



## **Picturesque America; or, the land we live in**

a delineation by pen and pencil of the mountains, rivers, lakes, forests, water-falls, shores, cañons, valleys, cities, and other picturesque features of our country ; with illustrations on steel and wood, by eminent American artists

**Bryant, William Cullen**

**New York, 1872**

Our Great National Park.

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## OUR GREAT NATIONAL PARK.

THE VALLEY OF THE YELLOWSTONE.



The Yellowstone.

THE Yellowstone River, one of the tributaries of the Missouri, has a long, devious flow of thirteen hundred miles ere it loses its waters in those of the larger stream. Its source is a noble lake, situated in Wyoming Territory, and nestling amid the snow-peaks of the highest mountain-range in the country. The upper course of the river is through immense cañons and gorges, and its flow is often marked by splendid waterfalls and rapids, presenting at various points some of the most remarkable scenery in the



country. The entire region about its source is volcanic, and abounds in boiling springs, mud-volcanoes, soda-springs, sulphur-mountains, and geysers the marvels of which outdo those of Iceland.

This remarkable area has recently been set apart by Congress for a great national



Map of the Yellowstone National Park.

park. It certainly possesses striking characteristics for the purpose to which it has been devoted, exhibiting the grand and magnificent in its snow-capped mountains and dark cañons, the picturesque in its splendid water-falls and strangely-formed rocks, the beautiful in the sylvan shores of its noble lake, and the phenomenal in its geysers, hot springs, and mountains of sulphur. It may be claimed that in no other portion of the globe are there united so many surprising features—none where the conditions of beauty and con-



trast are so calculated to delight the artist, or where the phenomena are so abundant for the entertainment and instruction of the student.

It is a magnificent domain in its proportions, extending nearly sixty-five miles from north to south, and fifty-five miles from east to west. The Yellowstone Lake lies near the southeasterly corner of the park, the Yellowstone River flowing from its upper boundary, and running almost due north. The lake is twenty-two miles in length, and its average width from ten to fifteen miles. Its height above the level of the sea is seven thousand feet, while its basin is surrounded by mountains reaching an altitude of over ten thousand feet, the peaks of which are covered with perpetual snow. Numerous hot springs are found on the shores of the lake, and also along the banks of the river. About fifteen miles from its source, the river takes two distinct, precipitous leaps, known as the Upper and the Lower Falls, and beyond the falls cuts its way through an immense cañon, the vertical walls of which reach, at places, the height of fifteen hundred feet. Near the western boundary of the park, the Madison, an important tributary of the Columbia, takes its rise; and along one of the branches of this river, known as Fire-Hole River, are found numerous extraordinary geysers, some of which throw volumes of boiling water to a height exceeding two hundred feet. In the northwest corner of the park, the Gallatin, another tributary of the Columbia, takes its rise.

This wonder-land has only recently been explored. For years, marvellous stories have been rife among the hunters of the far West of a mysterious country in the heart of the Rocky Mountains, which the Indians avoided as the abode of the evil spirits, where the rumble of the earthquake is frequently heard, where great jets of steam burst through the earth, where volcanoes throw up mud instead of fire, and where a river flows through gorges of savage grandeur; but beyond these rumors, often apparently absurd exaggerations, nothing was known of that region. An exploring party, under Captain Reynolds, of the United States Engineer Corps, endeavored to enter the Yellowstone Basin in 1859, by way of the Wind-River Mountains, at the south, but failed on account of the ruggedness of the mountains and the depth of the snow. In 1870, an exploring party under General Washburn, escorted by Lieutenant Doane, of the United States Army, succeeded in entering the valley; and from this source the public obtained the first trustworthy accounts of the strange land. Immediately thereafter, an expedition, under sanction of Congress, was organized by the Secretary of the Interior, and placed in the charge of Professor F. V. Hayden, United States geologist; while, at the same time, a party under the command of Lieutenant Barlow, of the United States Engineer Corps, ascended the Yellowstone, and traversed the greater part of the area now included in the park. Professor Hayden's expedition made a thorough exploration of the whole region, and it is to his full and exhaustive report to Congress that we are indebted for an accurate detailed knowledge of the strange features of this remarkable land. It is to this gentleman, probably more than to



any other person, that we are indebted for the idea of converting the valley into a national park. The expedition, however, was organized by the Hon. Columbus Delano, Secretary of the Interior; and hence we may attribute the successful issue of the noble conception to the coöperation of the secretary with the purposes of the scientific explorers appointed by him. From the interesting pages of Professor Hayden's report we



Cañon of the Yellowstone.

mainly draw the subjoined particulars of the romantic wonders of our imperial pleasure-ground :

#### THE YELLOWSTONE BASIN.

"The Yellowstone Basin proper, in which the greater portion of the interesting scenery and wonders is located, comprises only that portion enclosed within the remark-





Gorge of the Yellowstone.

able ranges of mountains which give origin to the waters of the Yellowstone south of Mount Washburn and the Grand Cañon. The range of which Mount Washburn is a conspicuous peak seems to form the north wall, or rim, extending nearly east and west across the Yellowstone, and it is through this portion of the rim that the river has cut its channel, forming the remarkable falls and the still more wonderful cañon. The area of this basin is about forty miles in length. From the summit of Mount Washburn a bird's-eye view of the entire basin may be obtained, with the mountains surrounding it on every side, without any apparent break in the rim. This basin has been called, by some travellers, the vast crater of an ancient volcano. It is probable that during the Pliocene period the entire country drained by the sources of the Yellowstone and the Columbia was the scene of as great volcanic activity as that of any portion of the globe. It might be called one vast crater, made up of thousands of smaller volcanic vents and fissures, out of which the fluid interior of the earth, fragments of rock, and volcanic dust, were poured in









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*The Upper Yellowstone Falls.*

New York, D. Appleton & Co.



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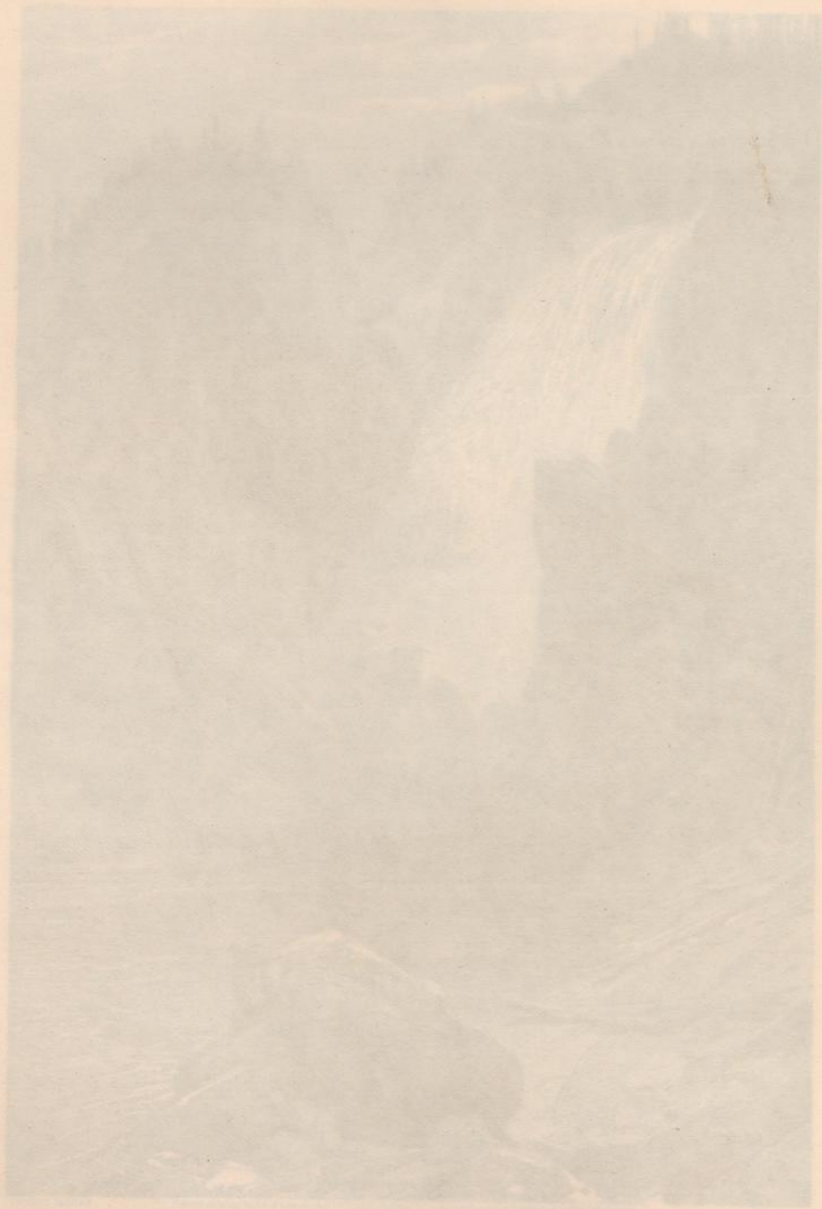


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THE FALLS AND GRAND CANYON

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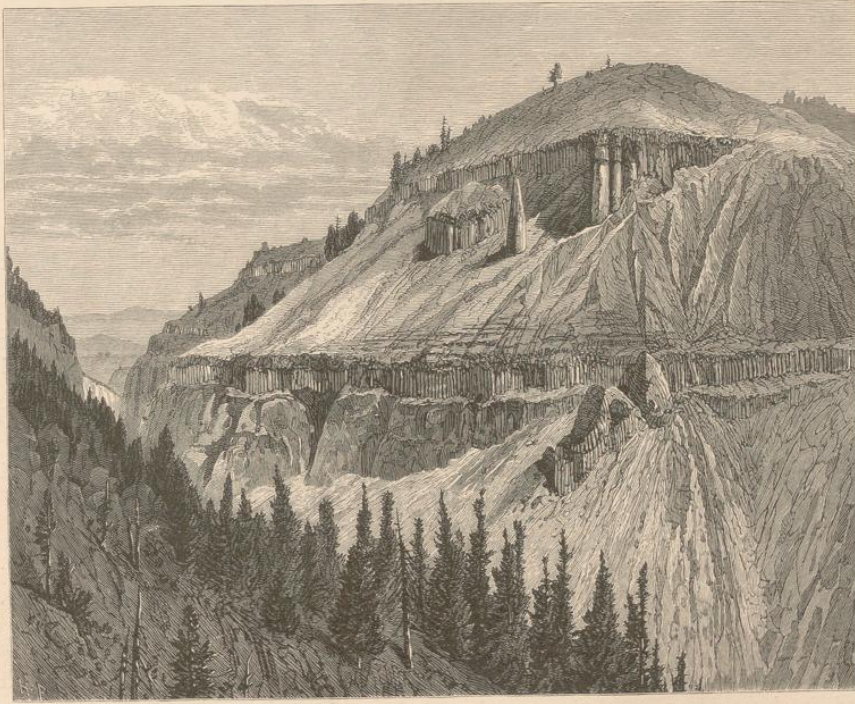


*The Upper Yellowstone Falls*

NEW YORK: G. P. PUTNAM'S SONS, 1890.



unlimited quantities. Hundreds of the nuclei or cores of these volcanic vents are now remaining, some of them rising to a height of ten thousand to eleven thousand feet above the sea. Mounts Doane, Langford, Stevenson, and more than a hundred other peaks, may be seen from any high point on either side of the basin, each of which formed a centre of effusion. Indeed, the hot springs and geysers of this region, at the present time, are nothing more than the closing stages of that wonderful period of volcanic action that began in Tertiary times. In other words, they are the escape-



Column-Rocks.

pipes or vents for those internal forces which once were so active, but are now continually dying out. The evidence is clear that, ever since the cessation of the more powerful volcanic forces, these springs have acted as the escape-pipes, but have continued to decline down to the present time, and will do so in the future, until they cease entirely."

#### THE FALLS AND THE GRAND CAÑON.

"But the objects of the deepest interest in this region are the falls and the Grand Cañon. I will attempt to convey some idea by a description, but it is only through

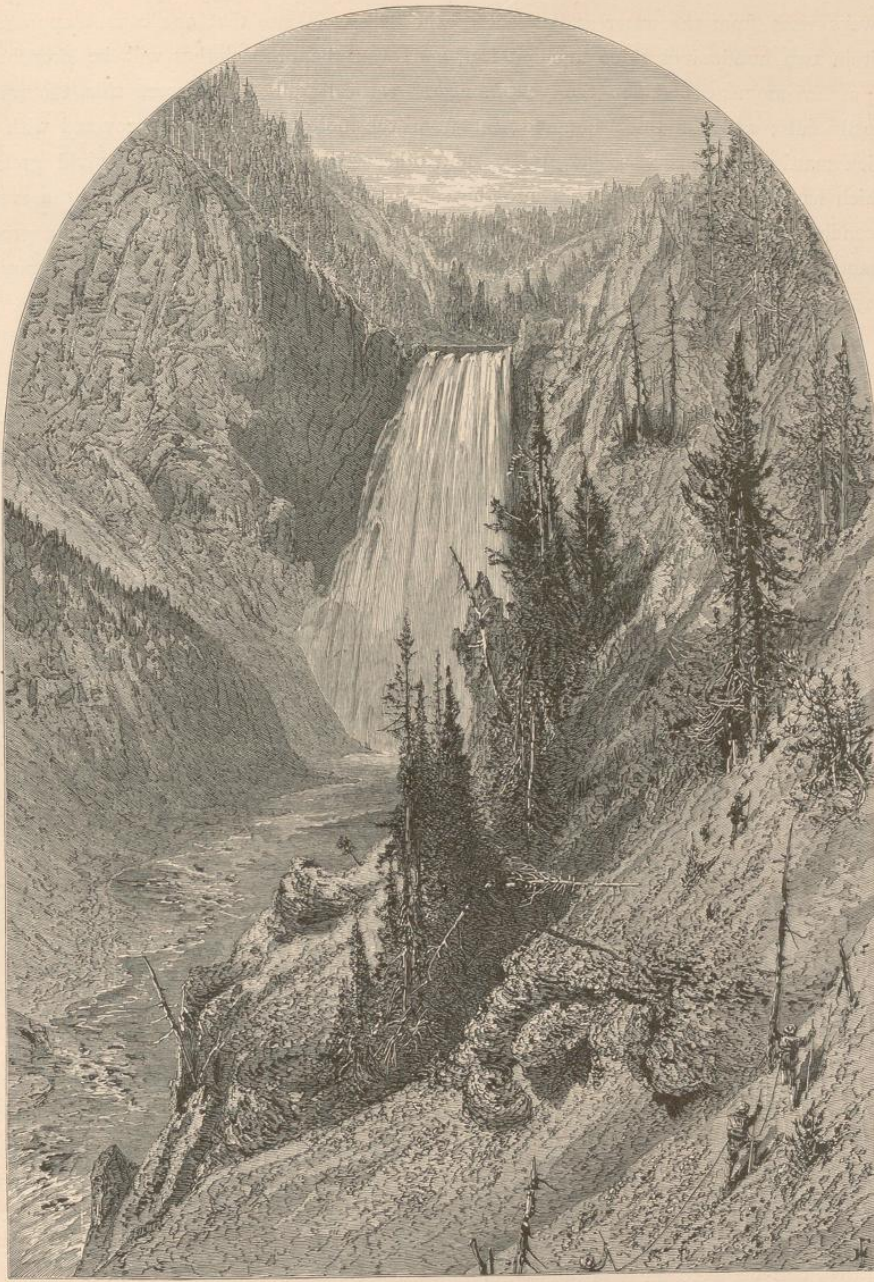


the eye that the mind can gather any thing like an adequate conception of them. As we approached the margin of the cañon, we could hear the suppressed roar of the falls, resembling distant thunder. The two falls are not more than one-fourth of a mile apart. Above the Upper Falls the Yellowstone flows through a grassy, meadow-like valley, with a calm, steady current, giving no warning, until very near the falls, that it is about to rush over a precipice one hundred and forty feet, and then, within a quarter of a mile, again to leap down a distance of three hundred and fifty feet.

"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 margins of the cañon on either side are beautifully fringed with pines. In some places the walls of the cañon are composed of massive basalt, so separated by the jointage as to look like irregular mason-work going to decay. Here and there, a depression in the surface of the basalt has been subsequently filled up by the more modern deposit, and the horizontal strata of sandstone can be seen. The decomposition and the colors of the rocks must have been due largely to hot water from the springs, which has percolated all through, giving to them the present variegated and unique appearance.

"Standing near the margin of the Lower Falls, and looking down the cañon, which looks like an immense chasm or cleft in the basalt, with its sides twelve hundred to fifteen hundred 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, with here and there a pine sending its roots into the clefts on the sides as if struggling with a sort of uncertain success to maintain an existence—the whole presents a picture that it would be difficult to surpass in Nature. Mr. Thomas Moran, a celebrated artist, and noted for his skill as a colorist, exclaimed, with a kind of regretful enthusiasm, that these beautiful tints were beyond the reach of human art. It is not the depth alone that gives such an impression of grandeur to the mind, but it is also the picturesque forms and coloring. After the waters of the Yellowstone roll over the upper descent, they flow with great rapidity over the apparently flat, rocky bottom, which spreads out to nearly double its width above the falls, and continues thus until near the Lower Falls, when the channel again contracts, and the waters seem, as it were, to gather themselves into one compact mass, and plunge over the descent of three hundred and fifty feet in detached drops of foam as white as snow; some of the large globules of water shoot down like the contents of an exploded rocket. It is a sight far more beautiful than, though not so grand or impressive as, that of Niagara Falls. A heavy mist





THE LOWER FALLS.



always rises from the water at the foot of the falls, so dense that one cannot approach within two hundred or three hundred feet, and even then the clothes will be drenched in a few moments. Upon the yellow, nearly vertical wall of the west side, the mist mostly falls; and for three hundred feet from the bottom the wall is covered with a thick matting of mosses, sedges, grasses, and other vegetation of the most vivid green, which have sent their small roots into the softened rocks, and are nourished by the ever-ascending spray. At the base and quite high up on the sides of the cañon are great quantities of talus, and through the fragments of rocks and decomposed spring deposits may be seen the horizontal strata of breccia."

## TOWER CREEK.

"Tower Creek rises in the high divide between the valleys of the Missouri and Yellowstone, and flows about ten miles through a cañon so deep and gloomy that it has very properly earned the appellation of the Devil's Den. As we gaze from the margin down into the depths below, the little stream, as it rushes foaming over the rocks, seems like a white thread, while on the sides of the gorge the sombre pinnacles rise up like Gothic spires. About two hundred yards above its entrance into the Yellowstone, the stream pours over an abrupt descent of one hundred and fifty-six feet, forming one of the most beautiful and picturesque falls to be found in any country. The Tower Falls are about two hundred and sixty feet above the level of the Yellowstone at the junction, and they are surrounded with pinnacle-like columns, composed of the volcanic breccia, rising fifty feet above the falls, and extending down to the foot, standing like gloomy sentinels or like the gigantic pillars at the entrance of some grand temple. One could almost imagine that the idea of the Gothic style of architecture had been caught from such carvings of Nature. Immense bowlders of basalt and granite here obstruct the flow of the stream above and below the falls; and, although, so far as we can see, the gorge seems to be made up of the volcanic cement, yet we know that, in the loftier mountains, near the source of the stream, true granitic as well as igneous rocks prevail."

## YELLOWSTONE LAKE.

"On the 28th of July (1871)," says Professor Hayden, "we arrived at the lake, and pitched our camp on the northwest 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 were filled with enthusiasm. The great object of all our labors had been reached, and we were amply paid for all our toils. Such a vision is worth a lifetime, and only one of such marvellous beauty will ever greet human eyes. From whatever point of view one may behold it, it presents a unique picture. We had brought up the





CLIFFS ON THE YELLOWSTONE.



framework of a boat, twelve feet long and three and a half feet wide, which we covered with stout ducking, well tarred. On the morning of the 29th, Messrs. Stevenson and Elliott started across the lake in the *Anna*, the first boat ever launched on the Yellowstone, and explored the nearest island, which we named after the principal assistant of the expedition, who was undoubtedly the first white man that ever placed foot upon it. Our little bark, whose keel was the first to plough the waters of the most beautiful lake on our continent, and which must now become historical, was named by Mr. Stevenson in compliment to Miss Anna L. Dawes, the amiable daughter of Hon. H. L. Dawes. My whole party were glad to manifest, by this slight tribute, their gratitude to the distinguished statesman, whose generous sympathy and aid had contributed so much toward securing the appropriation which enabled them to explore this marvellous region.

"Usually in the morning the surface of the lake is calm, but, toward noon and after, the waves commence to roll, and the white caps rise high, sometimes four or five feet. Our little boat rode the waves well; but, when a strong breeze blew, the swell was too great, and we could only venture along the shore. This lake is about twenty-two miles in length from north to south, and an average of ten to fifteen miles in width from east to west. It has been aptly compared to the human hand; the northern portion would constitute the palm, while the southern prolongations or arms might represent the fingers. There are some of the most beautiful shore-lines along this lake that I ever saw. Some of the curves are as perfect as if drawn by the hand of art. Our little boat performed most excellent service. A suitable framework was fastened in the stern for the lead and line, and, with the boat, a system of soundings was made that gave a very fair idea of the average depth of the lake. The greatest depth discovered was three hundred feet. It is fed by the snows that fall upon the lofty ranges of mountains that surround it on every side. The water of the lake has at all seasons nearly the temperature of cold spring-water. The most accomplished swimmer could live but a short time in it; the dangers attending the navigation of such a lake in a small boat are thereby greatly increased. The lake abounds in salmon-trout, and is visited by great numbers of wild-fowl.

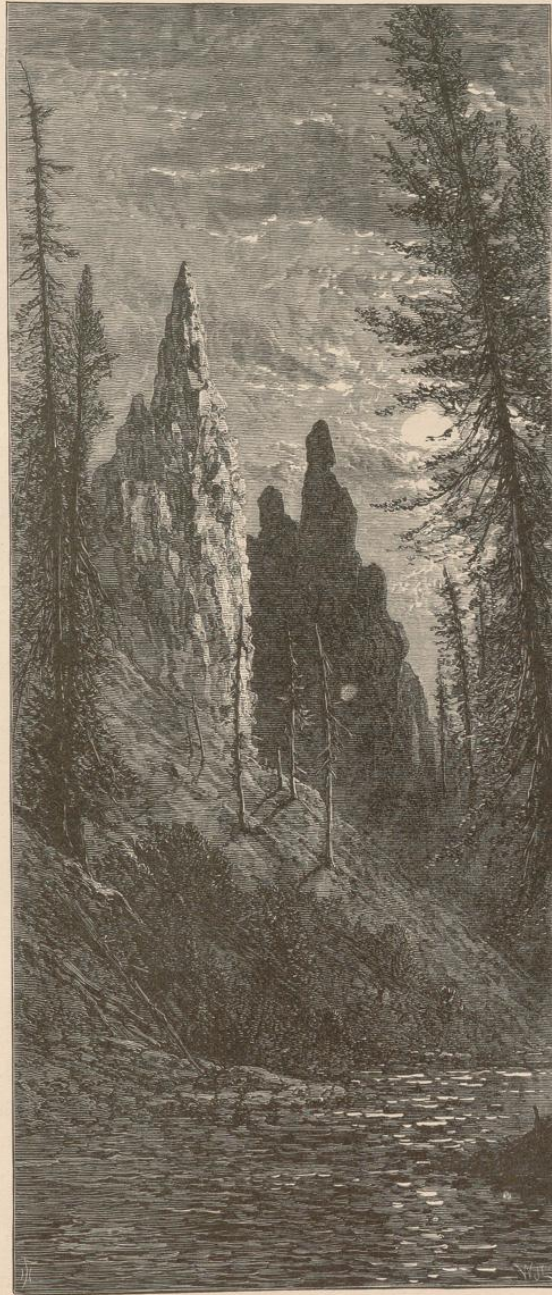
"We adopted the plan of making permanent camps at different points around the lake while explorations of the country in the vicinity were made. Our second camp was pitched at the hot springs on the southwest arm. This position commanded one of the finest views of the lake and its surroundings. While the air was still, scarcely a ripple could be seen on the surface, and the varied hues, from the most vivid green shading to ultramarine, presented a picture that would have stirred the enthusiasm of the most fastidious artist. Sometimes, in the latter portion of the day, a strong wind would arise, arousing this calm surface into waves like the sea. Near our camp there is a thick deposit of the silica, which has been worn by the waves into a bluff wall, twenty-five feet high above the water. It must have originally extended far out into the



lake. The belt of springs at this place is about three miles long and half a mile wide. The deposit now can be seen far out in the deeper portions of the lake, and the bubbles that arise to the surface in various places indicate the presence, at the orifice, of a hot spring beneath. Some of the funnel-shaped craters extend out so far into the lake, that the members of our party stood upon the silicious mound, extended the rod into the deeper waters, and caught the trout, and cooked them in the boiling spring, without removing them from the hook. These orifices, or chimneys, have no connection with the waters of the lake. The hot fumes coming up through fissures, extending down toward the interior of the earth, are confined within the walls of the orifice, which are mostly circular, and beautifully lined with delicate porcelain."

#### THE HOT SPRINGS.

"Upon the west side of Gardiner's River, on the slope of the mountain, is one of the most remarkable groups of hot springs in the world. The springs in action at the present time are not very numerous, or even so wonderful as

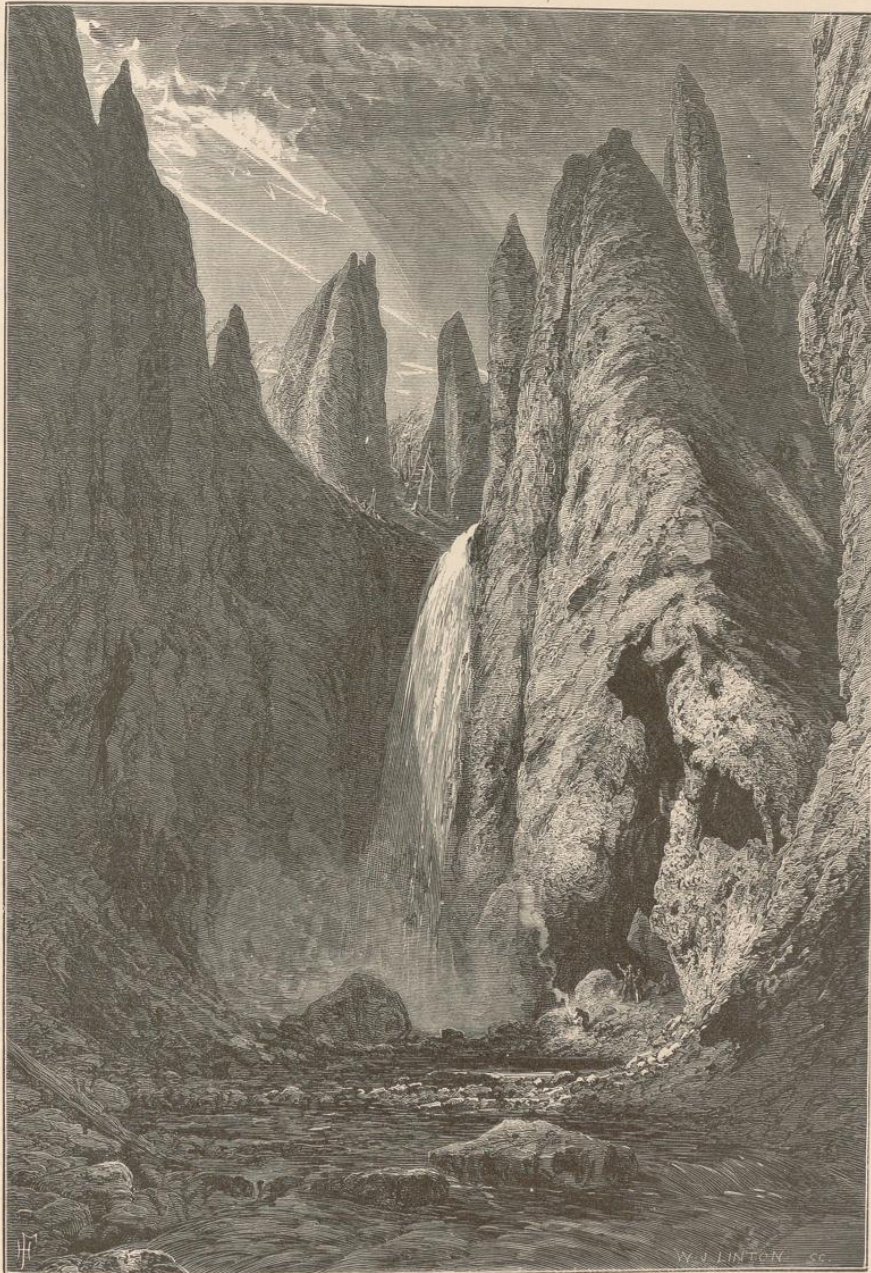


Tower Creek.



some of those higher up in the Yellowstone Valley or in the Fire-Hole Basin, but it is in the remains that we find so instructive records of their past history. The calcareous deposits from these springs cover an area of about two miles square. The active springs extend from the margin of the river five thousand five hundred and forty-five feet, to an elevation nearly one thousand above, or six thousand five hundred and twenty-two feet above the sea by barometrical measurement. Our path led up the hill by the side of a wall of lower cretaceous rocks, and we soon came to the most abundant remains of old springs, which, in past times, must have been very active. The steep hill, for nearly a mile, is covered with a thick crust, and, though much decomposed and covered with a moderately thick growth of pines and cedars, still bore traces of the same wonderful architectural beauty displayed in the vicinity of the active springs farther up the hill. After ascending the side of the mountain, about a mile above the channel of Gardiner's River, we suddenly came in full view of one of the finest displays of Nature's architectural skill the world can produce. The snowy whiteness of the deposit at once suggested the name of White-Mountain Hot Spring. It had the appearance of a frozen cascade. If a group of springs near the summit of a mountain were to distribute their waters down the irregular declivities, and they were slowly congealed, the picture would bear some resemblance in form. We pitched our camp at the foot of the principal mountain, by the side of the stream that contained the aggregated waters of the hot springs above, which, by the time they had reached our camp, were sufficiently cooled for our use. Before us was a hill two hundred feet high, composed of the calcareous deposit of the hot springs, with a system of step-like terraces, which would defy any description by words. The eye alone could convey any adequate conception to the mind. The steep sides of the hill were ornamented with a series of semicircular basins, with margins varying in height from a few inches to six or eight feet, and so beautifully scalloped and adorned with a kind of bead-work, that the beholder stands amazed at this marvel of Nature's handiwork. Add to this a snow-white ground, with every variety of shade, of scarlet, green, and yellow, as brilliant as the brightest of our aniline dyes. The pools or basins are of all sizes, from a few inches to six or eight feet in diameter, and from two inches to two feet deep. As the water flows from the spring over the mountain-side from one basin to another, it loses continually a portion of its heat, and the bather can find any desirable temperature. At the top of the hill there is a broad, flat terrace, covered more or less with these basins, one hundred and fifty to two hundred yards in diameter, and many of them going to decay. Here we find the largest, finest, and most active spring of the group at the present time. The largest spring is very near the outer margin of the terrace, and is twenty-five by forty feet in diameter, the water so perfectly transparent that one can look down into the beautiful ultramarine depth to the bottom of the basin. The sides of the basin are ornamented with coral-like forms, with a great variety of shades, from pure white to a bright cream-yellow, and the blue sky, reflected in the





TOWER FALLS





Yellowstone Lake.

transparent waters, gives an azure tint to the whole, which surpasses all art. Underneath the sides of many of these pools are rows of stalactites, of all sizes, many of them exquisitely ornamented, formed by the dripping of the water over the margins of the basins.

“On the west side of this deposit, about one-third of the way up the White Mountain from the river and terrace, which was once the theatre of many active springs, old chimneys, or craters, are scattered thickly over the surface, and there are several large holes and fissures leading to vast caverns beneath the crust. The crust gives off a dull, hollow sound beneath the tread, and the surface gives indistinct evidence of having been adorned with the beautiful pools or basins just described. As we pass up to the base of the principal terrace, we find a large area covered with shallow pools, some of them containing water, with all the ornamentations perfect, while others are fast going to decay, and the decomposed sediment is as white as snow. Upon this kind of sub-ter-



race is a remarkable cone, about fifty feet in height, and twenty feet in diameter at the base. From its form we gave it the name of the Liberty Cap. It is undoubtedly the remains of an extinct geyser. The water was forced up with considerable power, and probably without intermission, building up its own crater until the pressure beneath was exhausted, and then it gradually closed itself over at the summit and perished. No water flows from it at the present time. The layers of lime were deposited around it like the layers of straw on a thatched roof, or hay on a conical stack.

"The entire Yellowstone Basin is covered more or less with dead and dying springs, but there are centres or groups where the activity is greatest at the present time. Below the falls there is an extensive area covered with the deposits which extend from the south side of Mount Washburn across the Yellowstone rim, covering an area of ten or fifteen square miles. On the south side of Mount Washburn there is quite a remarkable group of active springs. They are evidently diminishing in power, but the rims all around reveal the most powerful manifestations far back in the past. Sulphur, copper, alum, and soda, cover the surface. There is also precipitated around the borders of some of the mud-springs a white efflorescence, probably nitrate of potash. These springs are located on the side of the mountain nearly one thousand feet above the margin of the cañon, but extend along into the level portions below. In the immediate channel of the river, at the present time, there are very few springs, and these not important. A few small steam-vents can be observed only from the issue of small quantities of steam. One of these springs was bubbling quite briskly, but had a temperature of only one hundred degrees. Extending across the cañon on the opposite side of the Yellowstone, interrupted here and there, this group of springs extends for several miles, forming one of the largest deposits of silica, but only here and there are there signs of life. Many of the dead springs are mere basins, with a thick deposit of iron on the sides, lining the channel of the water that flows from them. These vary in temperature from ninety-eight to one hundred and twenty degrees. The highest temperature was one hundred and ninety-two degrees. The steam-vents are very numerous, and the chimneys are lined with sulphur. Where the crust can be removed, we find the under-side lined with the most delicate crystals of sulphur, which disappear like frost-work at the touch. Still there is a considerable amount of solid amorphous sulphur. The sulphur and the iron, with the vegetable matter, which is always very abundant about the springs, give, through the almost infinite variety of shades, a most pleasing and striking picture."

#### MUD-SPRINGS.

"We pitched our camp on the shore of the river, near the Mud Springs, thirteen and a half miles above our camp on Cascade Creek. The springs are scattered along on both sides of the river, sometimes extending upon the hill-sides fifty to two hundred



feet above the level of the river. Commencing with the lower or southern side of the group, I will attempt to describe a few of them. The first one is a remarkable mud-spring, with a well-defined circular rim composed of fine clay, and raised about four feet above the surface around, and about six feet above the mud in the basin. The diameter of the basin is about eight feet. The mud is so fine as to be impalpable, and the whole may be most aptly compared to a caldron of boiling mush. The gas is constantly escaping, throwing up the mud from a few inches to six feet in height; and there is no doubt that there are times when it is hurled out ten to twenty feet, accumulating around the



The First Boat on the Yellowstone.

rim of the basin. About twenty yards distant from the mud-spring just described is a second one, with a basin nearly circular, forty feet in diameter, the water six or eight feet below the margin of the rim. The water is quite turbid, and is boiling moderately. Small springs are flowing into it from the south side, so that the basin forms a sort of reservoir. The temperature, in some portions of the basin, is thus lowered to ninety-eight degrees. Several small hot springs pour their surplus water into it, the temperatures of which are one hundred and eighty, one hundred and seventy, one hundred and eighty-four, and one hundred and fifty-five degrees. In the reservoirs, where the water



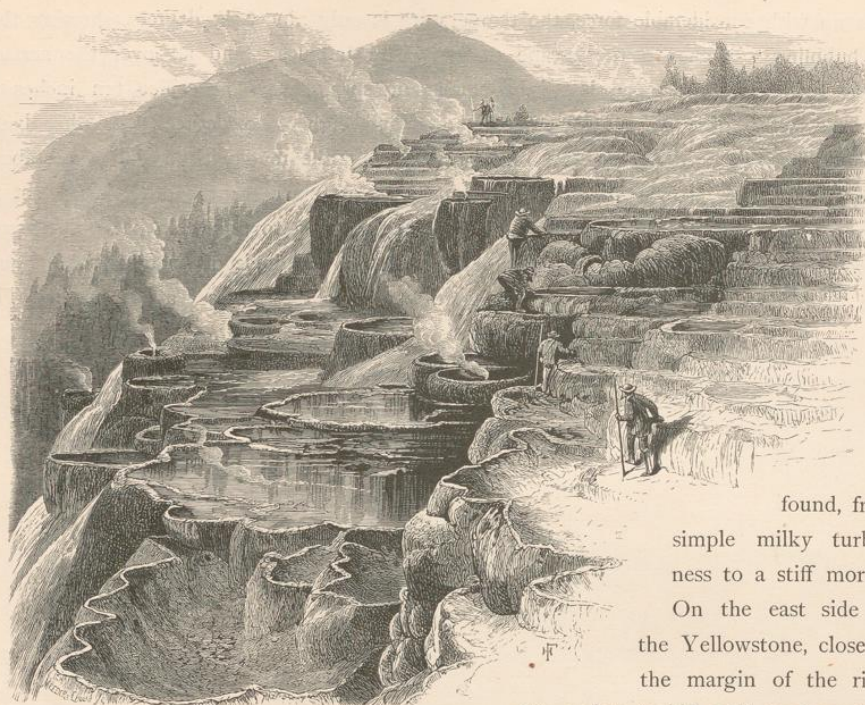
boils up with considerable force, the temperature is only ninety-six degrees, showing that the bubbling was due to the escape of gas. The bubbles stand all over the surface. About twenty feet from the last is a small mud-spring, with an orifice ten inches in diameter, with whitish-brown mud, one hundred and eighty-two degrees. Another basin near the last has two orifices, the one throwing out the mud with a dull thud about once in three seconds, spurling the mud out three or four feet; the other is content to boil up quite violently, occasionally throwing the mud ten to twelve inches. This mud, which has been wrought in these caldrons for perhaps hundreds of years, is so fine and pure that the manufacturer of porcelain-ware would go into ecstasy at the sight. The



Hot-Spring Cone.

contents of many of the springs are of such a snowy whiteness that, when dried in cakes in the sun or by a fire, they resemble the finest meerschaum. The color of the mud depends upon the superficial deposits which cover the ground, through which the waters of the springs reach the surface. They were all clear hot springs originally, perhaps geysers even; but the continual caving-in of the sides has produced a sort of mud-pot, exactly the same as the process of preparing a kettle of mush. The water is at first clear and hot; then it becomes turbid from the mingling of the loose earth around the sides of the orifice, until, by continued accessions of earth, the contents of the basin become of the consistency of thick mush, and, as the gas bursts up through it, the dull, thud-like noise is produced. Every possible variation of condition of the contents is





Hot Springs.

mud is quite yellow, and contains much sulphur. This we called a mud-sulphur spring. The basin is fifteen by thirty feet, and has three centres of ebullition, showing that, deep down underneath the superficial earth, there are three separate orifices, not connected with each other, for the emission of heated waters."

found, from simple milky turbidness to a stiff mortar. On the east side of the Yellowstone, close to the margin of the river are a few turbid and mud springs, strongly impregnated with alum. The

#### SULPHUR-MOUNTAIN AND MUD-VOLCANO.

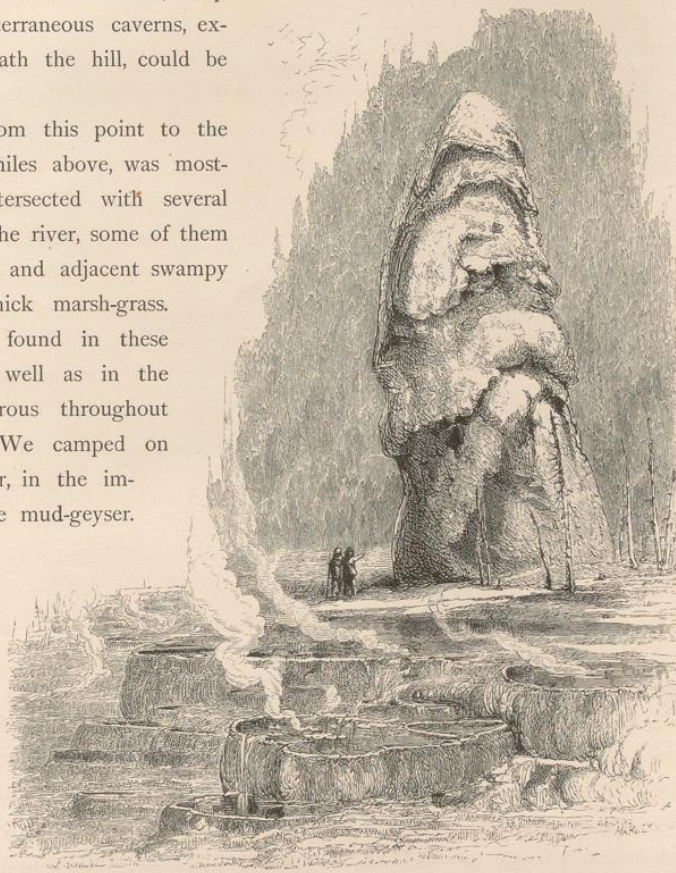
From Lieutenant Barlow's report we derive the following description of a sulphur-mountain near Cascade Creek, and of a mud-volcano a few miles distant: "Toward the western verge of a prairie of several miles in extent, above the Yellowstone Falls, a hill of white rock was discovered, which, upon investigation, proved to be another of the 'soda-mountains,' as they are called by the hunters. Approaching nearer, I found jets of smoke and steam issuing from the face of the hill, while its other side was hollowed out into a sort of amphitheatre, whose sides were steaming with sulphur-fumes, the ground hot and parched with internal fires. Acre after acre of this hot volcanic surface lay before me, having numerous cracks and small apertures, at intervals of a few feet, whence were expelled, sometimes in steady, continuous streams, sometimes in



puffs, like those from an engine, jets of vapor more or less impregnated with mineral substances. I ascended the hill, leaving my horse below, fearful that he might break through the thin rock-crust, which in many places gave way beneath the tread, revealing caverns of pure crystallized sulphur, from which hot fumes were sure to issue. The crystals were very fine, but too frail to transport without the greatest care. A large boiling spring, emitting strong fumes of sulphur and sulphuretted hydrogen, not at all agreeable, was also found. The water from this spring, overrunning its basin, trickled down the hill-side, leaving a highly-colored trace in the chalky rock. Upon the opposite side was found a number of larger springs. One, from its size and the power it displayed in throwing water to the height of several feet above the surface, was worthy of notice. Near this was a spring having regular pulsations, like a steam-engine, giving off large quantities of steam, which would issue forth with the roar of a hurricane. This was, in reality, a steam-volcano; deep vibrations in the subterraneous caverns, extending far away beneath the hill, could be distinctly heard.

"The country from this point to the mud-volcano, a few miles above, was mostly rolling prairie, intersected with several streams flowing into the river, some of them having wide estuaries and adjacent swampy flats, covered with thick marsh-grass. Ducks were usually found in these sluggish streams, as well as in the little lakes so numerous throughout this whole region. We camped on the bank of the river, in the immediate vicinity of the mud-geyser.

This being the first specimen of the true geysers yet seen, it was examined with great curiosity. The central point of interest, however, is the mud-volcano, which has broken out from



Liberty-Cap.



the side of a well-timbered hill. The crater is twenty-five feet across at the top, gradually sloping inward to the bottom, where it becomes about half this diameter. Its depth is about thirty feet. The deposit is gray mud, nearly pure alumina, and has been thrown up by the action of the volcano at no very distant period. The rim of the crater on the down-hill side is some ten feet in height, and trees fifty

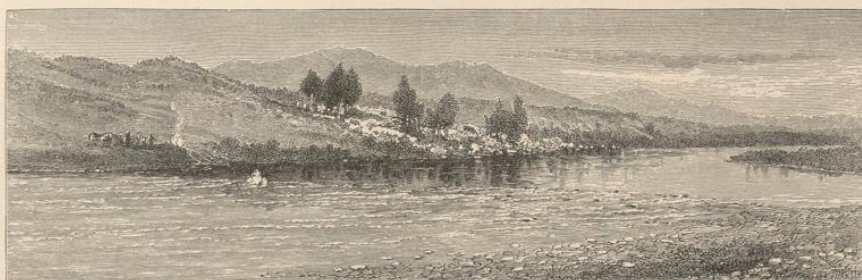


Mud-Springs.

feet high and a hundred feet distant are loaded with mud thrown from this volcano. The surface of the bottom is in a constant state of ebullition, puffing and throwing up masses of boiling mud, and sending forth dense columns of steam several hundred feet above the surrounding forests. This vapor can be seen for many miles in all directions. Some four hundred yards from this crater are three large hot springs of muddy water, one of which proved to be a geyser, having periods of active



eruption about every six hours. The phenomena attending these eruptions are as follows: Soon after the violent period passes, the water in the pool gradually subsides through the orifice in the centre, the surface falling several feet, the water almost entirely disappearing from sight. It then gradually rises again until the former level is reached, during which occasional ebullitions of greater or lesser magnitude occur. Great agitation then ensues; pulsations, at regular intervals of a few seconds, take place, at each of which the water in the crater is elevated higher and higher, until, finally, after ten minutes, a column is forced up to the height of thirty or forty feet. During this period waves dash against the sides of the basin, vast clouds of steam escape, and a noise like the rumbling of an earthquake takes place. Suddenly, after about fifteen minutes of this commotion, the waves recede, quiet is restored, the waters sink gradually to their lowest limit, from which they soon rise again, and repeat the same operation."



Soda-Springs.

## THE GREAT GEYSER BASIN.

We also quote from Lieutenant Barlow's report the following account of the great Geysers on Fire-Hole River: "Entering the basin from the north, and following the banks of the Fire-Hole River, whose direction there is about northeast, a series of rapids, quite near together, is encountered, when the river makes a sharp bend to the southwest, at which point is found a small steam-jet upon the right. A warm stream comes in from the left, falling over a bank ten feet in height. A short distance beyond a second rapid is found, and then another, about one hundred yards farther on, where the gate of the Geyser Basin is entered. Here, on either side of the river, are two lively geysers called the Sentinels. The one on the left is in constant agitation, its waters revolving horizontally with great violence, and occasionally spouting upward to the height of twenty feet, the lateral direction being fifty feet. Enormous masses of steam are ejected. The crater of this geyser is three feet by ten. The opposite Sentinel is not so constantly active, and is smaller. The rapids here are two hundred yards in length, with a fall of thirty feet. Following the bank of the river, whose





THE GIANT GEYSER.



general course is from the southeast, though with many windings, two hundred and fifty yards from the gate we reach three geysers acting in concert. When in full action, the display from these is very fine. The waters spread out in the shape of a fan, in consequence of which they have been named the Fan Geysers. A plateau, opposite the latter, contains fifteen hot springs, of various characteristics; some are of a deep-blue color, from sulphate of copper held in solution, and having fanciful caverns distinctly visible below the surface of the water. The openings at the surface are often beautifully edged with delicately-wrought fringes of scalloped rock. One variety deposits a red or brown leathery substance, partially adhering to the sides and bottom of the cavern, and waving to and fro in the water like plants. The size of these springs varies from five to forty feet in diameter. One hundred yards farther up the east side of the stream is found a double geyser, a stream from one of its orifices playing to the height of eighty or ninety feet, emitting large volumes of steam. From the formation of its crater it was named the Well Geyser. Above is a pine-swamp of cold water, opposite which, and just above the plateau previously mentioned, are found some of the most interesting and beautiful geysers of the whole basin.

"First we come upon two smaller geysers near a large spring of blue water, while a few yards beyond are seen the walls and arches of the Grotto. This is an exceedingly intricate formation, eight feet in height, and ninety in circumference. It is hollowed into fantastic arches, with pillars and walls of almost indescribable variety. This geyser plays to the height of sixty feet several times during twenty-four hours. The water, as it issues from its numerous apertures, has a very striking and picturesque effect.

"Near the Grotto is a large crater, elevated four feet above the surface of the hill, having a rough-shaped opening, measuring two by two and a half feet. Two hundred yards farther up are two very fine large geysers, between which and the Grotto are two boiling springs. Proceeding one hundred and fifty yards farther, and passing two hot springs, a remarkable group of geysers is discovered. One of these has a huge crater five feet in diameter, shaped something like the base of a horn—one side broken down—the highest point being fifteen feet above the mound on which it stands. This proved to be a tremendous geyser, which has been called the Giant. It throws a column of water the size of the opening to the measured altitude of one hundred and thirty feet, and continues the display for an hour and a half. The amount of water discharged was immense, about equal in quantity to that in the river, the volume of which, during the eruption, was doubled. But one eruption of this geyser was observed. Its periodic turns were not, therefore, determined. Another large crater close by has several orifices, and, with ten small jets surrounding it, formed, probably, one connected system. The hill built up by this group covers an acre of ground, and is thirty feet in height."



In the report to Congress by the Committee on Public Lands we learn that "the entire area comprised within the limits of the reservation 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 six thousand 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 six thousand feet in altitude; and the Yellowstone Lake, which occupies an area fifteen by twenty-two miles, or three hundred and thirty square miles, is seven thousand four hundred and twenty-seven feet. The ranges of mountains that hem the valleys in on every side rise to the height of ten thousand and twelve thousand 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 twenty-six degrees. There is frost every month of the year." These statements make it evident that, in setting apart this area "as a great national park and pleasure-ground for the benefit and enjoyment of the people," no injury has been done to other interests. The land did not need to be purchased, but simply withdrawn from "settlement, occupancy, or sale;" and hence, by timely action, a great public benefit was secured, which in a few years would have been impracticable, or at least attainable only with great difficulty. The time is not distant, in the opinion of the Congressional committee, when this region will be a place of "resort for all classes of people from all portions of the globe." The Northern Pacific Railroad, now rapidly advancing toward completion, will render the park easily accessible; and, this once accomplished, the marvels of the strange domain will tempt the curious in great numbers to visit it. As a place of resort for invalids, the Yellowstone Valley, on account of its pure and exhilarating atmosphere, is believed to be unexcelled by any portion of the globe; and, if this anticipation prove true, there will be additional reason to be gratified at the wise forethought which secured it for public uses forever. The Congressional enactment which creates the park amply provides for its control and management. "It shall," says the act, "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. 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 to be expended under his direction in the management of the same, and the construction of roads and bridle-paths therein."