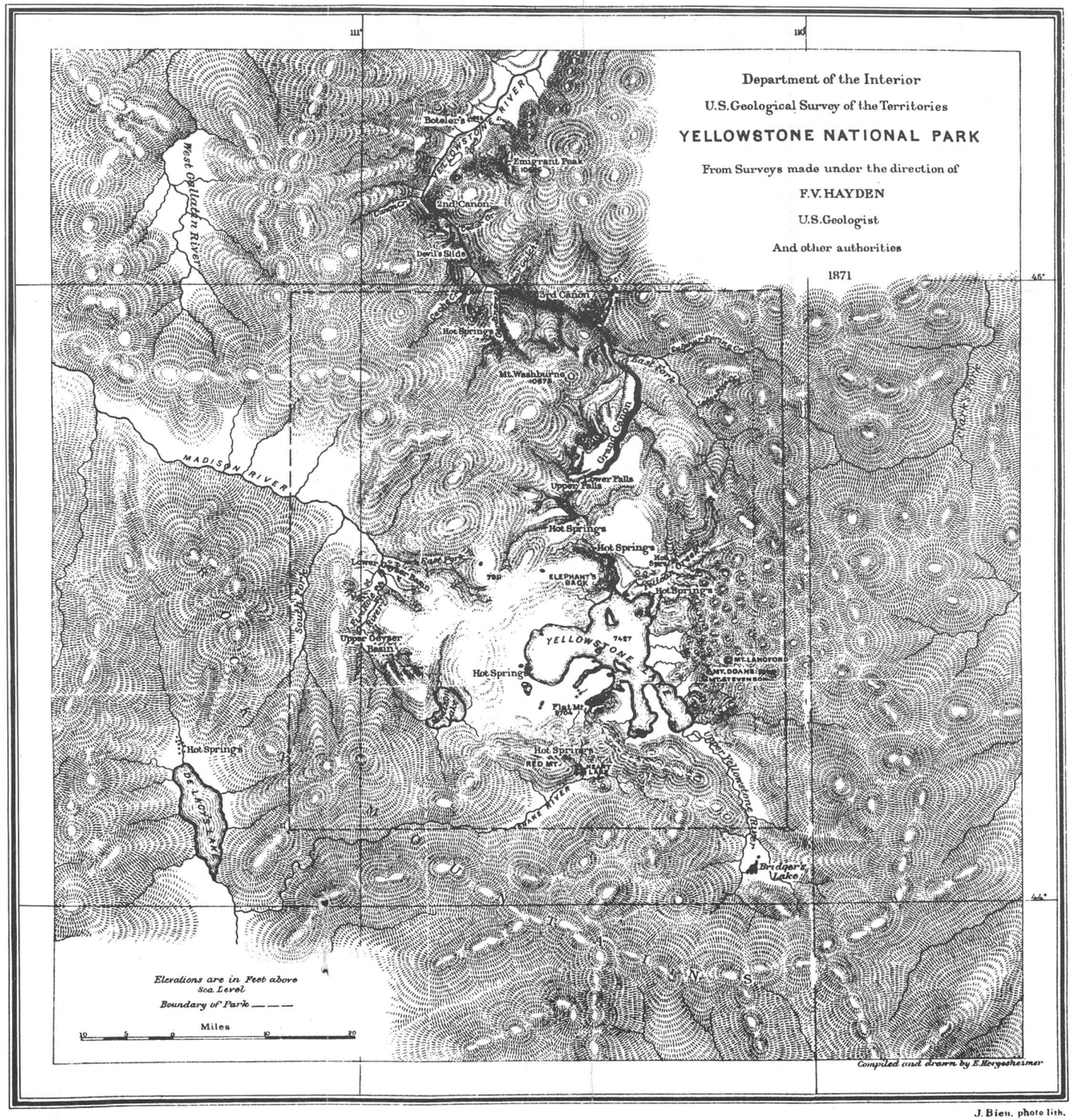
"The bill now before Congress has for its object the withdrawal from settlement, occupancy, or sale, under the laws of the United States a tract of land fifty-five by sixty-five miles, about the sources of the Yellowstone and Missouri Rivers, and dedicates and sets it apart as a great national park or pleasure-ground for the benefit and enjoyment of the people. The entire area comprised within the limits of the reservation contemplated in this bill is not susceptible of cultivation with any degree of certainty, and the winters would be too severe for stock-raising. Whenever the altitude of the mountain districts exceeds 6,000 feet above tide-water, their settlement becomes problematical unless there are valuable mines to attract people. The entire area within the limits of the proposed reservation is over 6,000 feet in altitude and the Yellowstone

Crystal Falls on Cascade Creek between the upper and lower falls of the Yellowstone River, Yellowstone Park area.

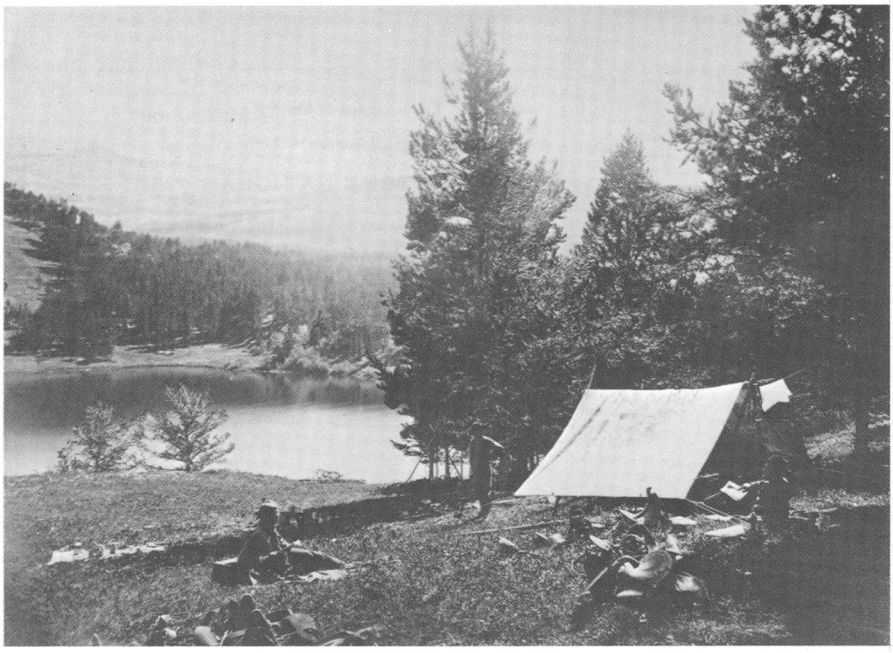


A hot spring cone entirely surrounded by the clear, cool water of Yellowstone Lake. In the center of the cone is a spring of boiling water. A fisherman may stand on the cone, extend a rod into the lake, catch a trout and cook it in the boiling spring without taking it from the hook.

Map of Yellowstone National Park and vicinity, 1871. This map was included in the Hayden report to the Secretary of the Interior.



Lake, which occupies an area fifteen by twenty-two miles, or three hundred and thirty square miles, 7,427 feet. The ranges of mountains that hem the valleys in on every side rise to the height of 10,000 and 12,000 feet, and are covered with snow all the year. These mountains are all of volcanic origin, and it is not probable that any mines or minerals of value will ever be found there. During the months of June, July, and August the climate is pure and most invigorating, with scarcely any rain or storms of any kind, but the thermometer frequently sinks as low as 26°. There is frost every month of the year. This whole region was, in comparatively modern geological times, the scene of the most wonderful volcanic activity of any portion of our country. The hot springs and the geysers represent the last stages—the vents or escape pipes—of these remarkable volcanic manifestations of the internal forces. All these springs are adorned with decorations more beautiful than human art ever conceived, and which have required thousands of years for the cunning hand of nature to form. Persons are now waiting for the spring to open to enter in and take possession of



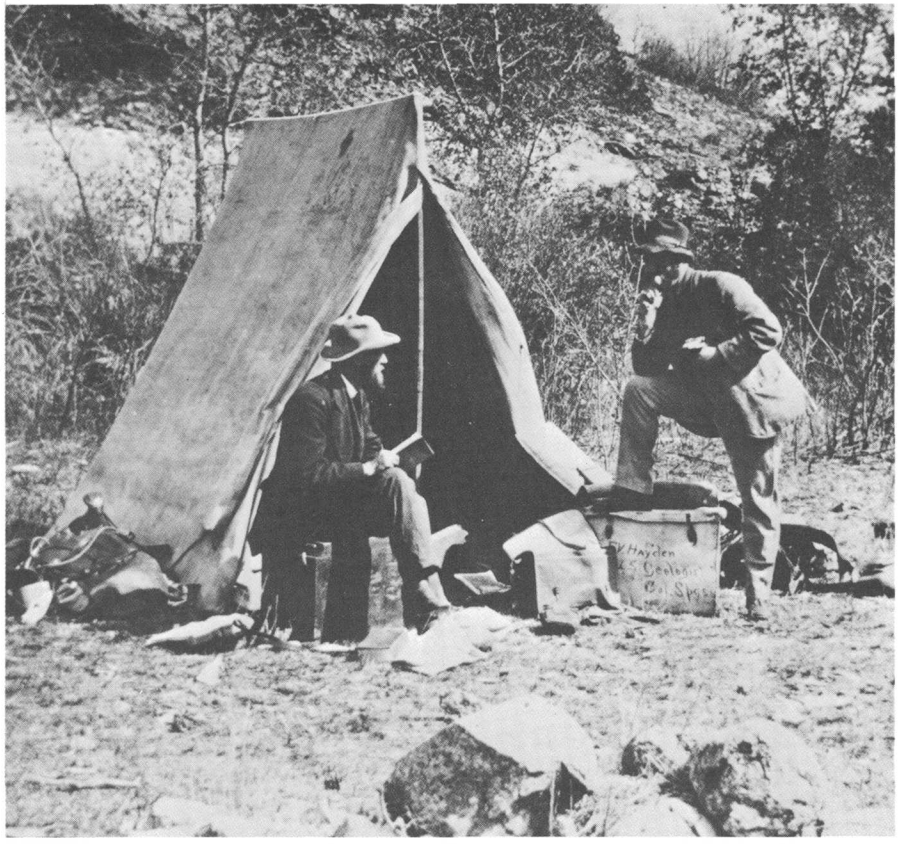
Camp on Mystic Lake.

these remarkable curiosities, to make merchandise of these beautiful specimens, to fence in these rare wonders, so as to charge visitors a fee, as is now done at Niagara Falls, for the sight of that which ought to be as free as the air or water.

In a few years this region will be a place of resort for all classes of people from all portions of the world. The geysers of Iceland, which have been objects of interest for the scientific men and travelers of the entire world, sink into insignificance in comparison with the hot springs of the Yellowstone and Firehole Basins. As a place of resort for invalids, it will not be excelled by any portion of the world. If this bill fails to become a law this session, the vandals who are now waiting to enter into this wonder-land will, in a single season, despoil, beyond recovery, these remarkable curiosities, which have required all the cunning skill of nature thousands of years to prepare.

We have already shown that no portion of this tract can ever be made available for agricultural or mining purposes. Even if the altitude and the climate would permit the country to be made available, not over fifty square miles of the entire area could ever be settled. The valleys are all narrow, hemmed in by high volcanic mountains like gigantic walls.

The withdrawal of this tract, therefore, from sale or settlement takes nothing from the value of the public domain, and is no pecuniary loss to the government, but will be regarded by the entire civilized world as a step of progress and honor to Congress and the nation."



Camp study of the Hayden Survey. The figures in the photo are (left to right): F. V. Hayden (seated) and Walter Paris. 1871.

The Senate, sitting as Committee of the Whole gave its final consideration to the bill on January 30, 1872. There was limited floor discussion, basically concerning whether or not the land was suitable for agricultural development. The bill's chief supporters convinced their colleagues that the region's real value was as a park area, to be preserved in its natural state, and the bill passed by a comfortable margin.

The House considered the same bill on February 27. Again, the question was raised as to whether the region should be left open for agricultural development. However, as in the Senate, the obvious value of the region as a scenic preserve made the task of the park's advocates an easy one. The bill was readily passed with 115 yeas to 65 nays, and 60 not voting.

On March 1, 1872, President Grant signed the bill into law establishing the Yellowstone region as a public park, thus setting a major conservation precedent. The Nation had its first National Park; an area of unique beauty was set aside for the enjoyment of generations to come, and a tradition of preserving other such areas was established.

Forty-second Congress of the United States of America;

At the Second Session,

Begun and held at the City of Washington, on Monday, the Fourth day of December, one thousand eight hundred and seventy-one.

AN ACT

To set apart a certain tract of land lying near the head-waters of the Yellowstone River as a public park.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

That the tract of land in the Territories of Montana and Wyoming, lying near the head-waters of the Yellowstone River, and described as follows, to wit, commencing at the junction of Gardiner's River with the Yellowstone River, and running east to the meridian passing ten miles to the eastward of the most eastern point of — Yellowstone Lake; thence south along said meridian to the parallel of latitude passing ten miles south of the most southern point of Yellowstone Lake; thence west along said parallel to the meridian passing fifteen miles west of the most western point of Madison Lake; thence north along said meridian to the latitude of the junction of the Yellowstone and Gardiner's Rivers; thence east to the place of beginning is hereby reserved and withdrawn from settlement, occupancy, or sale under the laws of the United States, and dedicated and set apart as a public park or pleasuring-ground for the benefit and enjoyment of the people; and all persons who shall locate or settle upon or occupy the same, or any part thereof, except as hereinafter provided, shall be considered trespassers, and removed therefrom. Sec. 2 That said public park shall be under the exclusive control of the Secretary of the Interior, whose duty it shall be, as soon as practicable, to make and publish such rules and regulations as he may deem necessary or proper for the care and management of the same. Such regulations shall provide for the preservation, from injury or spoliation, of all timber, mineral deposits, natural curiosities, or wonders within said park, and their retention in their natural condition. The Secretary may, in his discretion, grant leases for building purposes for terms not exceeding ten years, of small parcels of ground, at such places in said park as shall require the erection of buildings for the accommodation of visitors; all of the proceeds of said leases, and all other revenues that may be derived from any source connected with said park, to be expended under his direction in the management of the same, and the construction of roads and bridle-paths therein. He shall provide against the wanton destruction of the fish and game found within said park, and against their capture or destruction for the purposes of merchandise or profit. He shall also cause all persons trespassing upon the same

The Yellowstone Founding Bill page 1.

after the passage of this act to be removed therefrom, and generally shall be authorized to take all such measures as shall be necessary or proper to fully carry out the objects and purposes of this act.

Speaker of the House of Representatives

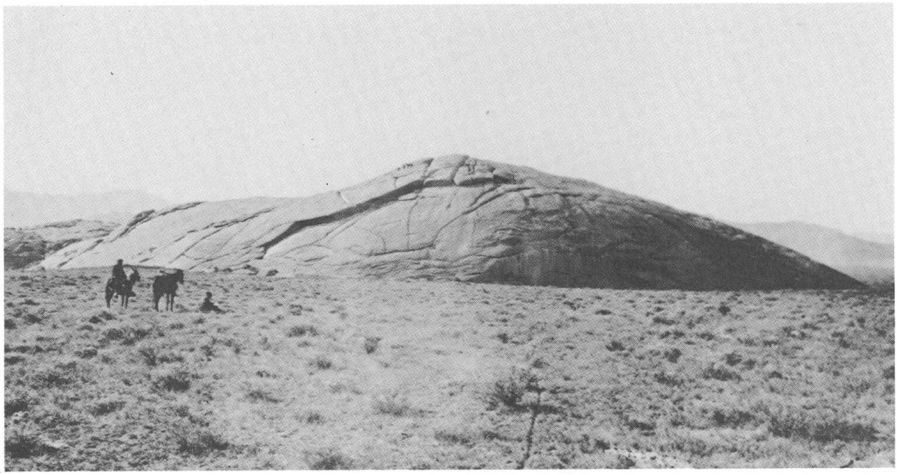
Vice President of the United States
and President of the Senate.

I certify that this act originated in the Senate

Secretary

Approved March 1st 1872

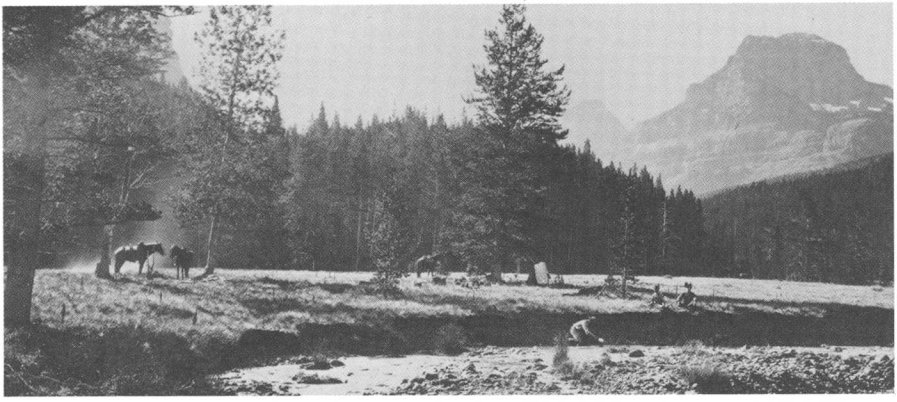
The Yellowstone Founding Bill page 2.



Independence Rock. A noted landmark for travellers at the time when the route was used. Its base, bordering on the old road, is literally covered with names and dates, many of the former well known in the history of the West, and some of them antedating Fremont's time.

The Odometer. A horse-drawn vehicle used to measure distances travelled in the wilds.

Palace Butte Park. This view was taken near Mount Blackmore with Palace Butte in the distance. Middle Creek is one of the branches of the East Gallatin, which passes near Bozeman.



ABOUT THE ILLUSTRATIONS IN THIS PUBLICATION .....

The illustrations used in this publication are, principally, reproductions of photographs taken by William Henry Jackson and pen-and-ink sketches by Thomas Moran, both of whom accompanied Hayden on his Yellowstone Expedition in 1871. Jackson, considered by many to be the foremost photographer of the early west, was among the first to photograph these scenes of the Yellowstone area. In 1873, 37 of Jackson's photographs were published for the first time by the Interior Department in "Photographs of the Yellowstone National Park and Views of the Montana and Wyoming Territories." Jackson's own captions describe a selection of these photos on the following pages.

Moran's equally famous sketches and paintings sparked the interest of government officialdom as well as the general public. One of his landscapes (presented on page 3 of this booklet) hung for many years in the Halls of Congress. Moran was fascinated by Jackson's work and at times selected the subject matter of the photographs. Often he set up his easel nearby and the men shouted back and forth above the noise of the roaring water.

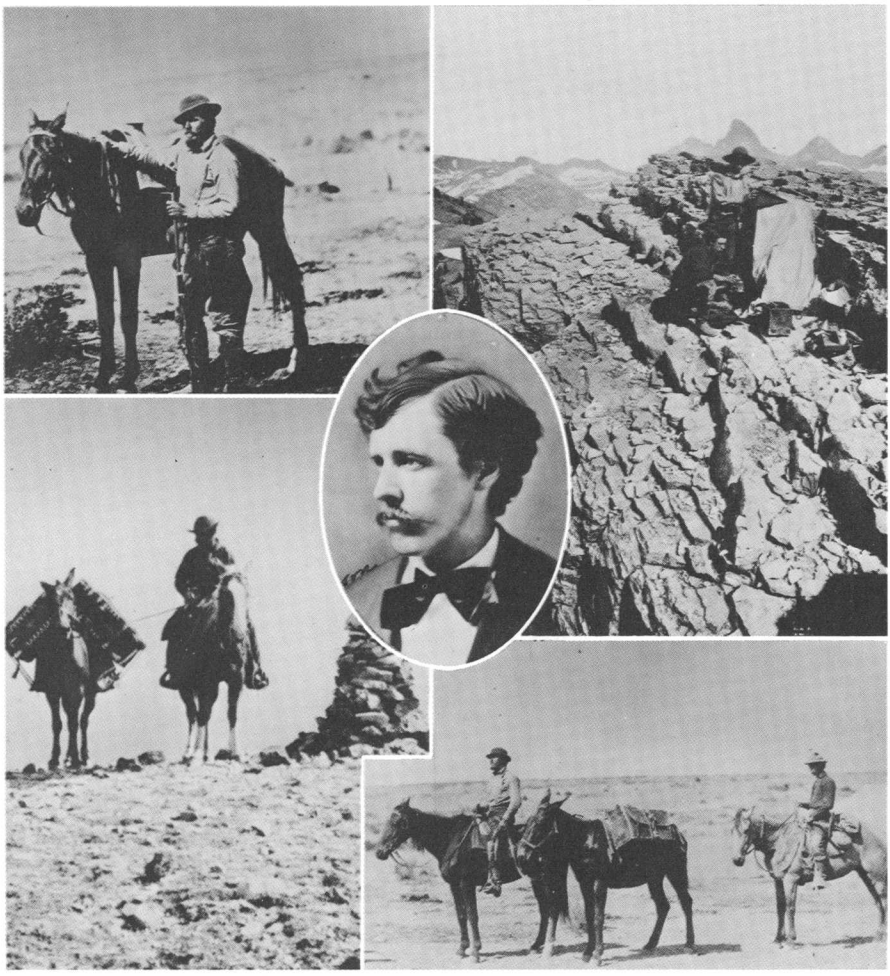
The worth of Jackson's photographs was considered by many to be the most important contribution of the 1871 expedition. Their practical value was enhanced because they were really the only photos of the Yellowstone area. J. Crissman, a local free-lance photographer who used a camera borrowed from Jackson, never made any real use of his photos outside the Montana area. T. J. Hines, a photographer with the Barlow-Heap expedition returned home in time to have all his negatives destroyed in the Great Chicago Fire on October 8, 1871.

The value of Jackson's photographs was acknowledged by Hayden in his report to the Secretary:

"Mr. William H. Jackson performed his duties with great zeal, and the results of his labors have been and will continue to be of the highest value. During the season he obtained nearly 400 negatives of the remarkable scenery of the routes, as well as the canon, falls, lakes, geysers, and hot springs of the Yellowstone Basin, and they have proved, since our return, of very great value in the preparation of the maps and report."

But, perhaps the most fitting testimonial of Jackson's contributions to the Yellowstone Expeditions was offered by a former Director of the National Park Service, who said:

> "It was a singular stroke of fortune that the Hayden Expedition took with it to the Yellowstone land of miracles, the miracle of photography. The camera, in the hands of William H. Jackson, recorded for the first time the phenomena of the Yellowstone in a form that the most skeptical human eye could not dispute. These photographs helped as much as anything to convince Congress that the Yellowstone region should be set aside as a National Park."



Montage—Center—William Henry Jackson, studio portrait, 1873.
Upper left W. H. Jackson, self-portrait.
Upper right—Photographing in high places—the Tetons. Jackson is shown squatting over his wet-plate equipment while an assistant (Dixon) stands by.
Lower left—One of Jackson's assistants holds Hypo, the cropped-eared, Army mule reject who at times, carried as much as 350 pounds of camera equipment.
Lower right: —Jackson starting on a photo reconnaissance.

* * *

U. S. Geological Survey Bulletin 1347, *The Geologic Story of Yellowstone National Park* describes the geologic "how, why and when" of the Yellowstone Region. The 90-page, full-color bulletin may be obtained for $1.25 from:

Superintendent of Documents
U. S. Government Printing Office
Washington, D. C. 20402

PHOTOGRAPHS

OF THE

YELLOWSTONE NATIONAL PARK

AND

VIEWS IN MONTANA AND WYOMING TERRITORIES.

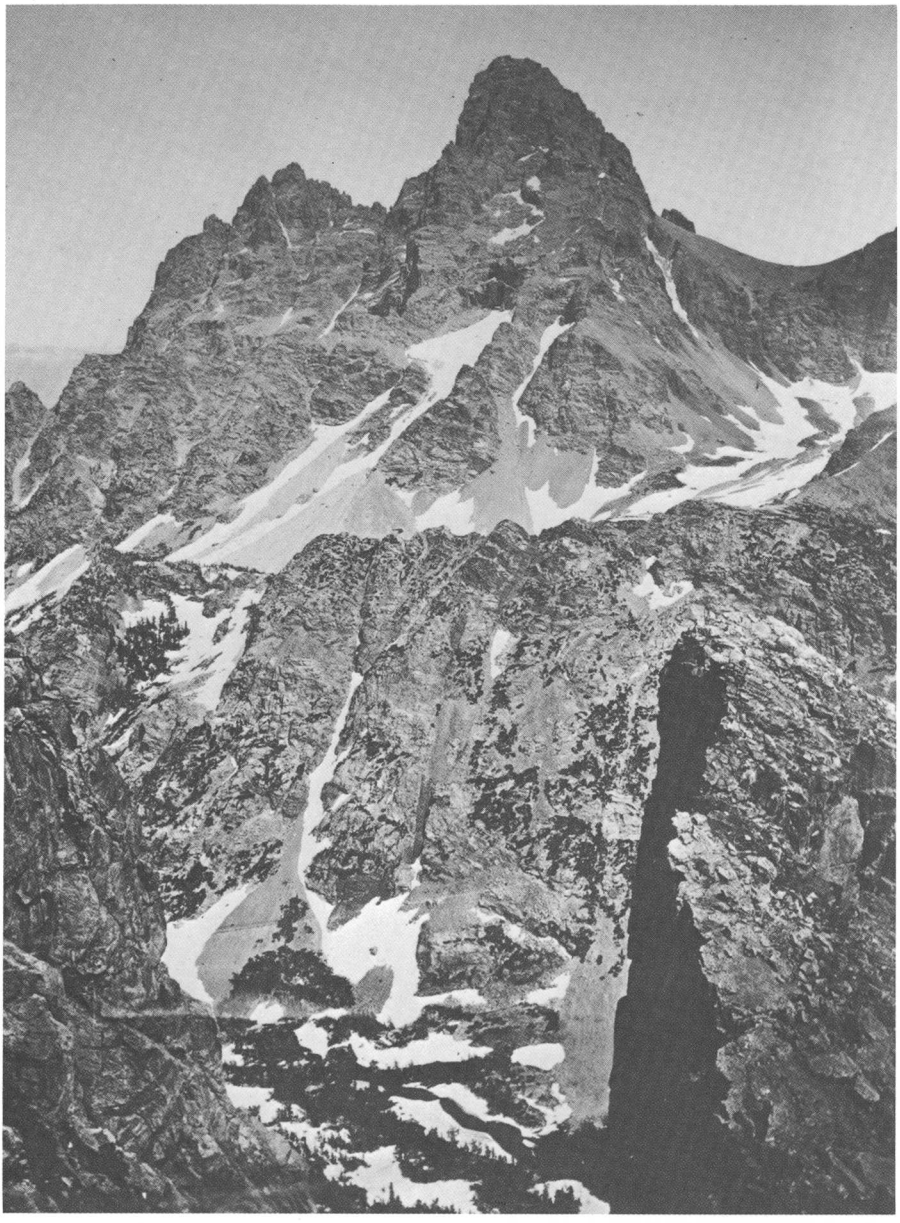
DEPARTMENT OF THE INTERIOR,
UNITED STATES GEOLOGICAL SURVEY OF THE TERRITORIES,
F. V. HAYDEN, UNITED STATES GEOLOGIST-IN-CHARGE.

W. H. JACKSON, PHOTOGRAPHER.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1873.

Camp of U. S. Geological Survey, Ogden, Utah. The camp is located on one of the remarkable lake-terraces which form an interesting feature of the scenery on the Salt Lake Basin. The Wasatch Mountains, in the background, are about five thousand feet above the camp, and nine thousand five hundred and thirty feet above sea level.

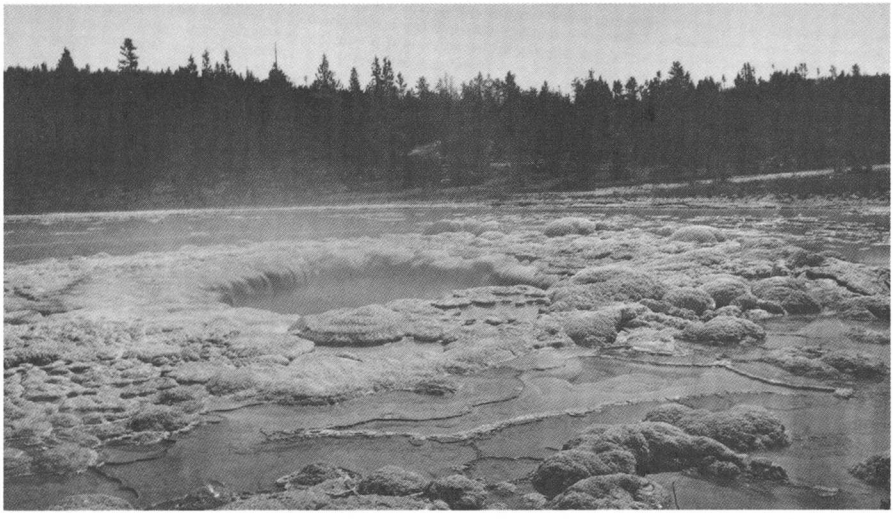
Meeting of the U. S. Geological Survey in the Lower Firehole Basin. The two divisions of the Survey met at this locality on the same day, July 17, 1872, starting from this point several hundred miles distant from each other. The locality is near the source of the Madison River, and is within the limits of the National Park, Latitude 44°36′6″; Longitude 110°55′15″.

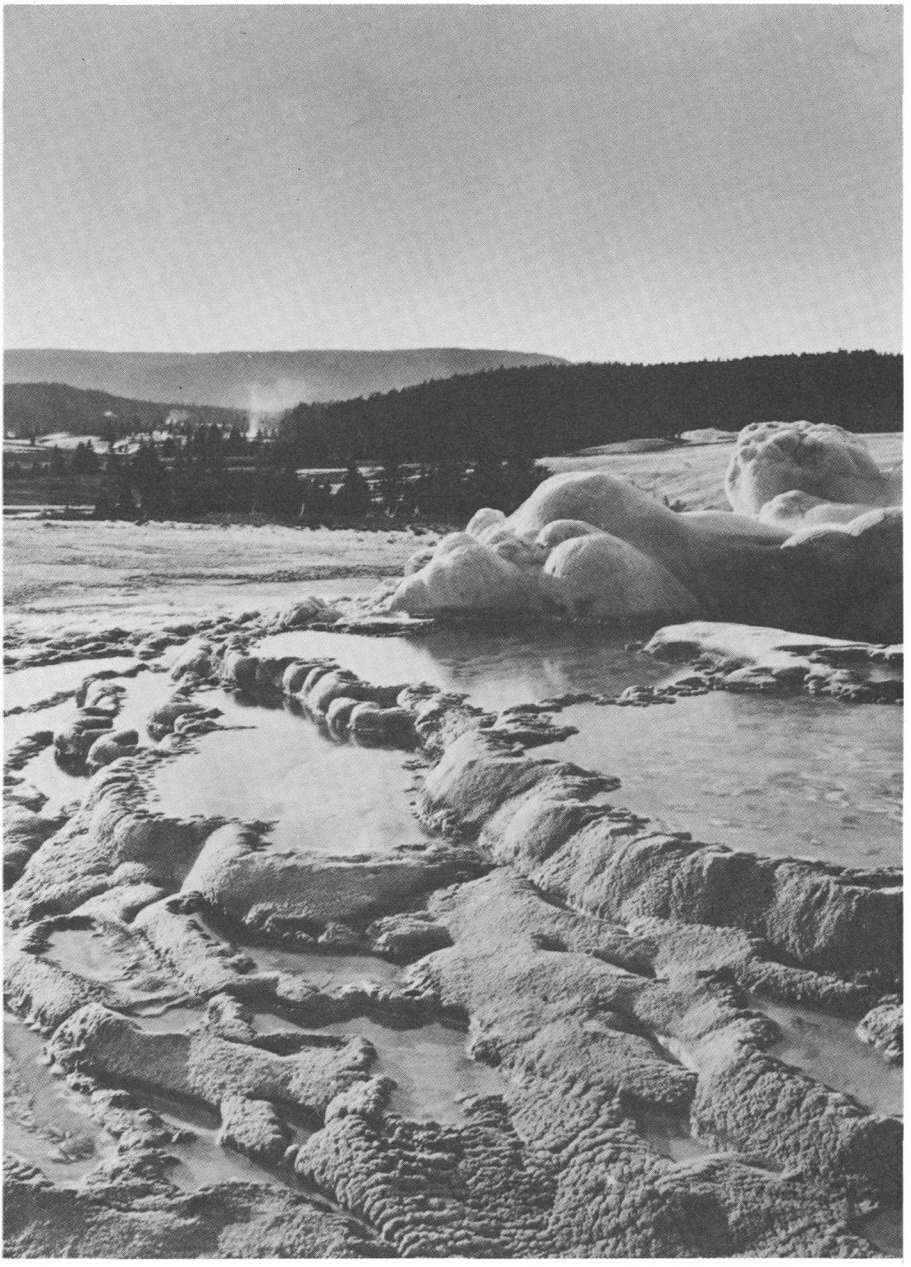


Mt. Hayden, or the Great Teton. This picture represents one of the monarch peaks of the Rocky Mountains. It is visible on a clear day for a radius of one hundred and fifty miles in every direction, thus forming one of the most conspicuous landmarks in the West. It is probable that the only white men that ever reached its summit are Mr. James Stevenson and Hon. N. P. Langford. The elevation is thirteen thousand four hundred feet. It is seen by the traveler on the overland stageroad to Montana, from the Snake River Basin, far to the eastward, rearing its "Bald awful head" far above the limit of perpetual snow.

Camp at the Mouth of Teton Canyon. This camp is in the Teton Canyon, and West of the Teton Range, just ten miles by Triangulation to the summit of the Grand Teton. The trees are all pines and firs. As the sun rises in the morning immediately back of the peaks, it invests them with remarkable beauty. The scenery along the Teton River is rugged and most attractive. It furnished some of the finest views taken on the Survey.

Crater of the Architectural Geysers, Lower Basins. This picture represents one of the handsomest fountain springs in the Lower Basin. The entire mass of the water is at times most violently agitated, and is thrown up by a succession of impulses forty to sixty feet. The water overflowing the borders and producing the wonderful ornamentation which is so clearly shown in the photograph. The peculiar coral-form masses of pearly silica are well brought out. The crater is about twenty-five feet in diameter, and the water when quiet has a temperature of about 180°.



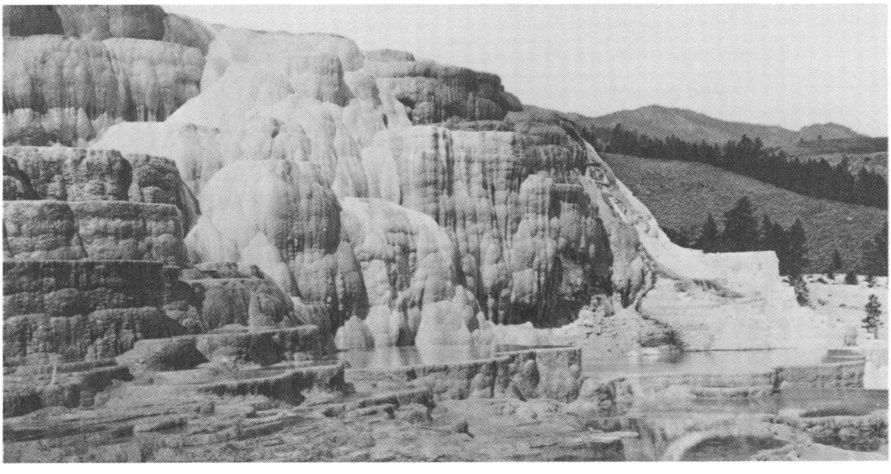


Upper Firehole Basin from the Crater of Old Faithful. Old Faithful derived its name from the regularity of its action, which occurs once in sixty-five minutes. When it is in operation it throws a column of water, by a succession of impulses six feet in diameter, to the height of one hundred and sixty feet. The paroxysm continues about twelve minutes when the water sinks down in the crater, and all is quiet. The silicious deposits around the crater are marvels of beauty. The Madison River can be seen in the distance, and also the geysers in operation.

Mammoth Hot Springs on Gardiner's River. The peculiar character of the deposits is well shown in this picture. The larger hot springs are located on the terrace above, and, as the heated water flows over the declivity, the beautiful pool-like basins are formed from four to eight feet wide and two to four feet deep. As the water leaves the spring and flows over the sides of the mountain, it loses a portion of its heat, so that the bather may choose any temperature he may desire. These pools are sometimes called Diana's Baths. The deposit is as white as snow.

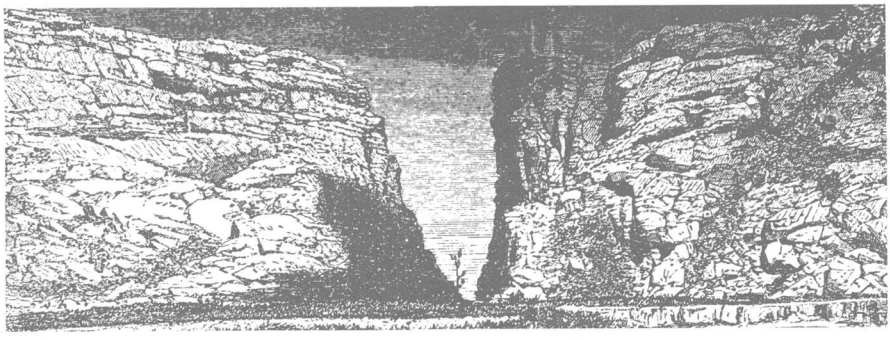
Mammoth Hot Springs, Lower Basin.

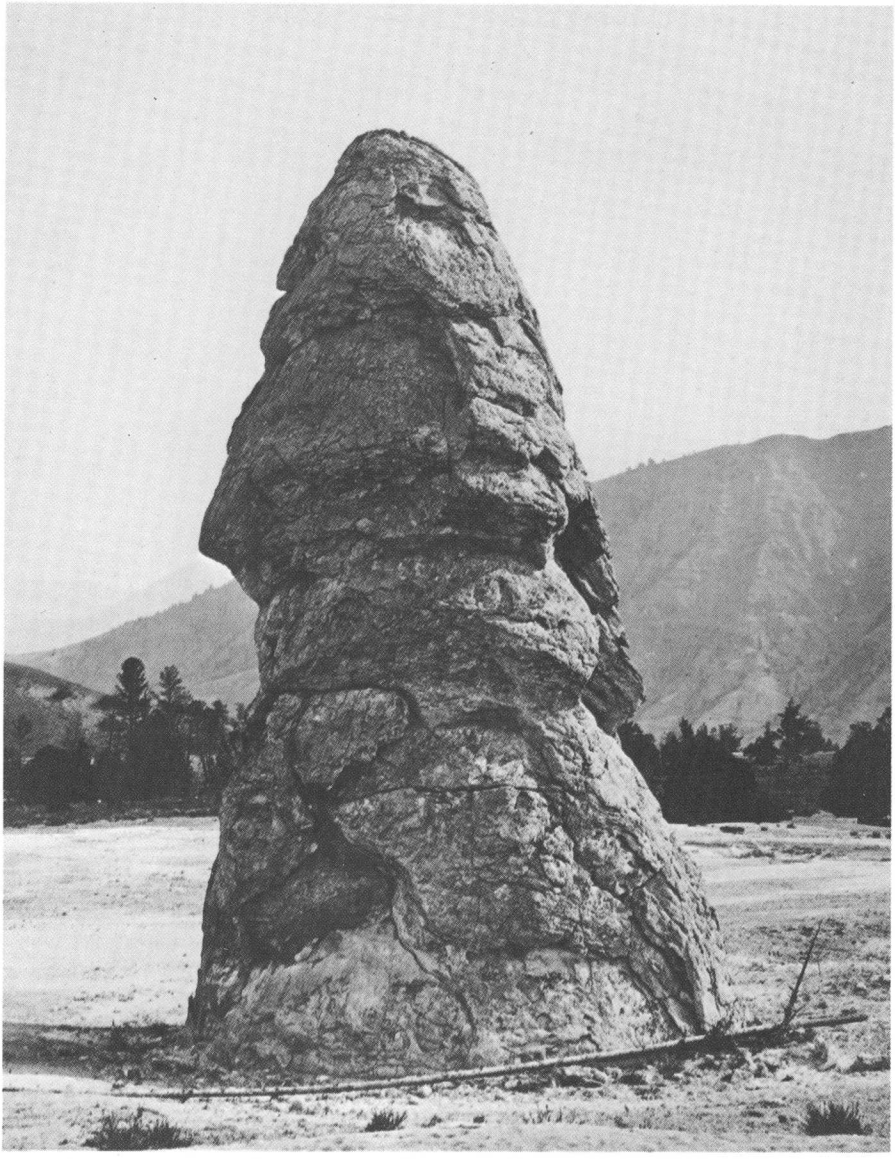
There are two kinds of hot springs in the park, called siliceous and calcareous from the character of their deposits. A large amount of lime is held in solution in the hot water which is precipitated in wonderfully unique architectural forms on the steep sides of the mountains, as shown in the photograph. These springs are located in the valley of the Yellowstone, near the northern boundary of the park, and are named White Mountain Hot Springs on the map. At the present time they are most accessible by way of Fort Ellis, Montana, and the Yellowstone Valley.



Lower Falls of the Yellowstone. About a fourth of a mile below the upper falls, the waters of the Yellowstone take a much more fearful lean, making a clear descent of three hundred and fifty feet. There is probably not a more beautiful sight in existence than the falls with the Grand Canyon below. The rocks are mostly volcanic.

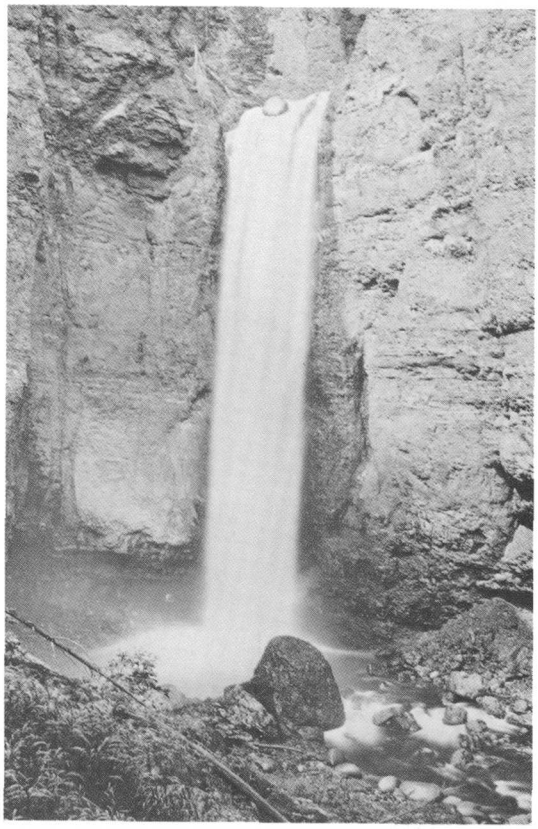
Lower Falls of the Yellowstone. A more distant view of the falls. The photograph however, conveys but a dim conception of the ruggedness of the surroundings.





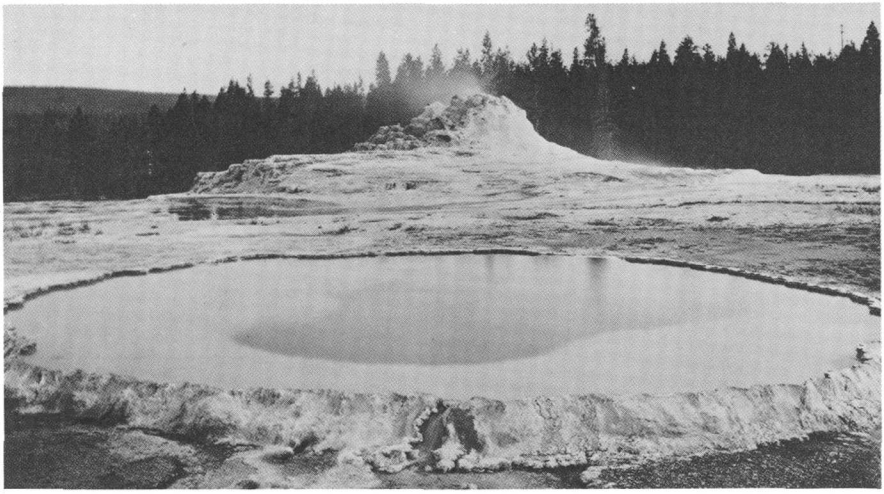
Cap of Liberty Mammoth Hot Springs. This is a fine example of an extinct geyser or fountain spring. It doubtless operates much like one of our artificial fountains, throwing up a column of water several feet, by a succession of impulses, building up a cone by over-lapping layers of lime, like the thatch on the roof. The cone is forty-two feet high and about twenty-five feet in diameter at its base. When the hydrostatic force begins to abate, the cone is gradually closed up at the summit, as is shown in the photograph. These dead springs or geysers are a common feature in the park, and are called, in the language of Iceland a "laug". It is only a calcareous spring that can form so curious and lofty a cone as this.

Tower Falls. These beautiful falls are located on a little branch of the Yellowstone, which flows in from the west side, near the lower end of the Grand Canyon. The descent of the water is about one hundred and fifty feet. The rocks are composed of a peculiar conglomerate, which has been weathered into most fantastic, pointed columns resembling the towers of a gothic cathedral. Hence the name.

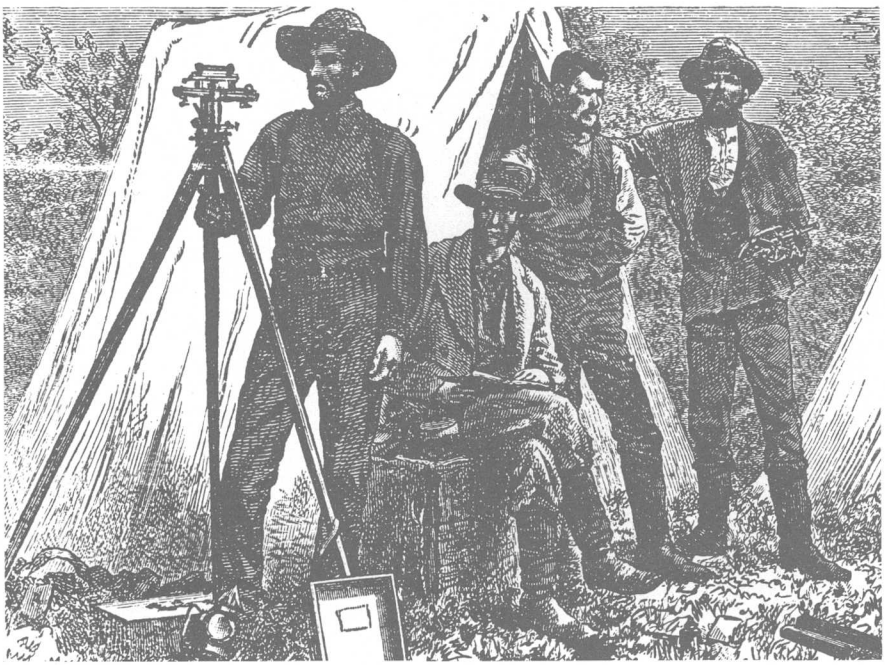


Panoramic View of the Valley of the Yellowstone. This is one of three pictures that form a panoramic view of what is regarded by visitors to that region as the most beautiful and symmetrical range of mountains in America. The summits of the peaks are covered with snow more or less the year round, and can be seen for eighty to one hundred miles in every direction.

The Grand Canyon, One Mile Below the Falls. This picture is intended to convey to the eye some idea of the depth and remarkable ruggedness of the Canyon. To one standing on the margin of the Canyon, the Yellowstone River fades to a slender thread as it flows along the bottom of the chasm.

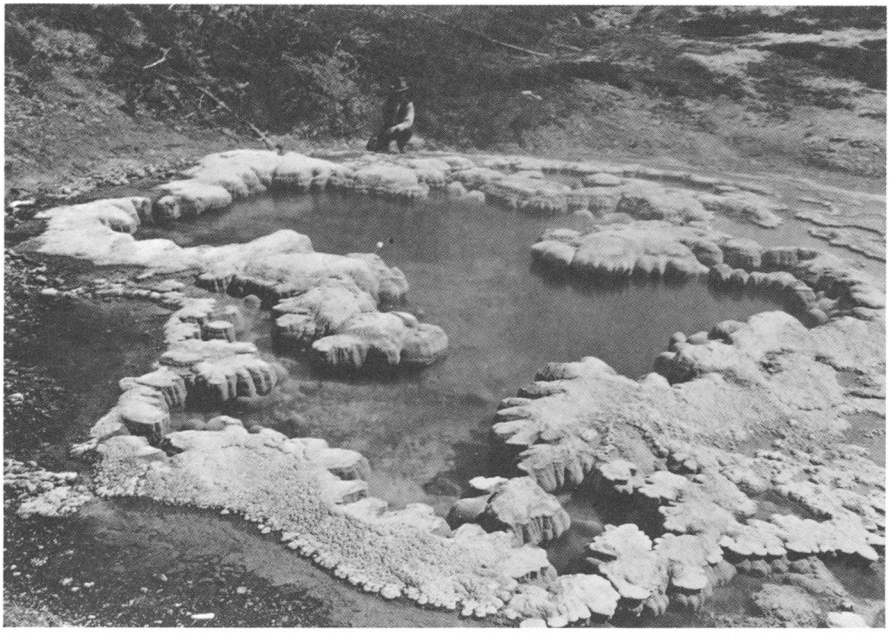


Hot Springs and Castle Geyser. The spring in the foreground is in all respects the most beautiful one in the National Park. The ornamental rim is nearly circular, being about twenty-two feet. The depth is unknown. When the rays of the sun fall nearly vertically on the almost unnaturally transparent waters, all the colors of the prism are produced. The temperature is about 180°. Just in the background is the Castle Geyser, which is so called from the form of its crater. It is really an old ruin. It seldom plays, but when in operation it is terrific power, shaking the ground for a considerable distance. It continues with great force for one to two hours.



Panoramic View of the Teton Range. This photo presents a panoramic view of the north portion of the Teton Range. The peaks in the distance are composed of massive granites, while the rocks in the foreground are limestones.

Crater of the Deluge Geyser, Red Mountain Basin. The crater of Deluge Geyser reminds one with its irregular shape of a clover leaf. The water temperature is about 160° and when it erupts it throws its water out in a powerful deluge.

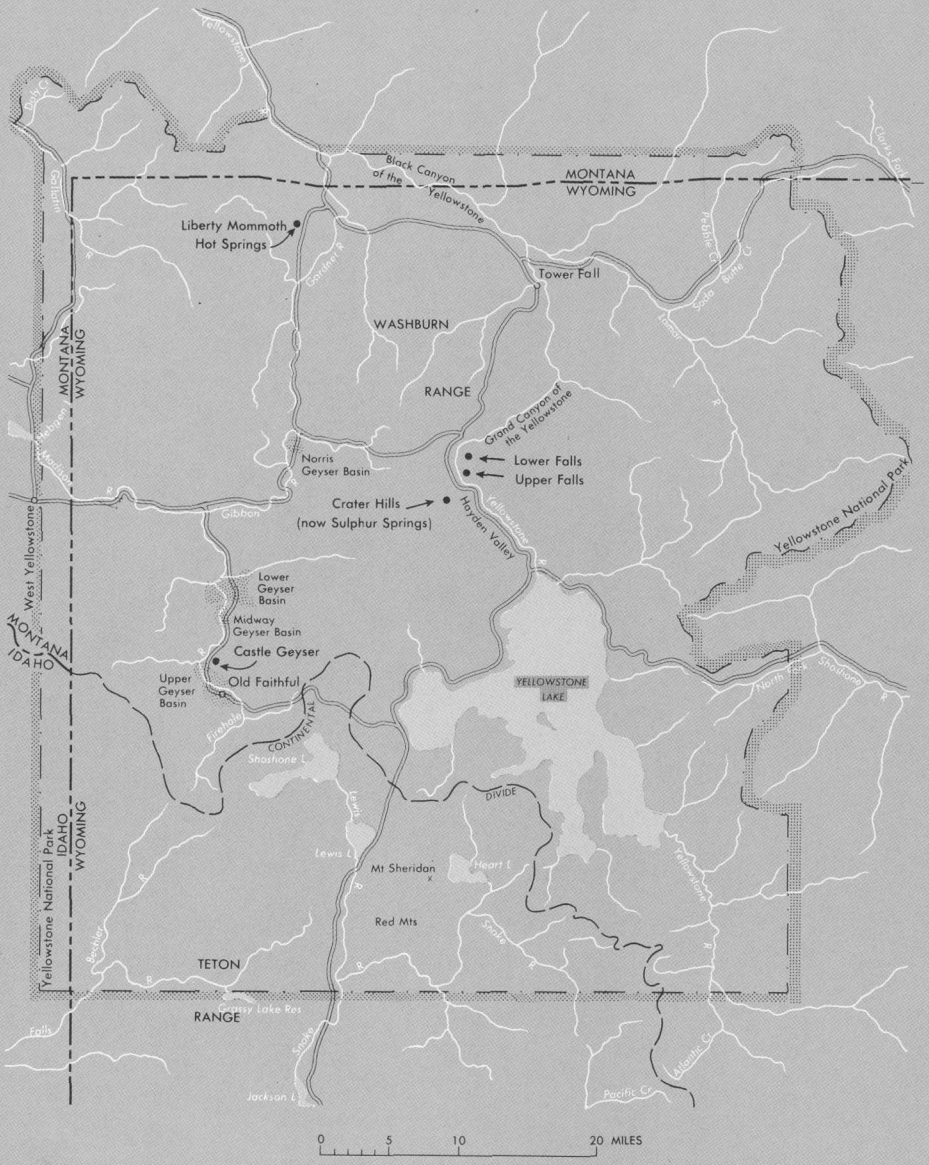


Mystic Lake, Source of East Gallatin. In the range of mountains that separate the waters of the Missouri and Yellowstone, south of Fort Ellis and Bozeman and the upper end of the Gallatin Valley, are some of the finest scenery in Montana. Mystic Lake is a gem set among the mountains and gives origin to one of the main branches of the Gallatin River. It is full of trout and is a place of resort for fishermen. It is located about twelve miles southeast of Fort Ellis.

Photo Credit

1. *The illustrations appearing in this booklet were researched and collected by Nellie C. Carico of the U. S. Geological Survey and her many associates.*
2. *Photograph staged by Mark Twain (page 19) —courtesy of the National Park Service, U. S. Department of the Interior.*

U.S. GOVERNMENT PRINTING OFFICE : 1973 O—508-735



Index map of Yellowstone National Park

As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of America's "Department of Natural Resources."

The Department works to assure the wisest choice in managing all our resources so each will make its full contribution to a better United States—now and in the future.