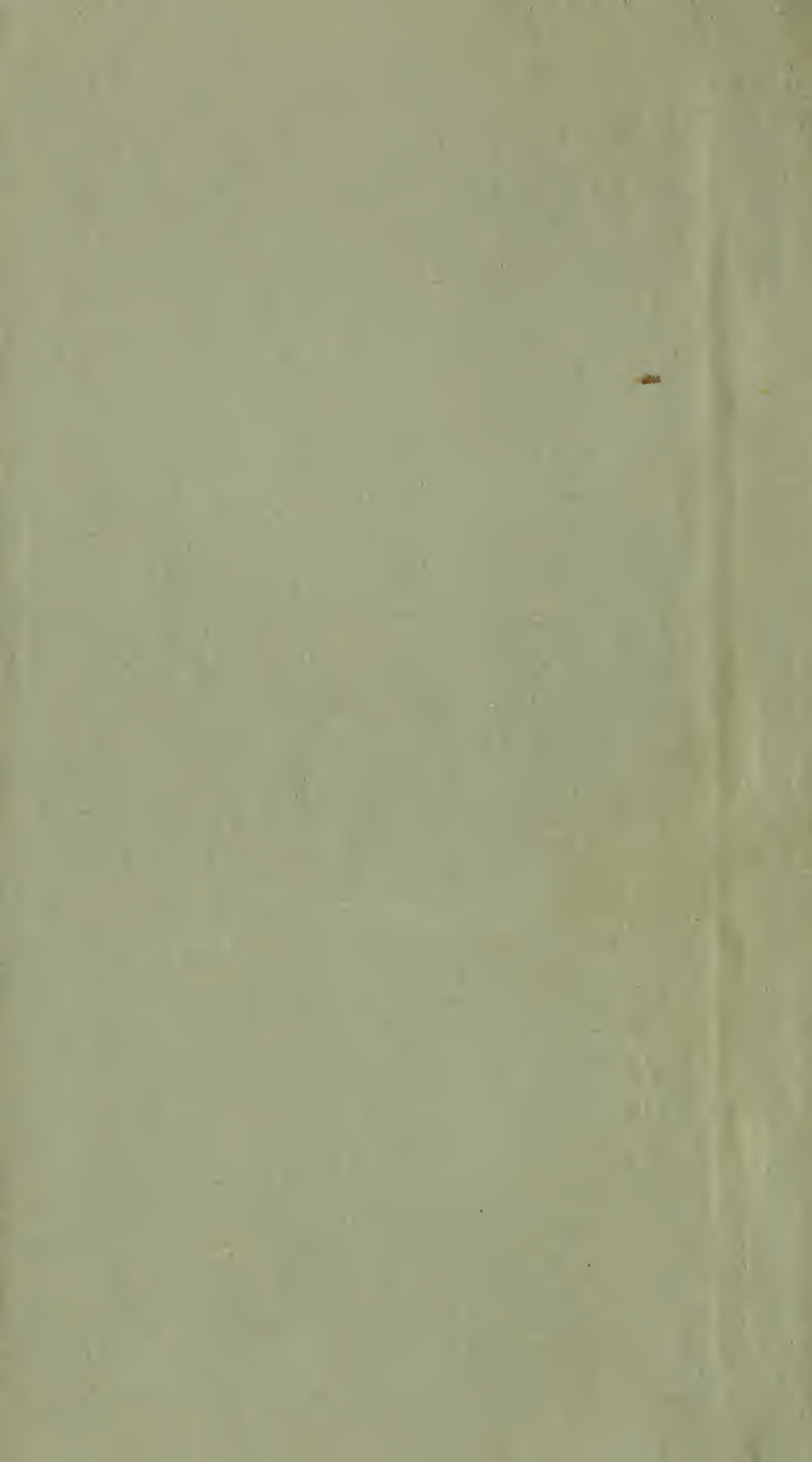
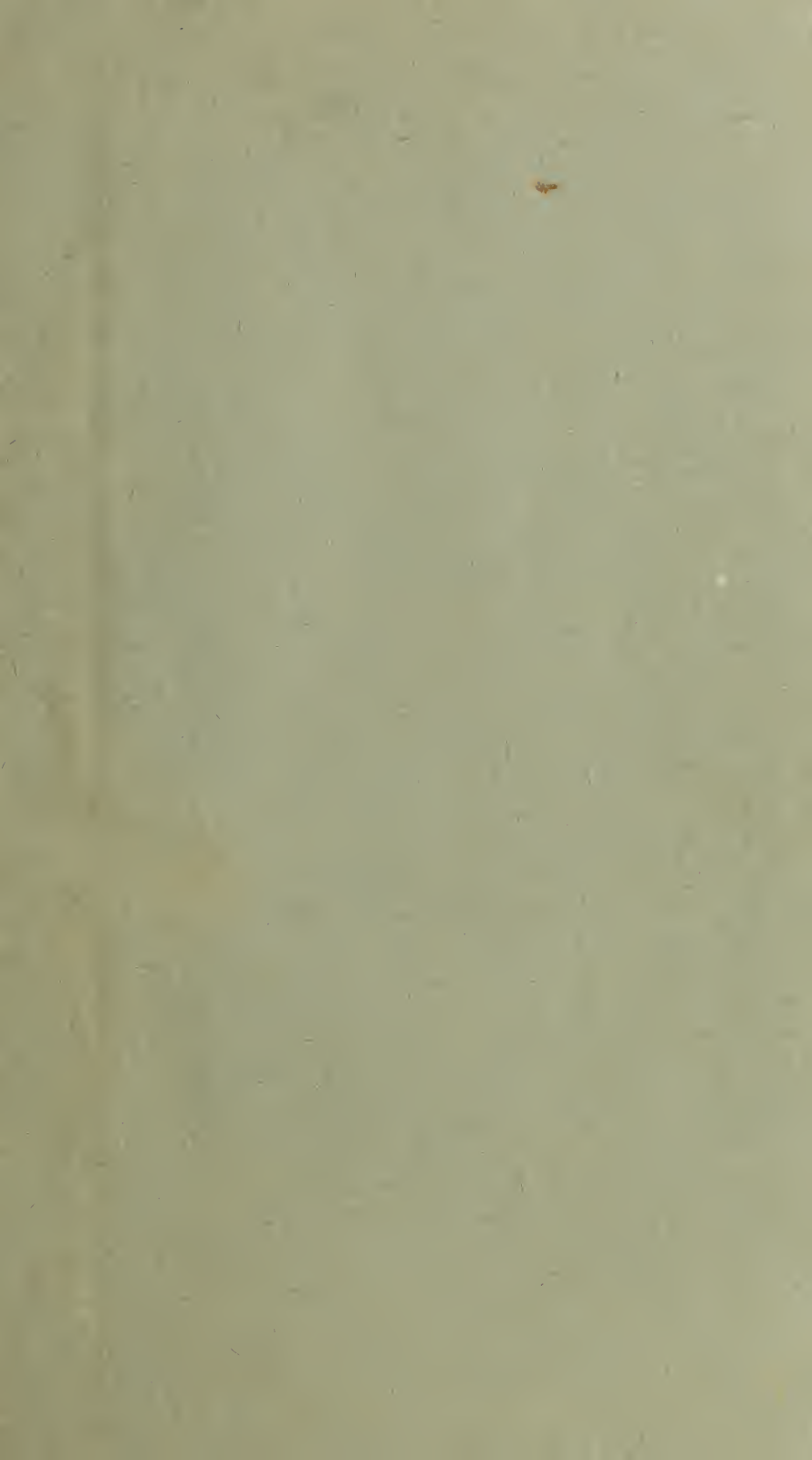



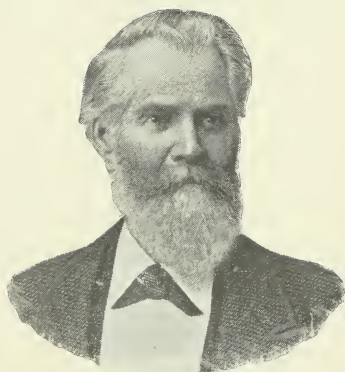
ANNUAL REPORTS
OF THE
SUPERINTENDENTS
Yellowstone National Park







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PHILETUS W. NORRIS.

ANNUAL REPORT

OF THE

SUPERINTENDENT

OF THE

YELLOWSTONE NATIONAL PARK

TO THE

SECRETARY OF THE INTERIOR

FOR

THE YEAR 1880.

358



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1881.

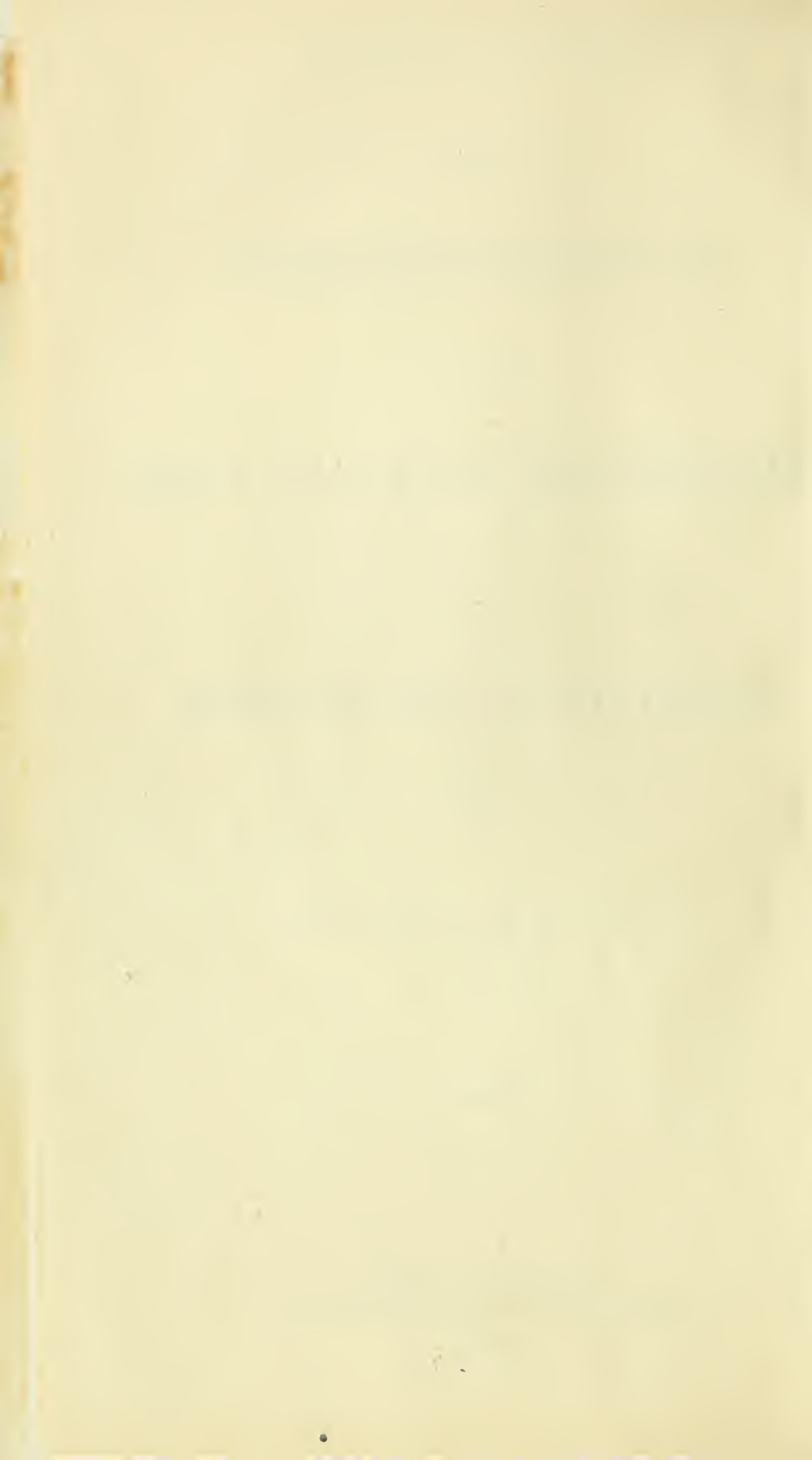


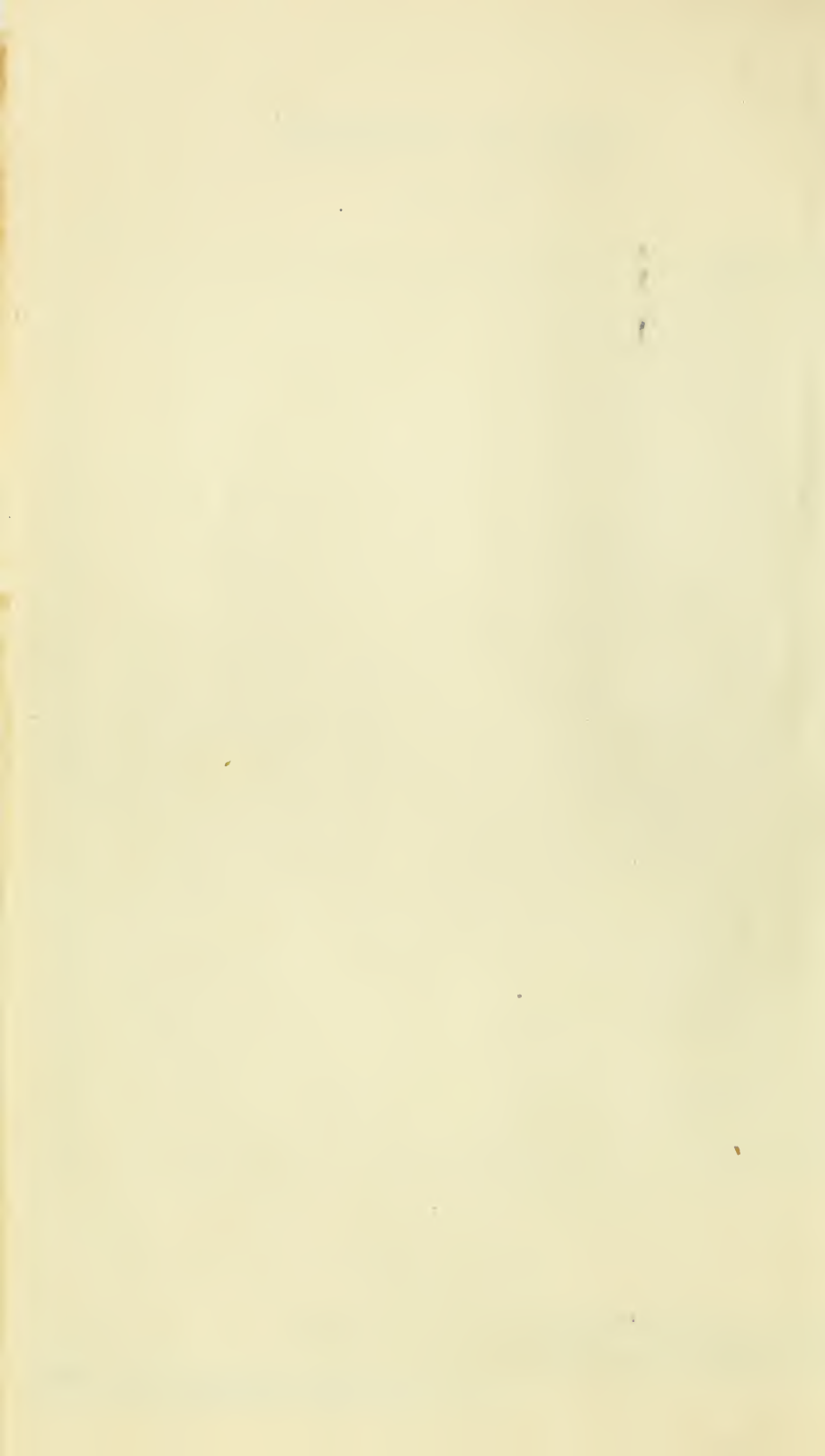
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ANNUAL REPORT

OF THE

SUPERINTENDENT OF THE YELLOWSTONE NATIONAL PARK.

HEADQUARTERS MAMMOTH HOT SPRINGS,
YELLOWSTONE NATIONAL PARK, WYOMING,
November 30, 1880.

Hon. CARL SCHURZ,
Secretary of the Interior :

SIR: I have the honor to submit the following report of operations during the year 1880 for the preservation, protection, and improvement of the Yellowstone National Park (the fourth which I have submitted to the department), and to respectfully request that if approved it may be printed.

Soon after the negotiation in Washington of treaties with the Crow, Shoshone, Bannack, and Sheepeater Indians, who had been either aboriginal owners of, or occasional troublesome ramblers in portions of the Park, I proceeded, via Omaha and Ogden, to the agency of a part of the Shoshone and all the Bannock and Sheepeater Indians on the Ross Fork of Snake River, in Idaho Territory. Here and at a mountain camp twenty miles distant I obtained, partly through the assistance of the affable and efficient agent of these tribes, Major Wright, and subsequently by my own personal efforts with Major Jim's band of Bannocks, at Ruby Valley, Montana Territory, a solemn promise from all these Indians to abide by the terms of their treaty in Washington, and also that thereafter they would not enter the Park beyond Heart Lake, thus averting in future all danger of conflict between these tribes and laborers or tourists. To this agreement I am gratified to report their faithful adherence.

Proceeding on the Utah Northern Railroad to its terminus at Red Rock, and thence by coach through Virginia City to Bozeman, I there met my competent assistant, Mr. C. M. Stephens, with teams and an escort. His report of the snows and streams within and adjacent to the Park, corroborated as it was by persons at Bozeman and my own experience in crossing the chilly waters of swollen streams, induced me to inform the Chief Signal Officer at Washington, by telegram, of the backwardness and unusual coldness of the season, and also of the unprecedented depth of snow in the mountain passes and the floods in the valley streams, so that a warning might be given to any who contemplated a visit to the Park the present year, to defer the same until at least late in July. Ignorance of or inattention to this timely warning, by a number of tourists, resulted in many otherwise needless hardships, privations, and delays to themselves, and much unjust criticism and censure to myself.

Quickly procuring an outfit, arranging field parties, and leaving the train to follow, I left Bozeman, with the horsemen, on the 1st day of July, reaching here, eighty miles distant, on the evening of the 2d, our

wagons being delayed by terrific hail-storms until the 5th. On this date, Mr. O. J. Salesbury, with five horsemen, arrived by the Geyser route, on a tour of inspection of the road from the Utah Northern Railway for a coach and mail route; and being desirous of my assistance in selecting and reopening the same across the Park, before deciding to close a mail contract, I returned, in company with him and Mr. James Goodwin, one of my old scouts, over the Geyser road to the falls of the Gibbon. Having effected one crossing of this stream by swimming its swollen, ice-cold waters, and in the same manner having made five crossings (within a distance of six miles) of the waters of the Madison in its cañon, we reached the open valley below. The members of the party were unanimously of the opinion that this Cañon route was dangerous, if not, indeed, impassable during a large part of each year, and that it was likely to continue so during 1880, and there was neither time nor means to construct bridges or grades this season for a coach and mail route from the railroad direct to the headquarters of the Park. We were therefore compelled to seek a new route of entrance to the Madison end of the Park, and an arduous effort was immediately made to discover a more favorable approach. The rugged mountains to the north were evidently impassable, while we were ignorant as to whether the rocky cliffs of the southern elevated timber plateau had ever been scaled by either explorer or mountaineer. Scattering in parties of two, we attempted the ascent, and, though some were baffled by cliffs or cañons, within two days a route was discovered so unexpectedly favorable that its adoption and opening were immediately determined upon. Mr. Salesbury, leaving his men to construct a mail station where the cut-off would strike the Madison at Riverside, returned East to close his mail contract, while I returned to headquarters, remaining there until I had built an excellent blacksmith shop and barn, and repaired the bridges, fences, and grades in the vicinity. Subsequently, with some thirty men, two wagons, and a pack train, I started upon the Geyser road for the Fire Holes.

No one, lacking practical experience with untimely Sierra snows and floods, can form an adequate conception of the difficulties of repairing or constructing grades, culverts, or bridges, over fifty miles of mountain roads of the character of those in this region. All difficulties were, however, finally surmounted, and after fording both the Fire Hole Rivers near their forks with my party, I ascended a stream from the west, making camp where a bison-trail descended from the plateau to a cold-spring rivulet on the margin of a lovely, grassy valley, which, being dotted with spouting hot springs, we called Geyser Meadows.

As our proposed road was to descend from the plateau on a long, natura, winding turnpike between two cañons near the Forks of the Fire Holes, three miles distant, we opened the bison-trail for the saddle and pack animals to the line of road, exploring and working both ways. The cold-water streams of the valleys were still swollen, and numerous old snow-drifts remained upon the plateau: yet there were neither springs, streams, nor even lakes, the porous lava ashes and loose gravel of the soil having speedily absorbed all the melted snow, while during the last five days of July the temperature was so low that a sufficient quantity of water was obtainable only by thawing snow-drifts, great piles of timber being heaped upon them and burned for that purpose. Although strongly flavored with smoke, pitch, and sometimes with alkali, this water was tolerably potable, and sufficed to quench our thirst until a cold rivulet was discovered just above its sink at the west foot of the plateau. Three miles from here we made the Madison below the cañon, twenty one miles by that route and fifteen via the new one over the plateau from the

Forks of the Fire Holes. We reached this point, where the Riverside mail station is now established, on the 7th of August, subsequently improving somewhat the northern ascent to the Terrace. This route possesses the advantage of being always dry; it is also well shaded by beautiful pine forests, and is six miles shorter than the Cañon route; besides, by this road, while there would be the expense for two long and somewhat steep grades, the necessity of building four long bridges and several expensive grades, exposed to snow-drifts and floods, on the old road would be obviated; and it is more than probable the new route would never be abandoned, although if necessary the old one could be used for a brief period each summer.

While on a tour of the more important portions of the Park, in August, with the honorable Secretary of the Interior and his party, the main force of laborers continued improving the Geyser road and other routes in that portion of the Park. Soon afterwards, with a small party and pack train, I proceeded from our headquarters to the Great Falls of the Yellowstone.

Having bridged several streams, including Cascade Creek at Crystal Falls, opened trails, and rendered safe the lookouts at main points of interest, as at Great Falls and the upper portion of the Grand Cañon, I left most of the party to open a trail along its brink, and, in company with Messrs. Jack Davis and W. H. Parker, both excellent navigators, ascended the Yellowstone River to its lake, and in a small, unsafe craft, called the Explorer, made the tour of the latter and its islands. We also ascended Pelican Creek and the Upper Yellowstone River to their rapids. After encountering several heavy gales, one severe snow-storm, and a shipwreck, I ascended Mount Chittenden and other peaks of the range, crossed two passes to the Passamaria or Stinking Water branch of the Big Horn River, and returned to the foot of the lake and falls. Thence, while the main force was opening a trail between Mount Washburn and the Grand Cañon, with a small party I opened a route of ascent to the former, and also one of descent to the latter, where, at a depth of 1,300 feet, was found a beautiful and unique geyser basin, whence, by exceedingly toilsome and dangerous sheep-paths, we descended (mainly within) and explored the Grand Cañon to Tower Falls. This trail is much shorter and better than the old one over Mount Washburn, and opens up such matchless scenery along the Grand Cañon that it will doubtless soon supplant it.

Finding at the Forks of the Yellowstone the noted guides Rowland and Miller, with the famous photographer of the Park, Mr. H. B. Calfee, my assistant, Mr. W. H. Parker, and myself joined them, and with them constituted the first party of visitors to the famous and exceedingly interesting medicinal springs, ~~the~~ ^{the} matchless dikes and other unique marvels of the East Fork regions.

During this trip I ascended several snowy peaks of the broken and elevated Sierra-Shoshone Range, which extends from Pilot Knob to the Wind River range, and from a monument which I erected on Hoodoo Mountain took bearings of Mounts Washburn, Chittenden, Doane, Stevenson, and Pilot Knob, and of the Yellowstone and other lakes.

My return was via the petrified forests at the head of Pleasant Valley, headquarters being reached on the 4th of October.

While absent, my trusty gamekeeper, Harry Yount, who had left us at the foot of Yellowstone Lake, explored alone its western borders, the Shoshone, Lewis, Heart, and other lakes, and the basins of Barlow and Upper Snake Rivers, and, after tracing some excellent trail routes, and obtaining much useful and valuable information, returned just in advance of our party.

The season for labor in the Park continued, as it had begun, later than usual, permitting work upon the various bridle-paths and on the road up the Gardiner River. A good and well-located house was also constructed for the gamekeeper at the mouth of Soda Butte, a branch of the East Fork of the Yellowstone, and a favorite winter haunt of elk and bison. This, and my own explorations of the Gallatin Range, kept the entire party active until well into October, when most of the laborers were discharged. With the remainder, buildings and fences were repaired, tools and implements gathered and secured, and other preparations made for winter just in time to escape its severity amid the snowy peaks and passes. Elk, deer, and other game being driven by storms into the sheltered glens and valley, we were enabled to secure an abundant winter's supply of fresh meat, and also fine hides of the bear, wolf, and wolverine. Although severe and dangerous, hunting in the Park was excellent sport, and the only recreation I enjoyed during the season.

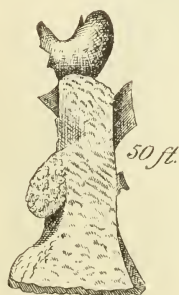
During the autumn, observations, and visits to Gamekeeper Yount's house, thirty-five miles distant one way, and to neighbor Marshall's, at the Forks of the Fire Holes, fifty miles the other; closing up business and preparing this report, including accompanying maps, tables of elevations of mountains ascended, and records of weather regularly entered, kept me actively employed until my departure late in November. At that time I left Harry Yount with one man at the gamekeeper's cabin on the East Fork of the Yellowstone, and my assistant, Stephens, with three men and the animals, at the Mammoth Hot Springs, and returned to Bozeman to liquidate my remaining indebtedness for outfit and supplies for the season. Thence, by coach, I went to Dillon, the present terminus of the Utah Northern Railroad, and by that road to Ogden, where I took the usual railroad route and returned to the East.

EXPLORATIONS.

As stated in my report of 1879, the want of funds adequate to such protection and improvements as are absolutely required in the Park has constantly prevented explorations not only desirable in the interest of science, but also necessary to an intelligent and judicious expenditure of the funds actually appropriated. The appropriation for the past season, however (\$15,000), was a sufficient increase over that of the previous year to admit of the employment of an active and reliable gamekeeper, who, besides attending to his regular duties, made, during the season, interesting explorations (see his appended report), and also to enable me during the favorable autumn to make extensive and valuable explorations in the known as well as in the hitherto unknown portions of the Park, accounts of which will be found throughout this report.

HOODOO REGION.

This is a mountain phrase which for years has been applied to a terribly broken and eroded portion of the Sierra-Shoshone Range around a portion of the head branches of the East Fork of the Yellowstone and the Passamaria or Stinking Water Fork of the Big Horn, and which, until my own visit of this season, had never been visited by any of the scientific tourists or government explorers of the National Park. In fact nearly all that was previously known of this region was from information derived from a small party of prospecting miners, two of whom,

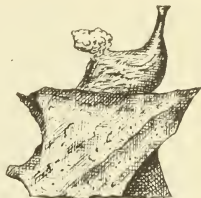


HOODOOS

Or remnants of erosion in the Goblin Labyrinths



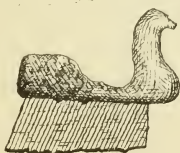
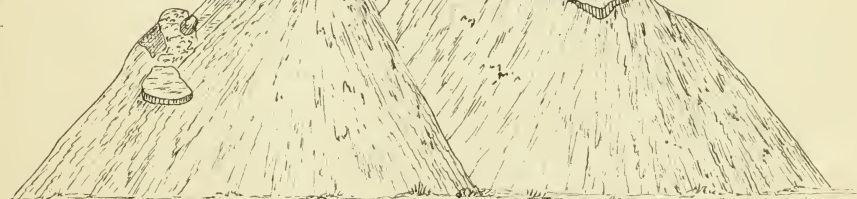
40 ft.



30 ft.



125 ft.



25 ft.



20 ft.

HOODOOS

Ornaments of erosion in the Goblin Labyrinths

Crandall and Adams, were killed by Indians, while three others, Adam Miller and his two companions, narrowly escaped, after losing their horses and camp outfit, and were compelled to make a long and terribly trying retreat to the Old Crow Indian Agency in the fall of 1870. It was this party which discovered the Clark's Fork mines, and this region of countless remnants of erosion, so wild, weird, and spectral that they named it the "Hoodoo" or "Goblin Land." Few white men have visited it, and fewer still who have ventured there returned. Miller, Rowland, and myself narrowly escaped from the Indians during our effort to visit it in the fall of 1878; but seeing no Indians in the Park this year, and deeming it important to ascertain the true character of this region before fixing the permanent boundaries of the Park, with Miller, Rowland, and others, late this season, I made another effort to explore it. Ascending the deep, narrow valley of the East Fork of the Yellowstone, I visited a sulphur basin near the mouth of Cache Creek, and found upon it, two miles from its mouth, an important basin of medicinal springs, some of which are evidently similar to those of the Soda Butte, while others are of alum or sulphur; and in the channel of the stream several huge, hissing caldrons of hot water of unknown properties. Some seven miles above Cache Creek we passed the mouth of another stream in a deep, narrow, timbered valley which we named Calfee Creek, after the famous photographer of the Park. Five miles farther on we reached the creek which Miller recognized as the one he descended in retreating from the Indians in 1870, and which, on this account, we called Miller's Creek. Some miles from the mouth on a southern branch of this stream we found another basin of mineral springs similar to, and in a nearly direct line south of, those upon the Soda Butte and Cache Creek.

Ascending Miller's Creek to its forks, and, by long and severe effort, scaling the elevated plateau between them, within forty miles from the mouth of the Soda Butte we found the decaying brands of Miller's old camp-fire. Just above were still standing the poles of one Indian lodge, while there were more than forty others that had fallen, but which evidently had been used the previous year; many still older also remain to mark this habitat of the red man. These poles are near the summit of an open, grassy pass between Hoodoo and Miller Creeks, close by a dwarf-timber-fringed pond at the foot of an old snow-field on the side of Parker's Peak, and within sight and easy striking distance of rough, elevated passes to Crandall's Creek (a branch of Clark's Fork), and other passes to the Stinking Water. Hidden upon the flanks by snowy mountains, and in the pass by a screen of dwarf pines and balsams, and with a precipitous descent over the snow-fields to Hoodoo Creek, this Indian perch commands a fair view of all approaches. Abundant pasturage for game and domestic animals was had in the notches of the numerous adjacent cañons. This position, therefore, formed one of the most secure lairs and admirable lookouts for hostile Indians that I have ever met with, and also bears ample evidence of its frequent summer occupancy. Fragments of china-ware, blankets, bed-clothing, and costly male and female wearing apparel here found, were mute but mournful witness of border raids and massacres.

Convinced that there were at that time no Indians in the vicinity, and leaving Handford with our animals at Miller's old camp, I pushed on some three miles to explore the Hoodoo Mountain and its labyrinths. While Miller with Calfee and Parker explored and obtained sketches and views of many of the weird wonders of erosion, with Rowland I ascended and took the elevations of the adjacent peaks, including the Hoodoo Mountain. The latter was found to be 10,700 feet high (ane-

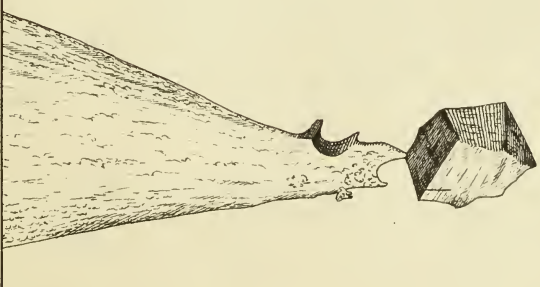
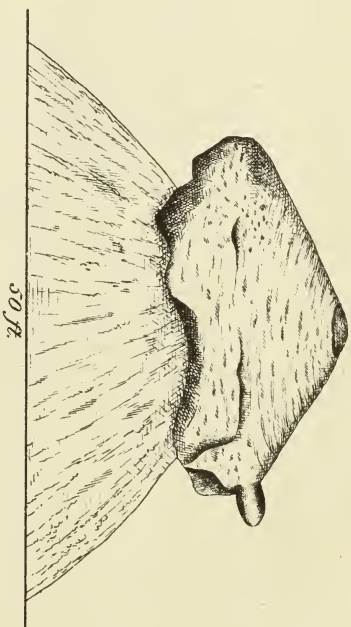
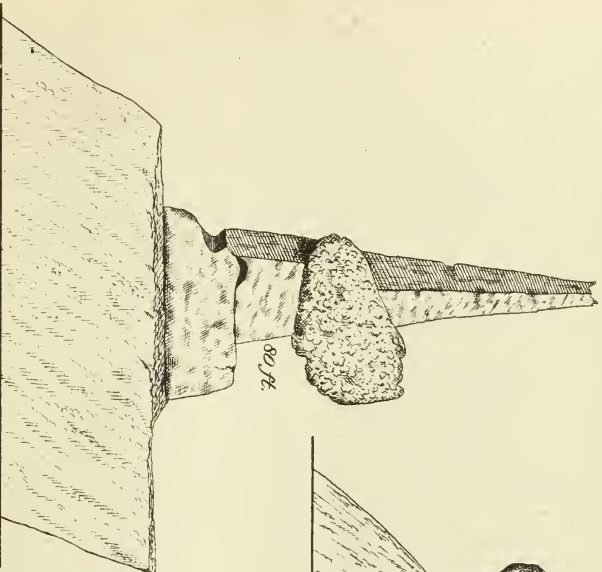
roid-barometer measurement) at the western end, where we erected a monument.

This mountain is about one mile in length, with a horizontal ridge-like crest, trending nearly northeast and southwest, and is the real water-shed of the various fountain-heads of the East and Clark's Forks of the Yellowstone, and nearly that of the Stinking Water branch of the Big Horn River; and though Saddle Mountain and some other adjacent peaks are somewhat higher, none of them are so isolated and prominent as a landmark. While probably never itself a crater, Hoodoo Mountain is evidently of volcanic origin, and was eroded into its present form. Upon its southern face it is still changing. Here, extending from 500 to 1,500 feet below the summit, the frosts and storms of untold ages in an Alpine climate have worn about a dozen labyrinths of countless deep, narrow, tortuous channels amid the long, slender, tottering pillars, shafts, and spires of the conglomerate breccia and other remaining volcanic rocks. In shape they are unlike any elsewhere known, being a cross between the usual spire and steeple form, and the slender-based, and flat, tottering, table-topped sandstone monuments near the Garden of the Gods, in Colorado; and while lacking the symmetry and beauty of these, surpass both in wild, weird fascination. Here the sharp-cornered fragments of rocks of nearly every size, form, formation, and shade of coloring, by a peculiar volcanic cement attached sidewise, endwise, and upon the tops, sides, and, apparently, unsupported, upon each other, represent every form, garb, and posture of gigantic human beings, as well as of birds, beasts, and reptiles. In fact, nearly every form, animate or inanimate, real or chimerical, ever actually seen or conjured by the imagination, may here be observed. Language does not suffice to properly describe these peculiar formations; sketches may probably do something, and photographs more, to convey a conception of their remarkable character, but actual observation is absolutely necessary to adequately impress the mind with the wild unearthly appearance of these eroded Hoodoos of the Goblin Land. These monuments are from fifty to two or three hundred feet in height, with narrow, tortuous passages between them, which sometimes are tunnels through permanent snow or ice fields where the big-horn sheep hide in safety; while the ceaseless but ever-changing moans of the wild winds seem to chant fitting requiems to these gnome like monuments of the legendary Indian gods.

Another feature of the Hoodoo region is worthy of more attention than it is here possible to give. I refer to the numerous huge dikes which trend uniformly in parallel lines nearly north and south, unaffected in course, size, or character by yawning cañons or the thousands of feet of craggy mountain sides, to their snowy summits, ever standing high above the softer and deeper disintegrating volcanic formations between them. While all basalt, obsidian, and other columnar formations observed within the Park, when found "in place," are uniformly vertical or radiating, these dikes, although as clearly columnar, are, in every observed instance, positively horizontal, very hard, and not friable, and part, in columns entire, across the dikes, thus appearing like gigantic steps ascending the cañon and mountain sides.

GALLATIN RANGE.

This range, so noted for its ragged basaltic formation, and sharp, unbroken crest north of Electric Peak upon the borders of the National Park, exhibits therein some novel peculiarities. Although retaining its



HOODOOS

Or remnants of erosion in the Goblin Labyrinth

north and south trend and character as a divide of the waters of the Yellowstone and Missouri, where it is severed by the yawning cañon of the Madison Fork of the latter, still on much of the intervening distance it presents not only a double line of peaks, but also a clearly distinct formation, outline, trend, color, and weathering of each. The western range, as viewed from the deep valleys of the West Gallatin and the Upper Madison Rivers, presents a nearly continuous outline of reddish rocks of a friable formation, like coarse grained sandstone or crumbling granite, and serrated by the peaks of the somewhat higher eastern range. The eastern range, from the valleys of the Gardiner and the Gibbon, shows the sharp outlines of a light gray Carboniferous limestone upheaved to the vertical in cross-sections to the trend of the mountain, the intervening yawning cañon clearly revealing the contiguous western range. Thus not only have Mounts Holmes and Quadrant and Bell's Peak each a sharp, naked crest of nearly equal height, but also several other peaks somewhat less elevated, but with outlines equally clear-cut; and where these cross-cañons reach the depression between the two ranges there are a number of small but beautiful Alpine lakes, notably high up on Mount Holmes, where at least three of them, in their deep, ultramarine waters, mirror in perfect but inverted beauty their dark fir and cedar borders, and the rocky crags, snowy sides, and naked crests of the surrounding peaks. To these interesting features of this prominent range add the great probability of finding more valuable minerals than in any other part of the Wyoming portion of the Park, and we have an inviting field for scientific research.

Between Mount Holmes and Bell's Peak is the pass through which the hostile Bannocks entered the Park in 1870. There is also another pass north of Quadrant Mountain, and still a third south of Mount Holmes, all direct and of easy ascent through the main range from the east, but steep, precipitous, and difficult down the slopes of the western range. The main range, rising from the east in long, graceful, and well-timbered terraces to an altitude of about 9,000 feet, then separating into sharply-outlined peaks, naked but for patches of permanent snow-fields, presents a beautiful appearance, particularly from the Terrace Pass and Gardiner Valleys. The western range, however, is more abrupt, continuous, and naked; but, serrated as it is by the three sharp crests of the eastern range, its outline is, perhaps, as interesting as that of the main range, as seen from the deep valleys of the West Gallatin and East Madison; while, seen from several of the peaks, the view in either direction is extended and charming. It is also an excellent as well as an accessible region for game, the presence of big-horn upon its crests, grizzlies in its deep timber-bordered gulches, countless water-fowl in the emerald lakes of its terraced foot-hills, elk, deer, antelope, and occasionally bison, in its charming parks, glens, and lovely open valleys, constituting it a most prolific field for sport.

MADISON PLATEAU.

This mountain barrier, hitherto deemed inaccessible, was when I was forced to explore it, found to be a dry, undulating, but beautifully timbered plateau, allowing a judiciously located line of wagon-road with nowhere an elevation much in excess of 1,500 feet above the Forks of the Fire Hole River, and which is so much shorter, safer, and cheaper of construction and preservation than the old Cañon route that it will doubtless supersede it. It also affords approaches to several interesting mottled obsidian cliffs and cañons, and to exceedingly favorable points

for observation of the Fire Hole Basins above, and the Upper Madison Valley, Tyghee's Pass, Henry's Lake region, and the Snowy Mountain borders below it.

MOUNT STEPHENS TRAIL ROUTE.

The great saving in distance by a trail from the Mammoth Hot Springs direct to the Great Falls of the Yellowstone, induced me to explore a route from the Cascades of the East Gardiner, through a pass in the Stephens Range east of Thompson's Peak, and through another pass of the Washburn Range, at the head of a fork of Cascade Creek some miles west of Dnnraven Peak. These passes, though elevated, are both practicable; but the numerous deep yawning cañons on the head fountains of Tower Creek, and continuous miles of dense fallen timber there and upon the west fork of Cascade Creek below the mountain lake will doubtless delay the opening of a trail upon this route until other trails more pressingly necessary shall have been completed; but the saving in distance, the romantic scenery, and the unexplored fossil forests on the head of Tower Creek will eventually render its construction justifiable.

GRAND CAÑON OF THE YELLOWSTONE.

There are several interesting cañons upon the Yellowstone, both within and without the National Park, but that uniformly called the Grand Cañon of the Yellowstone extends from its Great Falls to those of Tower Creek, a distance of something more than twenty miles. It had been entered and explored by several parties at both ends, but, before this season, nowhere else, except by myself near the spur of Mount Washburn, as mentioned in my report of 1878. Deep snows and high waters rendered this season unfavorable for the exploration, but by long, arduous, and dangerous cliff-climbing I succeeded in exploring the most of the cañon from within, and the remainder by following its western brink.

Leaving to future scientists the tracing of the geological periods and formation of this interesting region, I may in a general way state that, like the Niagara and other great cataracts, the cataracts of the Yellowstone have eroded a deep channel up-stream, far above their original location at the severed spur of Mount Washburn and the rim of the then and elevated Yellowstone Lake, at which time the fall of one, or that large of a succession of these cataracts, was far greater than at present.

It is neither certain nor practically material whether this cañon follows an ancient earthquake rift or is wholly one of erosion, as it evidently cuts through various formations to one of hot springs, often soft, shelly, and so easily eroded as, in connection with the remaining countless active ones, to occasionally undermine portions of the towering cañon walls, and thus precipitate enormous slides, especially of the western wall. These slides and the short but deep and narrow cañons entering them, compelled me to make a portion of the trail upon the slopes of Mount Washburn. There are many of these slides, of all dimensions up to at least a mile in length along the cañon, and half that distance from its brink; and the entire depth at each locality ranges from one to two thousand feet, thus damming the river until removed or cut asunder by its all-eroding power. Remnants of these, remaining as timbered terraces within the cañon, afforded the main routes of descent to the rapid, roaring river, which from above appeared like a thread of silver. Some of the side streams, notably one some three miles below the

Great Falls, pour over the eastern wall where it is about 1,300 feet high. It is not, however, like the Fairy or other falls, a clear leap; nor is it like a cascade dashing from projecting rocks, but a gliding fall down a flume-like groove, self-worn in the nearly vertical wall, and which, though a good-sized rivulet at the brink, in autumn is nearly if not quite lost in spray before reaching the river. Some of these streams descend by beautiful cascades or in dark narrow cañons, and others, as the Twin Falls, by cañons to the remnants of old slides, and thence, by a clear, beautiful leap of some two hundred feet, reach the river nearly opposite; while there is a similar fall from the eastern terrace less than a mile below. Between these, after making a descent of 1,300 vertical feet, past the noisy Safety-Valve and countless other geysers and brimstone basins within two miles, the Twin Falls trail reaches the river amidst rocky walls whose cornice-like formation possesses a variety and brilliancy of tint and coloring, matchless and enchanting, which it is impossible to describe, and which to be understood and appreciated must be seen. Indeed, in many portions of the cañons the coloring of the walls is the principal charm. The Grand Cañon of the Colorado is longer and deeper than this; the Yosemite more accessible, and to some, perhaps, more attractive, while other cañons are more ragged, weird, and yawning; but no known cañon so combines magnitude, meanderings; foamy, emerald waters; hissing hot springs, spouting geysers and inimitably beautiful tinting of its walls as the peerless Cañon of the Yellowstone.

YELLOWSTONE LAKE.

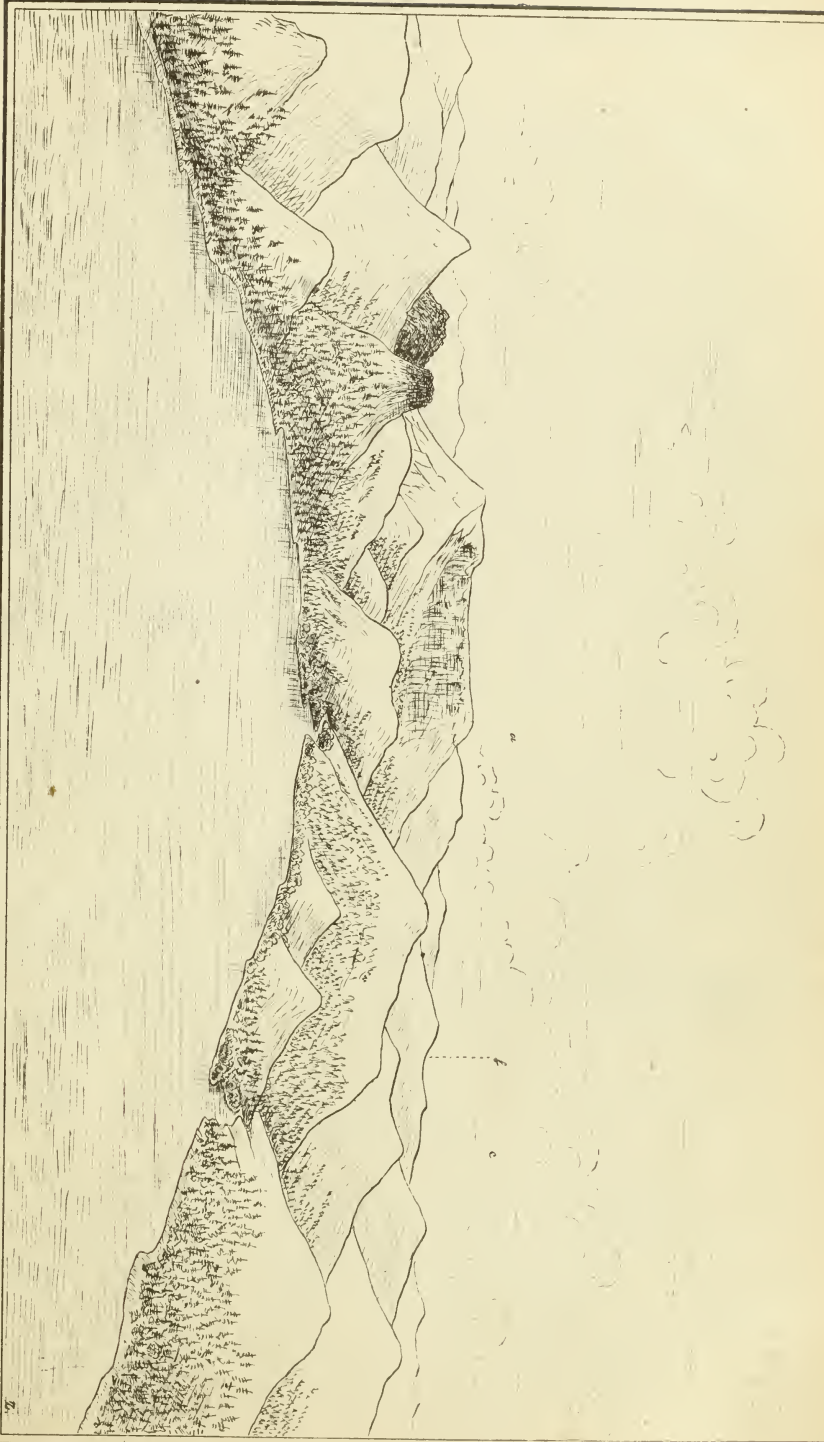
This doubtless mere fragment of an ancient inland sea, or great lake, of perhaps hot or tepid water, surrounded and dotted by active volcanoes, has been so long and yet so imperfectly known, and in trapper legends has been presented in so many different localities, shapes, dimensions, elevations, &c., that it appropriately merits its designation of "Mystic Lake." It has, however, been found to be one of the largest, most elevated, and peculiarly formed of all the mountain lakes of North America, and yet is comparatively so little known as to offer a most inviting field for romantic and interesting exploration.

The earliest published reports of this lake are those of Doane, Langford, Everts, and others of the Washburn expedition, who visited it in the fall of 1870. The first white men, however, known to navigate its blue waters were Messrs. James Stevenson, W. H. Holmes, and others of the Hayden expedition of 1871; their craft was the *Anna*, a small but well-constructed canvas boat. With the *Explorer*, made of green, whipsawed lumber, and which soon proved unseaworthy, my own navigation of this lake was made with two companions, Capt. Jack Davis and Mr. W. H. Parker. Suffice it to say, that after a voyage of ten or twelve days, and after encountering many mishaps and dangers, being once beached and fairly frozen in, we succeeded in circumnavigating the main lake and most of its bays and fingers; and with the first craft navigated by white men I ascended Pelican Creek, the Upper Yellowstone, and other streams to their rapids. While this exploration developed nothing to cause an essential change in my views of the general contour of the lake, as given in my last year's map, it furnished strong evidence to sustain my previous opinion that the length of the lake from the upper river inlet to the outlet is nearer thirty than twenty miles, and but little less across the palm and thumb, and also established Stevenson's soundings (published in Hayden's map of 1871) as approximately correct, since I seldom found soundings any distance off shore with a 255-foot line.

Interesting information of a varied character and data of much value were obtained relative to contours of bays, coves, and islands; sizes, number, and nature of tributaries; climate, prevailing winds and storms, &c.; while uniquely interesting evidences were encountered of erosion upon its wave-lashed shores, some of which will be given on an accompanying map, and others particularized in their proper connection in this report.

Although the Upper Yellowstone is navigable for three miles for small sail and steam boats, and without doubt is a fair-sized mountain river; and although the enormous quantities of huge pine, spruce, and fir timber piled for miles along its banks and the lake shore below its mouth, indicate that it is a boisterous and foaming stream during spring and summer floods, still its inlet as compared with the outlet is too insignificant to satisfy me that the combined tributaries of the lake more than equal its discharge; the immense quantities of water lost by evaporation remain, therefore, to be accounted for. True there is probably much less evaporation from water at its temperature and great height than is usual from a less elevated water surface of equal extent; and it is also true that the two or three feet of autumn drainage from the high spring or summer surface of the lake must be considered; in addition great subterranean feeders or countless large springs beneath its surface remain to balance this evaporation. That so large a body of water, with a vertical elevation one and a half miles higher than many of the principal cities of the East, and half a mile higher than the highest mountain peaks of that region; itself begirt with snowy mountains thousands of feet higher; its shore-lines dotted, and doubtless its depths modified by deposits of scorching sulphur, seething geysers, and boiling hot springs—that this body of water should possess many rare and interesting features is not unreasonable. Among these is one now admitted, viz, that while there is usually, in summer, a calm during the latter part of the night, and a slight breeze up the lake in the early morning hours, by eight or nine o'clock a. m. the breeze is down the lake; it is first upon the mountain and island crests, high above the lake; then, suddenly striking the water, it uniformly soon becomes a strong, continuous wind, and not infrequently a tearing gale. But any time in the warm season (and nothing is known of it in any other) this lake is subject to sudden changes of atmospheric temperature and direction and force of the wind. This is the case when passing not only into range of each separate finger and the thumb, but also into the draft of the palm or main lake, where in autumn, within half an hour, I have experienced the change from a stiff regular breeze from one quarter to sudden, shifting puffs from nearly every direction, which soon culminated in a terrific gale with wind diagonally downwards, so luffing the sail and chopping the waves as to threaten my craft with instantaneous swamping. On this account, and because of narrow deep seas, rocky shores, and sparse anchorage, this lake, while one of the most beautiful and interesting, is one of the most dangerous for sailing craft. I am confident, however, that with even a small steamer, well built and managed, there would be little danger attending regular trips around the fingers, thumb, and palm of the lake, and for at least seven miles down the river to the Nez Percé Ford at the Mud Volcanoes. Indeed it is probable that ultimately this lake and its river will be navigated much farther, and near to the Great Falls. This point is distant some thirty or forty miles by the meanderings of the river, which, bordered by enchanting landscapes, is one of the loveliest of streams. With a suitable steamer making regular excursions of, say, three hundred miles, it is safe to predict that a hotel on

a. Mouth of the Upper Yellowstone River.
b. Locality of Bridger Lake.
c. Trail Creek Cave.



some one of the many charming terraces near the foot of the lake would ultimately prove a profitable investment in this region of wonders.

ROADS, BRIDGES, AND TRAILS.

The time and funds spent in constructing the road over the Madison Terrace, on the route of entrance from Henry's Lake, and the numerous repairs to bridges, culverts, and grades, many in number and great in size, which were rendered necessary by the deepest winter snows, highest spring floods, and the latest-opening summer ever known in these mountain regions, compelled me to abandon for this season my cherished desire to construct a very important line of road from the Upper Fire Hole Basin via Shoshone Lake, thence down the Yellowstone to its foot and falls, via Mary's Lake, down the East Fork of the Fire Hole River to its forks. But the entire trail of last year was somewhat, and portions of it greatly, improved and prepared for a road. As just stated, great improvement was made in the road up Fire Hole River, while a road valuable to tourists was opened across a bend of the river by way of the terrace of the great midway spring, which developed many mineral springs and geysers of great interest and beauty, and hitherto unknown.

After abandoning the Madison Cañon road I opened a direct and excellent route from near the Forks of the Fire Hole through a corner of the earthquake-shaken region into the old road along the Gibbon, bridged the Norris Fork and other branches, and constructed long and expensive causeways, turnpikes, and grades there and along Obsidian Creek and Cañon, as well as along the cañon of the Gibbon.

The expensive grades and bridges along the mountain side below the Mammoth Hot Springs required little repair, but the grades up the Terrace Mountain considerable.

The road to the Forks of Gardiner River has been extended across both its branches, and up the eastern branch nearly half-way through its terrible cañon, necessitating a grade of over 1,000 feet within two miles. The trail and bridge at Tower Falls have been somewhat improved, but require much additional attention.

Little was done on the old trail over Mount Washburn, since, in my opinion, it will soon be practically superseded for general travel by the new one between it and the Grand Cañon.

Routes are explored, and trails will be needed next season, to the newly-developed Hoodoo regions, as well as from Shoshone Lake, via Lewis and Heart Lakes, and Red, Sheridan, and Flat Mountains, to the Yellowstone Lake.

TRAIL AND PROPOSED ROAD ALONG THE CAÑON OF THE MIDDLE GARDINER RIVER.

As fully demonstrated, with a moderate outlay on a long steep grade on this trail an excellent road will be afforded, and as between it and the present road over Terrace Mountain a choice of routes may be had. An easy day's ride will then enable the tourist to obtain a view of the Mammoth Hot Springs, both from below and above; of the eroded valleys of all the Gardiner Rivers; of the falls of the Middle Gardiner, nearly two hundred feet high; and of its cañon, twelve or fifteen hundred feet deep, with its basaltic columns, spires, and steeples towering amid scenery second only in wild, majestic beauty to that of the Grand Cañon of the Yellowstone. He will then also be easily able to visit the

Rustic Falls of the West Gardiner, with its yawning cañon water-way below and the decaying wickeups and game drive-ways of the Sheep-eaters above it, and their ancient but not remote haunts at the cliffs; also, by easy ascent from the summit of Bunsen's Peak and the Terrace Mountain, to enjoy the enchanting view of the adjacent smiling valleys and snowy mountains, and the sharp peaks of the Tetons, dim amid the clouds, fully a hundred miles away.

GUIDE-BOARDS AND MILE-POSTS.

As stated in my report of last year, I made use of fragments of lumber which had been hauled nearly one hundred miles to our headquarters, for making a large number of sign-boards, which were well painted, and lettered with the names of prominent geysers, salses, paint-pots, and other hot springs, and falls, cañons, roads, and other natural and artificial points of interest. These, after difficult conveyance, often over long distances, were firmly affixed to posts, rocks, and trees, and proved, as was anticipated, of great value to all persons visiting the Park; but the result of this experiment has neither justified the expectation that they would remain where affixed, nor proved their usefulness, nor the propriety, under present circumstances, of an increase in their number. It is found that posts placed near enough to prominent geysers to properly designate them, unless unusually well set, are liable to be washed away; also, that the lettering upon the boards in such localities, as well as near important salses and other hot springs, is, from chemical action or the direct effect of hot water and steam, liable to be rapidly obliterated. Ordinary iron would probably oxidize or corrode, and stone crumble; and it is therefore important to ascertain some mode of making and affixing guide posts or boards that will render them of permanent service. Some of the sign-boards I erected were destroyed by forest fires, and others crushed by falling timbers or swept away by floods; but the greatest havoc among them has not been wrought by time nor by the elements, but, on account of their usefulness, by wantonness and vandalism.

While the leading men of intelligence of all classes and stations in life in these regions, as elsewhere, have mainly been the warm and reliable friends of the National Park, of all efforts for improvements therein, and of the persons most active in making them, there have ever been among the many honest and reliable guides and mountain-ramblers within and adjacent to the Park a few of a widely opposite disposition. The latter usually divide their time between acting as guides and pil-laging, plundering game, valuable natural specimens, and often the outfit of those employing them, their ill-gotten gains being squandered in the vilest haunts of the neighboring towns, while they there lie in wait to entrap fresh tourists. These men, usually having neither ability, principle, nor habits suited to honorable employment, prefer to continue on in the lawless manner mentioned. Hence, like the ignorant, selfish, short-sighted, and often short-lived opponents of improvement elsewhere, they have constantly proved the greatest enemies of the Park and its visitors. They have been active, unscrupulous opponents of its exploration, and blatant slanderers, personally, and in the press when available, of those earnestly and honestly engaged in the improvement of this region. It is this small but despicable class of prowlers who, in addition to kindling devastating fires, slaughtering game, despoiling geyser-cones and other interesting formations, have, by extortionate de-

mands, robbed tourists, and who, to prevent the latter from following plain roads or trails, and from ascertaining routes and names of objects visited, have destroyed the boards designating the same. Hence I feel that the voice of all the better class of guides and mountaineer residents of the adjacent regions, as well as that of intelligent visitors from our own and other lands to this peerless region of wonders, will sustain me in urging the speedy enactment of laws to properly protect the Park, its contents, officers, and visitors, and the enforcement of the same by a body of determined police.

OBJECTS OF SCIENTIFIC INTEREST.

Well aware of their interest to the thinking portion of our people and their value to scientists everywhere, I secured many unique and valuable specimens of chalcedony, onyx, opal, and jasper, as well as various forms of silicified or crystallized ancient timber also petrified fish-eggs (so called), obsidian of various kinds and colors, &c., which, well boxed, are on the way to Washington via Bozeman and the southern or railroad route. Most of these were secured with great difficulty, often attended with danger, especially while exploring on rocky crags, in scorching sulphur basins, or on snowy mountain sides. None of the specimens mentioned in my last year's report, as sent in a small boat down the Yellowstone, and reported lost by wrecking at Buffalo Rapids, have been recovered, which is a serious loss to science.

Besides the deposits of obsidian, or volcanic glass, at the cliffs of Beaver Lake, which are unrivaled in quantity, beauty, and variety of color, there are large deposits of black and mottled obsidian at the Cascade or Crystal Falls, near the Falls of the Yellowstone, on the Continental Divide near Shoshone Lake, at the Lookout Cliffs, upon the new road over the Madison Plateau, and in other localities, while immense quantities of scattered fragments are found in the valleys, and minute particles sparkle like diamonds along the beautiful shore-lines of the Yellowstone, Shoshone, and other lakes.

Eroded fragments of fossil wood abound along the streams and lakes of the Park, while in many of these are beautifully-rounded fragments of geyser-cones and various kinds of hot-spring formations, and beautiful concretions from ancient or recent salses and paint-pools. The cones, branches, and even trunks of trees, are often found semi-petrified in the hot waters of the geysers, salses, and other hot springs and their outlets. Indeed there are but few of these springs whose waters will not, within a few months, so change any woody fiber, even the peculiarly light pine and cedar, as to cause it to sink. These fossilized woods retain their forms, but are clearly distinct in degree and character from the ancient fossil forests high up amid the basaltic terraces.

Along the mountain sides east of Yellowstone Lake are ancient terraces, shore-lines, and other indisputable and indelible evidences that at no remote geological period the surface of this lake was at least five or six hundred feet higher than at the present time; and that, like Shoshone and other lakes, which are being drained into opposite oceans, it is only a fragment of an ancient elevated inland sea or lake, bordered and dotted by active volcanoes, which have vomited into its perhaps tepid waters streams of lava, which have cooled into basalt, breccia, and other forms of more or less horizontally stratified rocks, beds, or deposits. With the intervening periods of time, and changes in the lake's surface, much of these deposits has crumbled or been broken or eroded away, and redis-

tributed in less elevated deposits, which the Alpine climate and lashing waves of the lake are now rapidly undermining, as evinced by the countless specimens of the hardest and heaviest portions of the mingled débris of all the preceding formations and erosions which strew the beach. A notable locality for these uniquely interesting specimens is upon the northeastern shore of the lake between the mouth of Pelican Creek and Steamboat Point, where the shore, the valley of Pelican Creek, and the plateau between, are still dotted with the dwindling geyser and other hot spring remnants of ancient subterranean fires.

At Steamboat as well as at Storm Point the deposits or other effects of continuous hot springs have better withstood the action of the waves than the six or eight miles of intervening shore, which, somewhat less elevated and with fewer hot springs, has been shaped by erosion into the beautiful Saint Mary's Bay, an extension of which, reaching nearly to Indian Pond, I named Concretion Cove.

At Steamboat Point the contest, for ages, of hissing hot springs and lashing cold surf to adjust their respective boundaries, has left interesting monuments of the diverse powers and operations of each combatant, and also furnished a rare field for obtaining a peculiar class of specimens, including much sulphur. Storm Point offers specimens somewhat similar, but less sulphur and also more beautifully banded and colored indurated clays, shales, and other formations, notable alike for the beauty of their variegated stripes and their tendency to crumble. Here I obtained a number of specimens, the brightness and variety of coloring of which are seldom found in nature or equaled by art. But it is along the surf-lashed shore of Concretion Cove that are profusely strewn the most peculiarly interesting specimens of their class that I have found in this region of wonders, and which rival any natural curiosities I have met with from other parts of the United States or from foreign lands.

Pelican Creek, in its twelve or fifteen miles of meanderings from the mountains to its mouth, some three miles south of the foot of the Yellowstone Lake, divides a beautifully undulating plateau of alternating grassy plains and parks, where lovely groves of branched pines are flanked upon the north by elevated sulphur hills with forest-clad base, sulphur-searched sides, bald, snow-white, and terraced crests (a noted landmark across the Yellowstone Lake), and on the south by the Turbid Creek spur of Mount Chittenden. This plateau is evidently a comparatively recent formation of the crushed, eroded, mingled, and redistributed débris of all the preceding formations of this mystic lake. It is usually found heavily banded or stratified with pudding-stone, conglomerate, or breccia. Other specimens exhibit thin, wavy laminae, all greatly disturbed, and often curiously banded and colored in circular formations, while firmly cemented by silica or deposits from the seething funnels of countless deep-seated subterranean hot springs, which continue to dwindle in number and power. Hence the immense quantities and varieties of interesting specimens of concretion and erosion plainly visible in nature's tracings along the steep cliffs, and the innumerable specimens strewn along the rocky strand of the ever lashing and eroding waters at their base.

Abruptly changing in character with the cliffs whence they were eroded, here are found, now variously-colored cobble-stones, with mingled and adhering fragments of the cement of the pudding-stones; now the eroded fragments of various forms of fossil wood, quartz, and crystals; and now a shingle beach of hard, fine-grained, oval-edged, gray, and probably concretionary clay formations, from one-half to an inch in thick-

ness, six to eighteen inches long, and of various widths. In form these concretions vary from a shoe-sole to a pot-lid, from a rolling-pin to a pestle; in fact, ladles and platters of every description and size are among these formations. Perhaps, however, the most unique and rare patterns are the cups, pitchers, and lather-boxes, the last-mentioned being notably uniform in color, size, banding, and form, and many of which so closely resemble lathe-work as on first sight to deceive. Although uniformly concave on one side and originally convex on the other, many of them, by splitting along some of their well-defined lines of stratification, show a perfectly flat bottom, thus presenting a miniature lather box or cup, suitable for use or ornament. I have at various times deposited examples of these in the National Museum at Washington, and in other museums and cabinets of natural curiosities.

There are several of these remarkable beaches in the immense shoreline of the main lake and its thumb and fingers, but the most extensive and interesting yet explored is at the head of Concretion Cove, on both sides of the outlet of Indian Pond, the shoe sole and pot-lid forms being found in front and below, and the lather-boxes, ladles, and skimmers about half a mile above it. The first varieties are countless; the latter extremely rare. I have heretofore, in both official and unofficial publications, referred to these curiosities, at one time advancing a query as to their origin and formation, but which query I am not aware has as yet been satisfactorily answered. I now only state the facts, in the hope of inducing scientific investigation.

During the past season I made and traveled a fine trail from the open valley of Pelican Creek, first between long sloping hills, then through grove-dotted elevations, to Indian Pond, skirting its southern shore, amid the decaying brush, corrals, wickenups, and lodge-poles, to my camp on the bluffs; thence across the outlet to Indian Pond, about midway its half mile of length, and on by a fine trail route through mingled parks and groves to the first bluff on the south bank of Pelican Creek, and from there to Yellowstone Lake, about half a mile above its outlet.

From the open valley of the Pelican to my camp, some three miles, is a fine natural carriage-way, while the trail, a like distance to the head of the bluffs of the Pelican, is an excellent one; but the remainder of the route, owing to steep bluffs, a miry stream, and a valley of dense and fallen timber, appears a much greater distance than it really is. A bridge and other improvements are necessary to render the lower portion of the road good, and at some seasons of the year even passable. The usual route still is to cross the Yellowstone at Nez Percé Ford, seven miles down the Yellowstone River from its head; thence, following its eastern bank as closely as the cañons and fallen timbers will permit, to strike the Pelican above its first bluffs; from here to ascend the northern bank to its forks, and thence the North Fork for the trail to Amethyst Mountain and Soda Butte, the Middle to the East Fork of the Yellowstone, and the Southern to the various rough timber-obstructed passes to the Passumria or Stinking Water. My favorite camp on the Yellowstone Lake (and it has evidently been a favorite one for the Indian) has ever been upon the grove-dotted bluff, elevated thirty or forty feet above the lake, directly fronting Indian Pond, where I left my boat while exploring Pelican Valley and Stinking Water Passes. This cove, so landlocked as to be safe except during southern gales, and the bluffs at its head will doubtless remain a chosen haunt for the scientist and tourist long after the now abundant evidence of its frequent occupancy by the Sheep-eater aborigines shall have vanished; the rude stone-heaps of their

wickiup sweat-houses being their most enduring monument, unless, indeed, at this most choice location in the Park an Indian cemetery may yet be found.

GEYSERS AND OTHER SPRINGS.

There are found within the Park a variety of both cold and hot water springs. Treating these springs in inverse ratio to the popular interest in the varieties, they are : the cold pure-water springs ; the cold medicinal springs ; the warm mineral, often poisonous, springs ; the warm medicinal springs ; the foaming or laundry springs ; the terrace-building springs, and the pulsating and the spouting geysers.

COLD PURE-WATER SPRINGS.

Cold pure-water springs are countless, excellent, and usually permanent, similar to those of other elevated mountains, and often large enough to supply a fine rivulet, such as the Big Spring Creek, near the Great Falls of the Yellowstone.

COLD MEDICINAL SPRINGS.

These are not numerous, the most important being those of the Soda Butte, Cache, and Miller branches of the East Fork of the Yellowstone, in the northeastern portion of the Park. The interesting ruins near these springs indicate that they were once hot, cone, or terrace-building, as, indeed, some of them still remain upon Cache Creek. The Soda Butte Springs are traditionally valuable for the cure of saddle-galled horses, and probably but little less beneficial than the Arkansas springs in treating rheumatism and some other diseases. In fact, I deem a leasehold of these springs, in a lovely sheltered valley, with matchless trout-fishing, amid the Fossil Forests and enchanting mountain scenery, as one of the most valuable of those within the Park.

WARM MINERAL SPRINGS.

Warm mineral or poisonous springs are found at a noxious sulphur basin at the head of Green Creek, and other localities near Beaver Lake ; they are also numerous along Norris Fork, the main Gibbon River, Pelican Creek, Turbid Lake, and Brimstone Basin, and also in the Grand Cañon of the Yellowstone, and elsewhere. The gases arising from these springs, as well as their waters, are usually injurious to health, and many of them are really poisonous, some of which I have so designated upon guide-boards along our roads, as a warning to tourists.

WARM MEDICINAL SPRINGS.

These springs seem to differ little from the cold ones, with which they are frequently intermingled, but their heat and vapors render them more convenient and valuable for bathing purposes. Examples of these springs are found at Cache Creek, the various Fire Hole Basins, and to a limited degree even among those of the Mammoth Hot Springs.

HOT FOAMING OR LAUNDRY SPRINGS.

These are found in the cañon of the Gibbon as well as that of the Yellowstone, in all of the Fire Hole Basins, and notably in the Geyser Meadows, west of the Forks of the Fire Hole Rivers. Although really hot

springs, the temperature of the water is far less than the casual observer would suppose, because much of the furious ebullition is caused by escaping gases. A careful analysis of these waters will alone demonstrate their properties, but many of them surpass any other water, either naturally or artificially prepared, for cleansing the skin, as well as blankets or clothing of any fabric.

TERRACE-BUILDING SPRINGS.

The description of the Mammoth Hot Springs as a typical representative of this class, in my report of 1879, is so full and complete as to require but little additional attention from those who have perused it. For those who have not I will briefly state that tortuous escape vents of deep-seated internal fire, in passing through the underlying cretaceous limestone, become charged with dissolving portions of the wall rock, and upon reaching the surface the water is discharged in pulsating throbs, each of which deposits a thin corrugated lamina of the calcareous substance held in solution.

This apparently slow but ceaseless process has resulted in building up beautiful scallop-bordered bathing-pools along the thousands of feet of terraced slopes adown the mountain side. Traces of iron and other minerals, held in solution, tint these formations with their own peculiar coloring, in vertical banding, presenting a view at once grand, unique, and inimitably beautiful. These Mammoth Hot Springs, although far the most important of the kind now active in the Park or perhaps the world, are insignificant to what they were when building the Terrace Mountain, or what other springs were at perhaps the same period when they built the enormous cliffs along the Yellowstone, at Bear Gulch, at Sheepsteater Cliff, upon the Cache, Tower, Pelican, and many other localities where these enormous deposits, destitute of active springs are now crumbling to ruins and eroding away.

PULSATING GEYSERS.

While these springs are frequently intermingled with those of the bathing-pools, and possess many features in common, they are in other respects very dissimilar. The bathing-pools or terrace-building springs are usually large pools of various forms upon a mountain slope, down which their escaping waters build the above-described bathing-pools and terraces; while the pulsating geysers are uniformly along a continuous fissure, building a steep ridge directly over it of nearly uniform horizontal elevation, sloping alike each side, or else a circular cone, which in height frequently exceeds the diameter or even the circumference at the base. The long or ridge form appears to have been more common formerly than at this time; indeed, the prevailing circular or cone formations over small escape vents from the internal forces is one of the many indications of their waning power. Peculiarly interesting views of these ridges are found in most of the Fire Hole Basins, where, as well as in the cañons of the Norris Fork and main Gibbon, and the elevated Monument Geyser basin, and other localities, the cones of both active and extinct pulsating geysers are frequently found commingled. Among the largest and most interesting of both the cone and the ridge varieties are those amid the terraces at the Mammoth Hot Springs.

The Devil's Grotto is only one of countless huge cavities in the ridges which are from ten to fifty or more feet high above the encasing terrace formations, and from one-eighth to one-fourth of a mile long. Many of them are extinct and crumbling to ruins, but others, as that through

the end of which we cut our road upon the main terrace, are still active. Some of the circular cones are also active, but a large one upon the upper terrace, which was surmounted by several miniature cones, some of which Professor Hayden (I learn) removed to the Smithsonian in 1872, as I did one other in 1875, is now in the dying throes of extinction.

Two large and interesting cones of extinct geysers are found near where our road from the Fire Holes descends the terraces at the Mammoth Hot Springs, as shown in the frontispiece of this report. As there shown, the Devil's Thumb is mainly concealed by the terrace above the road and the Liberty Cap below it, near a group of ever-changing terrace-building springs, which are fully two hundred feet below the main Mammoth Hot Springs upon the terrace next above.

LIBERTY CAP.

To visitors to the Park or attentive observers of the published descriptions and sketches of its wonders, the famous monument called Liberty Cap requires no further description, but for the information of others it may be said that it is an extinct, pulsating geyser-cone, some fifty feet in circumference, which rises forty-five feet vertically above the present surface of the hot-spring formations, which hide an unknown but perhaps equally great, if not greater, portion of its base. Not only is this encasing support shelly and cavernous, but, like the much harder and more durable circular laminae of the cone itself, it is crumbling away, and, as may be seen in a correct sketch of it, is greatly eroded near the base by time and the elements and is so deeply seamed and fractured as to continually threaten the dislodgment of masses sufficient to change its center of gravity and precipitate the fall and irreparable destruction of one of the most unique and interesting specimens of nature's handiwork as yet anywhere discovered. The settling of the encasing terrace deposits sufficiently to dislodge the timber which I inserted in 1878 to support the cone, proves that it lacks the firmness to properly sustain stone or iron supports, and it therefore becomes a question of scientific as well as practical interest whether a sufficient quantity of water from the much more elevated Mammoth Hot Springs cannot be cheaply conveyed into the ancient supply-pipe of the cone, if, as seems probable, it is still open, or, if not, alongside of it, in order to throw an ornamental column of water to any desired height. As my observations accord with Bunsen's theory, that these waters do not materially deposit within channels, conductors, or pipes, but only by evaporation at their termination, or edge, it is believed that the terrace-building properties of the water would soon encase this interesting cone with the inimitably beautiful-bordered pools of the terrace formation, and also ultimately surround it with an effective and permanent support. So strong is my conviction of the perfect feasibility of this plan, that nothing but absolute necessity for the use of all available funds for buildings and opening roads and bridle-paths has prevented my expending a moderate sum upon the experiment.

SPOUTING OR INTERMITTENT GEYSERS.

Without attempting to decide a mooted question among savants as to the true origin of these prominent wonders of the Park, I venture to state that successive years of careful observation tend toward the theory that, like pulsating geysers, salses, fumeroles, and most of the other kinds of hot springs, they are primarily escape vents for the earth's pent-up internal fires. In these vents the chemical action of escaping gas and

high-pressure steam produced by contact of this escaping gas-heat with the permeating surface-water, by dissolving the wall rock increases the heat and enlarges the orifice of these small, tortuous, and otherwise cooling fissure vents.

Slow, but sure and constant, change attends them all, and many, though probably not all of them, at the proper stage become true intermittent spouting geysers. This can occur only when the orifice is so nicely adjusted in height, size, and form to the power of the escaping steam and gas in the self-formed chamber beneath that the pressure of accumulating water for a time nearly or quite prevents its escape except through sympathetic fumeroles or natural safety-valves. But the constantly-increasing force from beneath ultimately overpowers the pressure of the water, when, after more or less subterranean rumbling, earth trembling, and sundry kinds of bubbling, gurgling, and spluttering, the aqueous monster seems fairly aroused, and then occurs the grand eruption. This is usually through one, but occasionally through several circular or oblong vents, cones, or craters with diverse kinds of throttlings and pulsations in the different geysers, each having its own peculiarities in color and size, and in the shape of the orifices, as also in the height, power, and direction of the column or columns of water and the length of the periods of eruption and of repose; and even these, as above stated, are doubtless slowly changing.

While the foregoing theory seemingly accounts for the usual manifestations of geyser eruptions, still the rending of huge geyser cones and the hurling of tons of rock, as have occurred at the Giant and New Crater Geysers and elsewhere, seem to indicate an occasional outburst of some greater power. Explosions of superheated steam or of gas; misplacement of the safety-valve upon escape vents of internal fires; infernal regions, or other places of pent-up power are occasionally suggested by phenomena otherwise inexplicable.

To the Upper, Lower and Midway Geyser basins upon the Fire Hole Rivers, and others less important upon the shores of the Yellowstone, Heart, and Shoshone Lakes, early discovered by others, my own explorations have added the Monument, the Norris, and the Paint Pool basins upon the Gibbon or its branches, the Safety Valve in the Grand Cañon of the Yellowstone, and several others, less important, in other portions of the Park, which is now so well explored that there seems little probability of additional basins of importance being hereafter discovered. Still, as my own explorations have mainly been made in connection with the ever-urgent duties of exploring or opening roads or trail routes, and the scientific explorers of the Park have labored under many and grave disadvantages during brief periods of summer sauntering, amid hostile Indians, doubtless interesting isolated geysers, or perhaps small groups of them, may yet be discovered. In fact so little, comparatively, is yet known of the number, size, and peculiarities of the various geysers or other springs of these regions that I deem it one of the most inviting fields for further scientific investigation, and recommend that provisions be made accordingly.

FOSSIL FORESTS.

As explorations of the fossil forests of the Park have each succeeding year greatly added to our knowledge of their area, magnitude, and wonders, during the past year I explored the hitherto unknown forests on Cañon Creek and other localities of the Yellowstone Range, Mount Washburn, and the basaltic range between the fingers of the Yellowstone

Lake; also those in the mountains east of it, in the Hoodoo region, and on the Stephens Range, besides many additional localities on the Pelican and Warm Springs Creeks, as well as other well-known forests.

It is now evident that the basins of the East Fork of the Yellowstone, Pelican, Tower, and Black Tail Creeks constitute a region of fossil forests where an excavation or erosion at an elevation of from 7,000 to 10,000 feet would most likely unearth the fossilized branches, trunks, and roots of the giant trees of some primeval forest. Whether the successive deposits now encasing these forests in some portions of the Park to a vertical depth of at least 4,000 feet are subaqueous or subaërial, or, as is probable, partly both, it is evident that great and long-continued oscillation of the surface and periods of submergence and elevation have occurred, as the roots of the fossil trees of these forests, little inferior in size to the "big trees" of California, often penetrate nearly, if not quite, through the horizontal stratum or layer of earth and rock upon which they grew, into the broken, shattered, and eroded trunks of the fossil trees beneath them. It is also evident, from the uniform character of the successive forests in vertical layers that the agents or influences for fossilization were for an immense period of time uniform and abundant, while those for crystallizing, though long continued, were at no period so abundant or uniformly distributed. In fact, it is not usually the largest trees, or forests of them, which are other than simply fossilized in the original forms of the timber, but, rather, limited areas of usually smaller and more scattering timber, originally concealed in the peculiar cement which fills every crack and cavity, not only of the wood but also of the encasing rocks and their interstices, with the most beautiful chalcedony, which, probably, after long-continued processes of cooling, has produced the famous caskets of brilliant amethysts and other crystals here found, and which, while elsewhere unequalled in nature, are considered inimitable by art.

NATURAL BRIDGE.

Although at various points in the Park, as on the plains, there are temporary bridges of shale or of indurated clays, formed by the undermining action of small, transient water-courses; and although in many of the basaltic cliffs and peaks within and adjacent to the Park (notably in the newly-explored Hoodoo region of the East Fork of the Yellowstone) there are natural fissures and rough-galleried passages through the crumbling peaks and turrets of the breccia or conglomerate formations, and also amid the immense débris of the fractured cliffs of the Mammoth Hot Springs; and while there are wind and storm worn tunnels through the sharp cliffs of crumbling sandstone, there is, as yet known, within the Park, but one substantial natural bridge of stone over a permanent stream. Upon the map accompanying this report Bridge Bay is shown for the first time. It has two small tributaries entering near its head some six miles up the west shore from the foot of Yellowstone Lake. At the entrance of the northern one is a shallow, marsh-bordered pond, perhaps a mile long and half a mile wide, which discharges but little water, and which is evidently the sand-spit-severed extremity of the bay. The southern one is a small creek, with a deep, narrow valley of alternating grassy glades and beaver-meadows, bordered by burned and fallen timber, and, within a distance of five or six miles, heading, in several branches, in the basaltic hills. This is Bridge Creek, appropriately named from a natural bridge over the north branch, about one and a half miles from the bay. From a remark in Dr. Hayden's report for 1871, it would appear that some members of his expedition had visited

this bridge, but this is all the evidence I have been able to find that any explorer of the Park, excepting myself, had discovered it before the season just passed. I first observed it in 1877, but, an immense mass of tangled and fallen timber intervening, I could not readily reach it, and hence made no attempt at its description. The north or bridge fork of the creek, though evidently a foaming torrent at the annual period of melting snows, in early autumn is a barely continuous rivulet amid the craggy bluffs above the bridge, where it is much enlarged by drippings from the overhanging walls of the chasm and the numerous springs of noxious-looking and nauseous-smelling water. What is now the bridge was once the brink of a cataract nearly one hundred feet high, over a ledge of peculiarly hard, durable, variegated trachyte upheaved to the vertical across the stream. Directly across this ledge countless ages of erosion have formed first a shallow, trough-like channel; then, or simultaneously with this channel, a vertical orifice, several feet long by one foot wide, between the strata, some two feet from the brink. There is a similar orifice eight or ten feet further up stream, so large and deep as to undermine the intervening brink of the falls, where the impetuous water and rocky débris, by first cutting a circular channel and ultimately greatly deepening it, have eroded one of the finest archways I have ever seen, which has about ten feet of stone support for a carriage-way above, and about thirty feet of water-way beneath. The chasm is fully spanned by the bridge, which, by measurement, I found to be twenty-nine feet long, and, including the above-mentioned vertical orifice, ten feet high above the top of the arch, and forty-one feet to the bed-rock of the chasm, which, at this point, is a rapidly-deepening cascade. As the two outside layers of the vertical strata are, on an average, considerably higher than the roadway between them, they form a rude but permanent railing. The vertical orifice, as well as the ancient channel, can readily be filled or floored with timbers. Moreover, this natural bridge is on a route which avoids the sand-spits, ponds, and gullies near the bay; and I cannot, therefore, doubt that as soon as funds are available for the necessary repairs to the bridge, and for the removal of the vast quantity of fallen timber upon the road, this route will be the one most traveled, and this natural bridge one day be crossed by thousands of eager pilgrims to this wonder-land. The well-worn game-trails over the bridge are evidence of its long and constant use as a crossing for elk, deer, and antelope; while from the actions of a huge grizzly, which I shot while rearing from his lair in a fallen tree-top, upon the western abutment, it is, I judge, used by bears as an ambuscade.

GOLD AND SILVER MINES.

While the volcanic and ancient hot-springs formation, or lake deposit, so characterizes the surface of the Park as to render improbable the existence of valuable mines in nearly if not quite all the Wyoming portion thereof, the mining operations of the past year have developed the presence of promising mines of gold, copper, silver, and lead in Bear Gulch, Crevice, Hellroaring, Soda Butte, and Clark's Forks regions, either within or adjacent to the Montana portion of the Park. Anticipating this, and believing, as has now been proved, that the three-mile strip of the Park in Montana was embraced in a treaty with the Crow Indians years in advance of the dedication of the National Park, I have not only abstained from any attempt to control it, but have openly pressed its recession, since it possesses no objects of interest, and hence, though it may be of value to others, it is utterly valueless to the Park. The ratification of

the Crow treaty for the cession to the government of all these mining regions unquestionably places this strip within the Park, and as its re-cession is pressingly necessary, it is hoped it will be made without delay.

The existence of granite and limestone nuclei in some lava-capped mountains along other boundaries of the Park renders possible the future discovery of valuable mines, but, if so, they can be re-ceded without cutting off any objects of interest, the retention of which may be desired.

SULPHUR, ALUM, AND OTHER VALUABLE DEPOSITS.

Unlike those mentioned under the last caption, the deposits of sulphur, alum, and other minerals, found in great quantities and possessing considerable scientific interest and commercial worth, are always found associated with hot springs or other wonders, and are inseparable from the Park. Of these, sulphur is perhaps the most widely distributed, as well as the most valuable.

The Terrace Mountain, at the Mammoth Hot Springs; Sulphur Mountain, near the Great Falls; Sulphur Hills, near the Pelican; the elevated, bald, and crumbling hills of the Norris, and, to some extent, other geyser basins and countless localities throughout the Park contain vast deposits of sulphur, and most of them alum, copperas, and other mineral substances in greater or less quantity, and together afford a vast field for chemical investigation, if not commercial enterprise. Some of the crystallized sulphur, apparently produced by vaporization, is almost pure enough for immediate use for pharmaceutical purposes.

HEADQUARTERS OF THE PARK.

MAMMOTH HOT SPRINGS.

In consideration of its isolation from the world, and of danger at the time from Indians, it is now fully conceded, if it was ever seriously doubted, that the location of the headquarters of the Park at the Mammoth Hot Springs, and the sites chosen for the buildings and for pasturage, are admirable for defense, convenience, and beauty: while the buildings, fences, and other necessary improvements, are well planned, constructed, and preserved. Hence, although the relative slower progress of the Northern Pacific to that of the Utah Northern Railroad in approaching their respective natural gateways to the Park may temporarily tend towards changing headquarters to the Forks of the Fire Holes and centering point of roads and places of interest at that end of the Park, still it is questionable, in the event of the ultimate opening of a railroad route up the Yellowstone, whether the relative superiority of the location for health, beauty, comfort of wintering, and grading purposes, as well as for great herding, farming, and mineral developments in the vicinity, may not render their continuation at the present site desirable and wise. But even should a change be necessary, the present buildings will be required for a long time, and are adequate as the residence of an assistant. The principal improvement necessary is the introduction into headquarters of hot and cold water, of which there is an ample supply at a proper elevation, and the routes for the carrying-pipes for which have been located, and estimates furnished of the cost of the work.

The observations of this season confirm those expressed in my last year's report upon the origin, former enormous terrace-building properties, and their present dwindling remnants, and the propriety of testing the effect of an increased supply of water from the West Gardiner River above the ancient terraces. If Bunsen's theory be true, as now appears

probable, that the deposits are only made by evaporation, and that pipes will not seriously coat nor fill internally, then a vast field is opened for the most unique, inimitably grand, beautiful, and permanent ornamentation of headquarters and surroundings of the Park that can be imagined by the most visionary dreamer of the beautiful and marvelous.

To these features may be added the leasehold value of hotel or other sites for a boundless display of portable ornamental work for sale to tourists or for display or preservation in the leading cabinets and museums of the civilized world.

BOUNDARIES OF THE PARK.

That the dedication in 1872 of the Yellowstone National Park as a heritage of wonders for the enjoyment of our people was a wise and timely act few will now question. Fortunately its boundaries as originally dedicated were approximately correct; but as the real object was to dedicate in the best possible form a mountain-girt park of unique and matchless marvels, priceless as a health and pleasure resort, and embracing as little as possible of value for other purposes, to fully accomplish this it is necessary to change somewhat the boundaries and restrict rather than extend them. I am still of the opinion, therefore, as expressed in my previous reports, and for the many and evident reasons therein stated, that the northern and western boundaries of the Park should be speedily changed so as to conform to those of Wyoming Territory. This will necessitate taking off a strip some three miles wide from the borders of Montana and Idaho Territories, which, while valueless to the Park, is valuable for other purposes. I also deem it quite likely that careful exploration will render evident the propriety of severing a like strip from the entire southern border.

While these changes will greatly reduce the area of the Park where there is nothing of value to retain, my explorations of the past season of the Sierra-Shoshone Range east of Yellowstone Lake and in the Hoodoo or Goblin regions, lead me to conclude that it is very probable the extreme drainage of the East Fork of the Yellowstone, including at least the Hoodoo regions, is outside of the present boundaries of the Park. This entire region south of Crandall Creek is probably destitute of all rich minerals, while it is one of the wildest, most precipitous, impassable, and worthless mountain ranges on the continent, valueless except for scientific exploration or as an attachment to the National Park. Hence I deem it practically important that a thorough exploration of this region be made before running the eastern boundary of the Park, with a view to learning whether it may not properly be modified or changed, if necessary, to embrace these newly-explored wonders. But if this be done the policy which has been uniformly pursued in regard to tolls on roads or bridges within the Park should be extended to that expensive and valuable portion of the road down the Gardiner, which would revert to the control of Montana, and the act of recession should contain a provision that all roads previously made within the Park or public lands of the nation shall remain forever free from toll.

CROW INDIAN TREATY.

A treaty with the friendly Crow Indians, for the cession of the mining regions within and adjacent to the present northern boundaries of the Park, prevented anticipated annoyance from that quarter during the past season, and trouble in this direction will be obviated hereafter by

the early ratification of the treaty and permanent legal occupation of the mines. These measures will, I trust, be speedily accomplished for these reasons, as well as for other reasons fully stated in my last year's report.

SHEEPEATER AND BANNOCK INDIANS.

¶ The feeble and harmless Sheepeater Indians were the aboriginal owners and formerly the only permanent occupants of the Park, and being somewhat allied to their Shoshone and Bannock neighbors, these latter were occasional ramblers therein. Excepting Washakie's band of Shoshones on Wind River, they are all now united in the agency at Ross Fork of Snake River, in Idaho. Having faithfully adhered to the obligations of their treaty of cession, made in Washington during last winter, as well as to their promises made to me at their agency in the Ruby Valley in the spring, no trouble has arisen with them in the Park during the past season, nor is any looked for in the future; and with the adoption of the measures mentioned above, there need be little fear of Indian depredations hereafter within its confines.

REPORT OF THE GAMEKEEPER.

It is with pleasure that I refer to the report of the active and efficient gamekeeper of the Park (which will be found in the Appendix, marked A), and indorse his suggestions for the protection of the interesting and valuable animals within it. The explorations this season in the Hoodoo and other eastern portions of this region will prove so inviting to tourists that game will soon be as much exposed there as elsewhere in the Park, and unwilling to abandon these animals to speedy extermination, I cordially commend Mr. Yount's suggestion for their protection in all its confines.

While the Park remained a haunt of hostile savages, and was without roads, hotel, or other conveniences of civilization, tourists necessarily went fully armed for self-protection as well as to secure food; but with the disappearance of the necessity for carrying heavy long-range rifles, their use should be discontinued, except by agents or employes of the government, and by them only upon specified conditions. It may require years of judicious management to accomplish this to the satisfaction of border-men ever fully armed; but habits speedily change with circumstances, and mountaineers and tourists will, it is believed, soon prefer unmolested enjoyment with the rod and fly, in the splendid opportunities for trout-fishing, or perhaps with the fowling-piece rather than the heavy, cumbersome, expensive, and often dangerous long-range rifle now in use. It is believed that few of the mountaineers would long resist appeals to their national pride for the preservation and protection of the noble animals that roam through this great National Park. For my constant and urgent appeals for protection for these animals and for methods of accomplishing it, I refer to pages 11, 12, and 13 of my Report of 1877, page 10 of Report of 1878, and pages 21 and 22 of Report of 1879, but in connection with the subject I would add that there are now in the Park abundance of bison, moose, elk, deer, antelope, and big-horn sheep; besides fine summer pasturage, there are winter haunts for these animals, where, with little care or expense other than protection from wanton slaughter, they would rapidly multiply. Many of them would become domesticated and thus an interesting feature of this great domain of nature would exist, when these animals become, as will ere long be the case, extinct elsewhere on this continent. Some would,

of course be slaughtered, but judiciously, and when both their pelts and flesh were most valuable.

HISTORY OF THE PARK.

On account of the evidently increasing interest of the public in the great Yellowstone National Park, and believing that a carefully-prepared and accurate statement of its location, dedication, and routes of access, as well as reference to its aboriginal inhabitants, prominent explorers, and first buildings may prove of present and permanent interest and be of lasting value, a few pages of the report are devoted to this subject.

As partly shown by the accompanying map of the Park, and much more fully by the excellent Land Office map of the United States, the Snake River Fork of the Columbia, and Green River Fork of the Colorado of the Gulf of California (Pacific waters), and nearly all the other great rivers of that portion of the continent, including the Jefferson, Madison, and Gallatin Forks, and the Yellowstone, Big Horn, and other branches of the Missouri-Mississippi Atlantic waters, to a great extent radiate from hot springs or spouting geysers within or adjacent to the great National Park, situated mainly in Northwestern Wyoming Territory and also embracing portions of Idaho and Montana. There can be no doubt that the modern sulphur basins, salses, hissing fumeroles, and spouting geysers are only dwindled remnants of the ancient volcanoes and vast and long-continued eruptions of lava, which, in the region of the National Park, characterized the elevation of the Great Plains and Rocky Mountain ranges from the oozy bed of a shallow ancient sea.

It is also evident that at some subsequent but remote period of time many of these mountain slopes were at an elevation of from 6,000 to 10,000 feet, covered with dense forests of timber, in size fairly rivaling those upon the Pacific coast, and that by some oscillation in the elevation of these regions, by eruptions of hot ashes, mud, and slime, like those which covered Pompeii and Herculaneum, or other all-powerful and long-recurring agencies, forests have been crushed or covered, often many hundred feet deep, by conglomerate breccias or other volcanic material.

Here erosion of the elements, or the blast, or pick and shovel of the tourist, unearth this ancient timber, which is often petrified entire into a perfect tree or log of stone: other timbers, while retaining their form, into opal or chalcedony, with amethyst or other crystallized cavities, matchless in shape, color, and beauty, which, for cabinet specimens, are unequaled elsewhere in nature and unrivaled by art.

Many hot springs and mineral streams now petrify timber or coat it with sparkling lime or silica, build geyser-cones, and many beautiful forms of crystallization, but they are all clearly distinct, and mainly much inferior to those of the closing eruptive period.

This wonderful region is really less one large park than a group of smaller ones, partially or wholly isolated, upon both sides of the Continental Divide, much lower in the Park than the nearly unbroken surrounding mountain ranges. Its average altitude probably exceeds that of Yellowstone Lake, which is some 8,000 feet, or nearly a half mile higher than Mount Washington. Its few yawning, ever difficult, often impassable, cañon-approaches along foaming torrents: the superstitious awe inspired by the hissing springs, sulphur basins, and spouting geysers: and the infrequent visits of the surrounding pagan Indians have combined to singularly delay the exploration of this truly mystic land.

Although Lewis and Clarke, by ascending the Jefferson instead of the Madison or Gallatin Fork of the Missouri in 1805, crossed the Rocky Mountain divide some seventy miles west of the Park without its discovery, yet it is from a member of that early band of Northwestern explorers that we derive our first knowledge of its existence. Coulter and Potts, after their discharge in 1806, retraced Captain Clarke's return route, via the Yellowstone River and Bozeman Pass, to the Three Forks of the Missouri. They there continued to trap and hunt until Potts was killed and Coulter captured in a Blackfeet Indian ambushade below the famous Beaverhead landmark upon the Jefferson. Coulter was allowed to run the gauntlet for his life, and, being remarkably fleet of foot, distanced all but one of his pursuers, whom he pinned to the earth with his own war-lance, escaping over six miles of prickly-pear plain to some drift-wood at the head of an island in the Jefferson. Unarmed, naked, and lacerated, he, through untold dangers, hardships, and suffering, reached a trading-post on the Lower Yellowstone, rearmed himself, and returning to his Bannock friends, for years hunted, trapped, and, with relentless vengeance, fought the Blackfeet Indians.

The haunt of the main Bannock tribe was at Henry's Lake, west of the Park; that of their little Sheepeater band within it; their main buffalo range being upon the Big Horn, east of it, and doubtless with them Coulter visited the Great Falls, Yellowstone Lake, and some of the fire-hole basins and spouting geysers, and after his return to Missouri in 1810 gloried in describing them; yet, so little credence was given to his descriptions, that for many years, even long after I was first upon the Lower Yellowstone, "Coulter's Hell" was a standing camp-fire jest upon now well-known realities; but John Coulter was, without a shade of doubt, the first white explorer of any portion of the Yellowstone National Park.

In 1809 the veteran fur-trader, Henry, driven from the Three Forks of the Missouri by the ferocious Blackfeet, constructed and for a time occupied a stockade fort upon the outlet of the lake which still bears his name.

W. P. Hunt and Ramsey Crooks, in their outward route to the ill-fated Astoria, with a strong party in 1810, and also the feeble remnant of the band during their return in 1812, crossed the Wind River Range south of the Park.

The famous American mountaineers, Henry, Ashley, Sublette, and Jackson; the Scottish Campbells and Stewarts; the French Pierre, Port Neuf, and Fontenelle, and other renowned trappers and traders roamed over the regions surrounding the Park until most of them were killed by the Indians, prior to the expedition of Captain Bonneville in 1832. During that year a sanguinary battle was fought between the bloody Blackfeet and the combined bands of these fur-traders and their Bannock friends at their general rendezvous in the famous "Pierre's Hole," near the Three Tetons, and with the mountains of the Park in plain view; and yet, most strangely, in all the published reports of these famous mountaineers we fail to find a hint of the Park or its wonders.

During nearly three years of trapping and trading with the Indians by Captain Bonneville and his detached parties, in all directions from the Park, it is evident that he neither visited it nor learned its true location; for although his map of these regions is far more accurate than *any* before and *many* since, even that shows the largest mountain lake as the head of the Snake River, and hence Pacific waters, instead of the Yellowstone, which really discharges into the Atlantic; Bonneville's representation of this lake is also inaccurate in form, and is without

name or indications of the great falls, cañons, or geysers, or any of the fire-hole basins in the Park. In fact, in his only reference to the latter (Irving's *Bonneville*, page 236) he erroneously locates it upon the Stinking River (now Water) branch of the Big Horn, where the sulphur fumes from an extinct geyser basin somewhat resemble those of the Park, the basin itself, however, every way less mountain-girt and less important than any which Coulter saw within the Park.

While I have given much credence to a well-indorsed camp-fire story that one Smith, a trapper, prior to the days of *Bonneville*, had written a narrative of his explorations of these regions, and who was killed shortly thereafter by Indians, I have never as yet met with any published record of the same.*

Border legends, although often gross exaggerations, are seldom wholly false, and scores of them indicate that white mountaineers did occasionally long ago visit portions of the Park for trapping or concealment, and perhaps for both purposes. This, in fact, is proven by ancient stumps of large trees cut for breastworks and for foot-logs across the Crevice, Hellroaring, and other mountain torrents, which no experienced mountaineer would fail to recognize as the work of white men, being rounded from below in a way never practiced by any known Indians; also by a corral near Amethyst Mountain, and ruins of an ancient block-house with earth roof and loop-holes, near the grand cañon below Mount Washburn, clearly the work of unknown white men, and a cache of marten steel traps, of a peculiar form only used by the Hudson Bay trappers some fifty years ago, which were recently found along our road near the Indian arrowhead-quarry at Beaver Lake.

In Frémont's reports of his explorations in those regions in 1842-'44, he describes mountain scenery and harmless hermit Indians similar to those in the Park, but makes no mention of geysers, being probably at that time ignorant of their existence.

In 1844 James Bridger described to me personally, and as I now know correctly, the cañons of the Upper Snake River, but he had then neither seen nor obtained a correct conception of the geysers, deeming them real volcanoes. His description of the Two Ocean Pass south of the Park is now admitted to be mainly correct, and there is "more truth than poetry" in his camp-fire story of a foaming torrent, icy cold at its snowy fountain-head, and seething hot half a mile down the mountain-side, though not caused, as he boasted and perhaps believed, by the velocity of the descent, but by a crag-hidden fire-hole basin of spouting water and seething brimstone. So, also, with his famous legend of the lake with millions of beaver, nearly impossible to kill because of their superior 'cuteness, with haunts and houses in inaccessible grottoes in the base of a glistening mountain of glass, which every mountaineer of our party at once recognized as an exaggeration of the artificial lake and obsidian mountain which I discovered, as stated in the chapter on explorations in my report of 1878. But as this locality and that of the arrow and lance head quarry are

* Since the publication of the facts already narrated in my report of 1878, learning that the late Mr. George Gibbs was supposed to have obtained a copy of the manuscript of this narrative of the trapper named Smith, and failing, after diligent search of his valuable papers (now with the ethnological bureau, under Maj. J. W. Powell) to obtain it, I last year addressed a letter of inquiry on the subject to his brother and representative, Prof. Wolcott Gibbs, of Cambridge, Mass. From his reply, learning that he failed to find the manuscript, cordially assisted by Mr. George H. Bochner, in charge of the international exchange office of the Smithsonian, I examined the Gibbs papers in that institution. Again disappointed, I reluctantly abandoned the search, believing that if found they would impart much interesting information relative to the Hudson Bay and other early trappers of those regions, and I leave this record of the circumstances to stimulate research for this missing manuscript.

across a sharp mountain range from where represented by Bridger and so long sought by trappers, it is not probable that he ever saw them, but that his information was derived from old Hudson Bay trappers or their Indian allies, who were, perhaps, alike interested in deceiving him as to their true location. These rumors of a mountain-girt land of wonders at the fountain-heads of the Missouri and Yellowstone so impressed Lieutenant (now General) G. K. Warren during his explorations of the Black Hills and Great Plains up to 1857, that he planned an expedition to verify them. A strong, well-equipped party, under the command of Captain (since General) W. F. Reynolds, with Prof. F. V. Hayden as geologist, and James Bridger as guide, were sent upon this expedition and spent the season of 1859 in exploring the Black Hills and Big Horn regions, but failing to cross the towering Yellowstone Range and reach its mystic lake, they wintered upon the North Platte. Efforts were renewed in the spring by sending Lieutenant Maynadier with a party down the Big Horn to again seek a pass from the east, while the chief of the expedition with the main party sought one up the Wind River from the south. Both parties failed; Reynolds by encountering a buttress-based, snow-capped mountain wall, to cross which, Bridger declared that even a crow would need to carry his grub.

Turning to the west and crossing the main Wind River divide, near the head of Green River, and failing in another effort to reach the cliff and snow encircled Park from near the Three Tetons, Reynolds abandoned the effort, and followed the old traders' route via Henry's Fork and Lake to the Three Forks of the Missouri. He was here joined by Lieutenant Maynadier, who, baffled in all attempts to reach the Park from the east, had crossed the Yellowstone in bull-boats below the Gate of the Mountains, and through the Bozeman Pass had reached and descended the Gallatin. (See Ex. Doc. 77, Fortieth Congress, first session.)

The utter failure of a two years' search for the geyser basins by such well-equipped parties, led by the most famous mountaineer guide, proves them mountain-girt and isolated from the surrounding regions, with few and difficult routes of access.

Thus baffled, the government made no further effort to explore the Park until long after gold-seeking pilgrims had visited various portions of it. Prominent among these prospectors were Bart Henderson, Adam Miller, George Houston, and C. J. Barronette around the Forks of the Yellowstone, and Frederick Bottler and H. Sprague from Henry's Lake to the Forks of the Fire Hole River. All these visits were prior to 1869, when two hunters, Cook and Folsom, explored portions of the Park, but their oral report, made to General Washburn and to others who sent them from Helena, has never been published.

Having myself, long before the Reynolds expedition, failed, as he did, to reach the Park from the east, in June, 1870, I again sought, after many years' absence from those regions, to reach it by ascending the Yellowstone above the Gate of the Mountains, accompanied by Frederick Bottler, from the Bottler ranch. Deep snows baffled our resolute efforts to cross the Madison Range to the geysers, and, when seeking to descend to the Yellowstone Valley below the Mammoth Hot Springs, Bottler was swept away in attempting to cross a mountain torrent above Cinabar Mountain, losing his rifle, ammunition, most of his clothing, and nearly his life. This mishap compelled our unwilling return from within the Park through the then nearly unknown and impassable second cañon of the Yellowstone to Bottler's, the only white ranchman at that time upon any portion of the mighty Yellowstone River. Thence I retraced

my route to Fort Ellis, published a brief account of my trip (see No. 3 of my *Journal of Rambles in the Far West*), and, under previous engagements, descended the Columbia to the ocean, purposing to return to the exploration the next year.

During the following autumn the Washburn expedition was suddenly organized for Park exploration. It was composed of H. D. Washburn, N. P. Langford, T. C. Everts, S. T. Houser, C. Hedges, W. Trumbull, B. Stickney, W. C. Gillett, and J. Smith. General Washburn, in command, was then surveyor-general, T. C. Everts and N. P. Langford ex-officers and all prominent and esteemed citizens of Montana Territory. They were well equipped, and at Fort Ellis were joined by Lieut. G. C. Doane and seven men; from here they followed my return route to and up the Yellowstone through its second cañon. They missed the Mammoth Hot Springs, but visited Mount Washburn, the Great Falls and Lake, returning by the Fire Hole River and Madison route to Virginia City. When among the fingers of the Yellowstone Lake, Everts lost his way, horse, arms, and provisions, and after thirty-seven days of exposure, starvation, and suffering, doubtless unequaled by any other man now living, was found by Barronette and Prichette, barely alive, upon the Black Tail, near the Mammoth Hot Springs. This is the first party of really successful explorers of any considerable portion of the Park of which we have any public record. (See General Washburn's surveyor-general's report; also that of N. P. Langford, in the May and June, and T. C. Everts's *Thirty-seven Days of Peril*, in the November number of the second volume of *Scribner's Monthly Magazine*, and Lieutenant Doane's report, Senate Ex. Doc. 51, Forty-first Congress, third session.)

The interesting letters, reports, and personal influence of the various members of this party led to Professor Hayden's interesting and valuable explorations in the wonder-land in 1871. (See Professor Hayden's *Geological Surveys of 1871*.) Capts. J. W. Barlow and D. P. Heap also made valuable explorations, maps, and report of portions of the Park in the same year. (See Senate Ex. Doc. 66, Forty-second Congress, second session.)

During the succeeding winter Professor Hayden and his associates were very active in publishing and distributing photographic views, sketches, and other valuable information in reference to this splendid region; and in preparing, and, aided by many leading members of Congress—notably Representative (now Senator) Dawes—advocating to its passage a bill dedicating it as a health and pleasure resort for the American people under the name of the Yellowstone National Park. (For its boundaries and control by the Secretary of the Interior, see copy of the act of dedication in Appendix, marked B.)

For report of Professor Hayden's extensive explorations in the Park, see his report of *Geological Surveys for 1872*.

Capt. W. A. Jones and Prof. Theodore B. Comstock explored mountain passes to, and a portion of, the Park, making valuable reports and maps. (See House Ex. Doc. 285, Forty-third Congress, first session.)

In 1874, the well-known Scottish Earl Dunraven made a tour of the Park, and published an interesting narrative of the same. (See his *Great Divide*.)

For the Rev. E. I. Stanley's visit to the Park, see his interesting narrative called *Rambles in Wonder Land* in (I think) 1874.

For Secretary of War Belknap's narrative of a tour of the Park, see his report of 1875.

Capt. W. Ludlow made a reconnaissance of the Park in 1875. (See Engineer's Report published by War Department.)

For record of P. W. Norris's explorations in the Park in 1875, see Nos. 24 and 25 of his *Journal of Rambles in the Far West*.

Besides Moran, Jackson, Elliott, Gannett, Holmes, and other justly famous artists who have at various times accompanied Professor Hayden's and other expeditions, J. Crissman, H. B. Calfee, Marshall, Fouche, and other photographers have at various times visited the Park, making and widely disseminating interesting views of the great falls, geysers, hot-spring terraces, and other wonders of the Park.

During all these years of exploration and research, so far as I am aware, the wisdom of Congress in promptly dedicating the National Park has never been seriously questioned; nor has its size, appropriate control by the Secretary of the Interior, and his rules and regulations for its protection and management, been deemed objectionable. Hence it is not what Congress has done, but what it so long neglected to do; not the dedication of a lofty mountain-girt lava region destitute of valuable minerals, isolated and worthless for all else, but matchless and invaluable as a field for scientists and a national health and pleasure resort for our people; but rather the failure to make moderate appropriations for its protection and improvement until leases could be made to assist in rendering it self-sustaining, which compelled its first superintendent, N. P. Langford, to abandon all efforts for its protection against long-allowed destructive forest fires, wanton slaughter of its interesting and valuable animals, and constant and nearly irreparable vandalism of many of its prominent wonders. So uniform was the testimony of the civil and military officers of the government, as well as of the American and European scientists and tourists who visited the Park, and so strong their appeals to the nation for its protection, or at least the sending of a commissioner or an agent specially empowered to investigate and report the facts, that among the early acts of the present honorable Secretary of the Interior was my appointment as superintendent of the Park, specially instructed to again visit it and report the facts as I should then find them for the information of Congress. But as to funds for salary, or even expenses, none were furnished or promised; but I was left to rely upon Congress to make provision to properly pay for the performance of duties pointed out and positively required of the Secretary of the Interior in the act dedicating the Park. This will, I think, appear clearly evident by perusal of the act of dedication, the rules and regulations of the Secretary of the Interior, and my appeal to the mountaineers as published in No. 62 of the *Norris Suburban*, several hundred copies of which were gratuitously distributed throughout the regions adjacent to the Park during the spring of 1877. (These documents will be found in the Appendix, marked A, B, and C.)

Under these circumstances, and without pecuniary aid from any department, association, or individual, I proceeded, via Bismarck, Forts Buford and Keogh, the Custer battle-field, and Gate of the Mountains upon the Yellowstone to the Park. After visiting the most important of its known wonders, and exploring others, as well as an important cut-off trail route of approach to the Park (which from being through a portion of the Crow Indian Reservation is still unopened), I started to descend the Yellowstone, but meeting General Sherman I returned with him to Tower Falls. Here, by the breaking of a saddle-girth, I was unhorsed and too seriously injured to proceed with the General or even to return home, except by descending the Yellowstone in a skiff from above the Gate of the Mountains, which course I adopted.

During my return home the hostile Nez Percés made a raid in the Park, which was so sudden and unexpected that General Sherman and his slender escort narrowly escaped capture. Several tourists, however, then in the Park, were killed, wounded, or captured. Among these was Professor Dietrich, whose body was riddled with bullets while he was standing in the doorway of the McCartney cabin at the Mammoth Hot Springs. In addition to the tourists known to have been in the Park at this time, there were also many miners from the Black Hills region, some of whom no doubt met death at the hands of these savages, as evinced by a number of skeletons of men and horses, and fragments of blankets and other camp outfit found by myself and others near the Indian line of retreat. This was by way of the best ford upon the Yellowstone River, at the Mud Volcano, thence by the East Fork and Cache and Crandall Creeks.

The selection of their camp sites, and their rude but effective fortifications, their valor in conflict, and their omission to scalp the dead or maltreat the living who fell into their hands, indeed, their conduct in all respects, proves that the Nez Percés are not wanting in courage, chivalry, or capacity, and that they are foemen not unworthy of the noted military officers, Howard, Miles, Sturgis, and others, who have battled against them.

The facts and suggestions in reference to the Park, as submitted by myself to the honorable Secretary of the Interior, were incorporated in his Report of 1877 (part first, page 837), and also deemed by him worthy of publication in pamphlet form. (See Report of the Superintendent of the Yellowstone National Park for 1877.)

After a long and careful investigation of the whole subject, and in consideration of the written opinions of prominent scientists and explorers of our country, the cautious and prudent Congress of this period, at its first session, with flattering unanimity, made an appropriation of \$10,000 for the protection and improvement of the Park.

For a detailed statement of the improvements made with a portion of these funds, during the Bannack Indian raid in the summer of 1878, see the superintendent's report for that year.

For accounts of the explorations and researches, in the Park, in 1878, of the assistants of Professor Hayden, Messrs. Stevenson, Holmes, Gannet, Wilson, and Peale, see Hayden's Geological Report for that year. During the year just mentioned, among other visitors to the Park, were General Nelson Miles, who, after a bloody and decisive conflict with the Bannacks, made its tour, with Colonel Baker and other officers, and Mrs. Miles and a party of ladies. Besides these, there were, as visitors to this wonder-land, Lord Stanley, the German Colonels Shutz and Kaster, Colonel Berthold, with a party of Utah Northern Railroad engineers, and Rev. Dr. Wayland Hoyt, of Brooklyn, N. Y.

During the season of 1879 there were no geological or scientific explorations within the Park. It was visited, however, by Generals Sackett and Hazen, and other American, as well as by several European, military officers; and also by Messrs. Thomson and Cadwalader, of Philadelphia, Buckland of Ohio, and other prominent railroad officials, and Professor Geike, of Scotland.

During this year (1879) there were no Indian raids, but the resident Sheepeaters, with small bands of horse-stealing Bannacks and Shoshones, rendered such caution necessary in selecting and guarding camps and animals as seriously to retard as well as to increase the expense of improvements in the Park.

Besides substantial buildings for headquarters of the Mammoth Hot

Springs and a small house in the Upper Fire Hole Basin, several important roads and trails were constructed. (For details of these improvements as well as for an exhibit of expenditures under the appropriation of \$10,000 for Park purposes for that year, see superintendent's report of 1879.)

At the pressing recommendation of the honorable Secretary of the Interior, the appropriation for the Park for the fiscal year 1880-'81 was increased to \$15,000, thus justifying the employment of a gamekeeper whose report has been previously referred to.

Notwithstanding the very unfavorable season and consequent bad state of the roads and trails within and adjacent to the Park, nearly 2,000 tourists visited and safely returned therefrom during the past season. Of these, prominent in position and reputation, were Secretary Schurz, General Crook, Colonel Staunton, Hon. Jacob M. Thornburgh of Tennessee, and others, who accompanied the honorable Secretary to the Park via the Henry's Lake route from the Utah Northern Railroad. General Crook, Webb Hayes (son of the President), and others, after viewing the geysers of the Fire Hole Rivers and the Yellowstone Lake and Falls, returned as they came. The honorable Secretary, his nephew and others of his party, after making a rapid but thorough tour of the leading points of interest within the Park, left it by the elevated and difficult trail-route to Clark's Fork just in time to escape a severe mountain snow storm. Among other prominent personages who visited the Park during the past season were General Davidson and lady, of Fort Custer, Colonel Alexander, of Fort Ellis, with their escorts and retinues of friends. Among the civilians were the Hon. John McNulta and lady of Illinois; the famous traveler and guide-writer, Mr. Robert Strahorne and lady, of Omaha; Captain John Burns, the mountain trailer and journalist, from the Black Hills; Mr. Majors, of Utah; Mr. Butler and other members of the Crook party; a brother and nephew of General Nelson A. Miles, and doubtless many others whom I regret to have failed to meet because of my long absence in the exploration of the Yellowstone Lake and Cañon and the Hoodoo region.

Doubtless many were somewhat disappointed in the state of the roads and trails, finding, as I have ever sought to inform the public, that, while the National Park is truly the peerless wonder-land of earth, it is also one of the largest, most elevated, and mountainous, as well as far the most humid, densely timbered, and difficult in which to construct or maintain roads or trails, of all our great mountain parks. Since the first dollar ever furnished by the nation for the protection or improvement of this heritage of wonders was expended, in August, 1878, I have deemed it more important to construct buildings for defense of the government property from the frequently recurring and ever-threatened Indian raids, and to explore the proper routes for permanent use and open all possible of them as well as the limited time and means at my command would allow for immediate use, than to hazard the loss of government animals, outfit, and probably valuable lives by Indians, or the construction of a few miles of fine coach-road, leaving the remainder of the Park as I found it—mainly an unexplored pathless region, crags, and forests. I deem the roads and trails as I have represented them—passable, most of them convenient, and portions of them excellent. Few residents of those regions find difficulty in traversing any of the roads with the teams and vehicles in common use there, but many of the grades and causeways neither are nor are claimed to be yet prepared for the use of heavy broad-track military wagons for mule-trains, such as were used upon several of them during the past season.

ABORIGINES OF THE PARK.

Although the Crow Indians upon the north, the Shoshones upon the east and south, and the Bannocks upon the west might have, during the brief summers, traversed the few difficult passes to the Park, there is little evidence to show that they did so. It is probable that they were deterred less by these natural obstacles than by a superstitious awe concerning the rumbling and hissing sulphur fumes of the spouting geysers and other hot springs, which they imagined to be the wails and groans of departed Indian warriors who were suffering punishment for their earthly sins.

The only real occupants of the Park were the pigmy tribe of three or four hundred timid and harmless Sheepstealer Indians, who seem to have won this appellation on account of their use of the flesh and skin of the big-horn sheep for food and clothing, and their skill in hunting these animals amid the cliffs, crags, and cañons of the snowy mountains.

Whether these people are the remnant of some former race, as the legendary wild men of the mountains, or are descendants of refugees from the neighboring Bannock and Shoshone Indians, is not known, although their own traditions and the similarity of their languages and signals indicate a common origin, or, at least, occasional intermingling.

These Sheepstealers were very poor, nearly destitute of horses and fire-arms, and, until recently, even of steel or iron hatchets, knives, or other weapons or implements. The stumps and the ends of the poles for lodges, wickiups, and coverts for arrow-shooting, from having been cut by their rude obsidian or volcanic-glass axes, appear not unlike beaver-gnawings.

On account of this lack of tools they constructed no permanent habitations, but as evinced by traces of smoke and fire-brands they dwelt in caves and nearly inaccessible niches in the cliffs, or in skin-covered lodges, or circular upright brush-heaps called wickiups, decaying evidences of which are abundant near the Mammoth Hot Springs, the various fire-hole basins, the shores of Yellowstone Lake, the newly explored Hoodoo region, and in nearly all of the sheltered glens and valleys of the Park.

Within or near these haunts, and notably at a great hot spring upon the Gardiner River, at and below the Sheepstealer Cliffs, which are above the Mammoth Hot Springs, and also in the Hoodoo, Pelican Creek, and Yellowstone Lake regions are found rude stone or decaying timber breastworks for temporary defense from man or animals, but all the substantial bulwarks found are those made by the Nez Percé and Bannock Indians during their recent raids.

To these latter Indians may be attributed the recent graves as well as burial cairns within the Park; but as the Sheepstealer Indians did not place their dead upon branched trees, or upon scaffolds, like the brown Indians of the Great Plains, graves or cemeteries of this people may yet be found.

Other traces of this tribe are found in the rude, decaying, and often extensive pole or brush fences for drive-ways of the deer, bison, and other animals to the arrow-coverts, in the cañons or in the narrow passes between them, for slaughter with their rude lances and obsidian-headed arrows.

For want of proper tools, but little timber was cut, and these drive-ways were mainly constructed of the ever-abundant dead and fallen saplings, with the roots attached, which, from their pitchy properties, long outlast the trunks and branches, thus enabling an experienced mountain-

eer to trace these drive-ways a long distance, even in groves of thrifty timber.

One of the most accessible of these drive-ways is upon the southern cliff of the impassable cañon of the West Gardiner, having its evidently more recent arrow-covert within point-blank range of its verge overlooking Rustic Falls.

From this covert there are traces of one wing that skirted the valley toward Swan Lake, and of another that wound through groves of pine at the base of Bunsen's Peak, far toward the Sheepeater Cliffs, upon the Middle Gardiner, nearly two miles distant.

Countless drive-ways and coverts in every stage of decay are still found in favorable localities throughout the Park, and are often crossed unobserved by ordinary tourists. In fact, these Indians have left fewer enduring evidences of their occupancy than the beaver, badger, and other animals on which they subsisted.

HABITATIONS OF WHITE MEN WITHIN THE PARK.

A list of the habitations of the early white rovers or explorers of these regions is here given, as well as those constructed in more recent times.

1. An earth-roofed, loop-holed cabin, 16 by 20 feet in diameter, discovered by Frederick Bottler, and visited and described by me in 1878, was almost entirely destroyed by the great fire of 1879. It was situated between Antelope Creek and the Grand Cañon, below Mount Washburn. Nothing is certainly known of its age, or of the character of its builders, but the advanced decay of the timber of which it is constructed, its fallen roof and generally dilapidated condition, indicate that it was the work of Hudson Bay or other trappers forty or fifty years ago. In corroboration of this theory is the absence of port-holes opening alike each way, as usual and proper in the now general use of fire-arms by Indians. This arrangement would have allowed a warrior armed with bow and arrows, by stealthy maneuvering in darkness through the timber, to use his weapons in silence and within point-blank range in front with terrible effect, but which was in trapper days prevented by using loop-holes, each open but one way, but alternating in direction, thus preventing a Bowman from reaching a dangerous position before exposed to loop-holed cross-fire.

2. A log house upon the point just above the Forks of the Yellowstone, built by C. J. Baronette in the spring of 1871. This was soon burned, presumably by Indians, and a second one, now in ruins, constructed on its site.

3. Earth-roofed log house in the ravine flanking the Mammoth Hot Springs, built by J. C. McCartney and Henry Hor in the summer of 1871, with which have been subsequently associated other houses, as well as bath-houses, some of which are shingle-roofed.

4. An earth-roofed log house, and also a cabin bath-house, built by M. McGuirk in 1871-72, near the Mammoth Hot Springs, and which still bear his name.

5. Earth-roofed cabin at Toppin's Point, near the foot of Yellowstone Lake, built by Captain Toppin in 1875.

6. Fine shingle-roof block-house of hewn timber, with a balcony and three wings, and surmounted by a gun-turret upon a commanding natural mound fronting the Mammoth Hot Springs, built by the superintendent of the Park for use as headquarters in the summer of 1879. (See frontispiece.)

7. Earth-roofed cabin in a small grove upon the bank of the Fire Hole

River, between the Castle and Bee Hive Geysers in the Upper Fire Hole Basin, built by the superintendent of the Park in the fall of 1879.

8. Block-house, barn, blacksmith shop, and bath-house at the Mammoth Hot Springs, built by the superintendent of the Park during the summer of 1880.

9. Earth-roofed log house and barn, for the Riverside mail-station at the forks of the old cañon, and the terrace roads below the cañon of the Madison, upon the road to Henry's Lake, built by Marshall and Goff during the summer of 1880.

10. Fine-shingle roofed mail-station and hotel, with barn and out-buildings, upon a cold rivulet at the foot of the cliffs just west of the Forks of the Fire Hole Rivers, built by Marshall and Goff during the summer and fall of 1880.

11. Rude, earth-roofed cabin and barn at the Norris Fork mail-station, built by Marshall and Goff in the fall of 1880.

12. Earth-roofed cabin for gamekeeper, upon the foot-hill terrace south of the confluence of the East Fork of the Yellowstone and Soda Butte Rivers, built by the superintendent of the Park and its gamekeeper late in the fall of 1880.

These, with several miners' cabins, and perhaps a Chilian arrastra upon the Montana and Crow Indian Reservation portion of the Park are all the buildings that have been constructed by white men within the Yellowstone National Park, of which I have any knowledge, down to the close of the year 1880.

WATER-CRAFT OF WHITE MEN.

1. The Anna (so named by the members of the Hayden expedition, in honor of Miss Anna Dawes, the accomplished daughter of Senator Dawes, of Massachusetts, who had been one of the most zealous and efficient advocates of the dedication of the Park to national purposes, and who has since proved his interest in all efforts for its protection and improvement) was a small but serviceable canvas boat, and, under the skillful management of Messrs. Holmes, Stevenson, and others of the Hayden expedition, proved valuable in the exploration of the Yellowstone and Shoshone Lakes during the season of 1871.

2. The Toppin, a small sail-boat of green, whipsawed timber, built by Captain Toppin at his cabin, near the foot of Yellowstone Lake, in the summer of 1875, and which, after perilous service during a small portion of the seasons of 1875 and 1876, was dismantled, abandoned, and finally lost.

3. The Explorer, so called by my own party, was built by the Hoffer Brothers, at Toppin's Point, during the summer of 1880, and was some 20 feet long, 6 feet wide, and $2\frac{1}{2}$ feet deep. Loggy and clumsy, it required skillful management and ceaseless labor to keep her in order; but with her I succeeded in exploring the lake and its near tributaries to the rapids. Finally, however, she was wrecked, and I left her battered hulk near the point where she was built.

I saw a rude canoe at the lower rapids of the Upper Yellowstone, and probably others have been used by both Indians and white men, but the above list embraces all the boats that, to my knowledge, have buffeted the blue waters of this mystic lake.

BRIDGES.

The one constructed in the spring of 1871, by C. J. Baronette across the main Yellowstone River, just above the forks, and over a dangerous

rapid and cañon, and one that cannot be avoided, was dismantled and partially burned by the Nez Percé Indians in 1877. It was repaired, however, by Baronette, myself, and others in 1878, but was always considered unsafe, and in the spring of 1880 was replaced by a substantial structure upon the old site. The necessity of reaching this, their only route of access in the absence of a safe ford upon the Yellowstone, led C. J. Baronette and J. W. Ponsford to construct the latter, which can be purchased by the government at less than its cost or value.

These are the only bridges that are known to have been constructed across the Yellowstone River in its course of many hundreds of miles.

In connection with road and trail building, I have constructed bridges upon all the branches of the Gardiner River, most of those of the Gibbon, also Tower Creek, Cascade, and other creeks, near the Great Falls of the Yellowstone and other localities, deemed unnecessary to here mention.

ANIMALS OF THE PARK.

BISON OR MOUNTAIN BUFFALO.

Bison, so called, in the Park, are somewhat smaller, of lighter color, less curly, and with horns smaller and less spreading than those of the bison that formerly inhabited the great parks of Colorado. They have also smaller shoulder humps, and larger, darker brisket wattles. They differ materially from the buffalo of the Great Plains, being more hardy, fleet, and intelligent; their hides also are more valuable for robes, as they are darker, finer, and more curly; and these animals are, in all probability, a cross between the two varieties just mentioned.

There are about three distinct or separate herds of bison within or adjacent to the Park.

The first, numbering about two hundred, pasture in summer in the valleys of the Crevice, Hellroaring, and Slough Creeks, and the mountain spurs between them, descending, with the increasing snows, to winter in the deep, sheltered grassy valleys of the East Fork of the Yellowstone and Soda Butte, and as the snows melt, accompanied by their young, returning to their old haunts.

The second, numbering over one hundred, summer in the elevated and abruptly-broken, little-known section of the Park, extending from the Hoodoo region to the Grand Cañon, and from Amethyst Mountain to Pelican Creek, near the foot of the Yellowstone Lake, and winter occasionally upon the East Fork of the Yellowstone and on Pelican Creek. Their other winter haunts are unknown.

The third herd, numbering about three hundred, roams in scattering bands. This season they were discovered upon the Madison Plateau and Little Madison River. Their winter haunts are unknown, though it is probable they are on the Pacific side of the Continental Divide, and, if so, they are not permanent occupants of the Park, and are therefore likely to be slaughtered by advancing settlers.

These animals, but little smaller than our common cattle, and with flesh quite as palatable, are easily domesticated. I have always carefully protected them from wanton slaughter during the deep snows of winter and when with their young in the spring, at which times alone they require such protection, being at other seasons the most keen of scent and difficult of approach of all mountain animals.

MOOSE.

Three of these animals were seen during the past season near the Lake of the Woods, and a few others in the various Fire Hole Basins. Their main haunts are in the densely timbered, swampy region around the various fingers and the thumb of the Yellowstone Lake. They also frequent the boggy inlets of Shoshone, Lewis, and Heart Lakes and the Snake River regions to the Tetons without the Park, but nowhere are they numerous. The boggy and inaccessible nature of their haunts renders these large and majestic animals difficult of capture, and on account of its scarcity their flesh is the more highly prized. Any attempt at their domestication must begin with inclosing them in some secure place.

ELK.

This animal is one of the largest, most beautiful, interesting, and valuable of those that inhabit this continent, and, so far as I have any knowledge, in no part of the United States were they ever found of greater size, symmetry of form, stateliness of antlers, or in greater number than in the great National Park at the period of its discovery in 1870.

As stated in my first report, at least 7,000 of these valuable animals were slaughtered between 1875 and 1877 for their hides, or perhaps for their carcasses, which were stripped and poisoned for bear, wolf, or wolverine bait. Since the first appropriation, however, for protection of the Park in 1878, notwithstanding the numbers since killed by our laborers, as well as by numerous tourists and raiding Indians, they have not seriously diminished, and but for the unprecedented severity of the past winter would have greatly increased; their increase hereafter, however, is assured if properly protected. They are inoffensive and harmless, and frequent all portions of the Park, often high up amid the mountain snows in summer, and in the most sheltered valleys in winter, in herds of a hundred or more. While the horns of these animals in the Park are, as elsewhere, unusually long, spreading, and symmetrically branched, there are many and remarkable exceptions. Some have lobed branches extending downwards, caribou-like, in front of the face; the horns of others are short, flat, and lobed, similar to those of the moose, while still others have horns both lobed and branched.

A specimen pair of horns, which I brought from the Park in 1878, is doubtless the heaviest ever seen in Washington. They are not only lobed and branched, but otherwise so notably peculiar in form as to lead me to inquire (1) are the animals to which this characteristic belongs a cross between the moose and the elk, though there is nothing else in the appearance of the animal to indicate this? or (2) is this phenomenon only a freak of nature? or (3) are the animals producing these wide horns really a subspecies of the elk? The careful consideration of naturalists is invited to this subject.

WHITE-TAILED DEER.

These animals do not differ essentially from those of the Atlantic States in size, color, horns, or habits. They usually frequent the densely timbered valleys and foot-hills, are more shy, sharp-eyed, and fleet, and less migratory than the black-tailed variety.

BLACK-TAILED DEER.

This is essentially a mountain animal, choosing the broken foot-hills or terraced slopes for pasturage and rest, and is difficult of approach ex-

cepting from above. It is frequently called mule-deer by tourists, and is so named in museums, though incorrectly, I think, since, while there are no two varieties of the deer family, in my opinion, more dissimilar, none of the latter inhabit the Park.

PRONG-HORNED ANTELOPE.

The National Park is, as a rule, too moist and thickly timbered to be a favorite resort of antelope, but they were once numerous in the open valleys of the Upper Gardiner River the open grassy region thence to the Forks of the Yellowstone, and up its East Fork to the Soda Butte, as well as on the main stream between the Great Falls, around the Sulphur Mountain westward to Mary's Lake, and in the Madison Valley. No other animal has suffered such severe slaughter, not alone within the Park, but upon the great plains, below the Gate of the Mountains, and upon the Yellowstone, where in their migrations they were wont to winter.

BIG-HORN SHEEP.

Although the web-footed, snow-loving white sheep, or Rocky Mountain goats are numerous in many of the adjacent snowy regions, I have never seen one within the Park, but the true big-horn sheep are abundant on all the mountain crests, as well as on their craggy spurs and foot-hills throughout the Park, which they never leave. Their habits and habitats tend to their preservation, which can, however, be better assured by a little effort and a small outlay.

BEARS.

The mountain men of this region believe that in the Park there are at least six varieties of the bear tribe, besides the long-tailed mud bear, or wolverine.

Grizzly bear.—The hog-back, or real California grizzly, with a mane upon the shoulders, is one of the largest, most powerful, ferocious, and dangerous animals upon the continent, but is less numerous than some other varieties within the Park. Specimens often occur of incredible size. At times one is met with which, when erect on its haunches—the customary position when looking for an enemy—will overtop in height a man on horseback. With one blow of its fearful fore paw and claws this animal is able to disembowel and kill any other animal of this region. One which I shot near Beaver Lake in the fall of 1879, after he had killed a valuable horse, was certainly heavier than any one of the more than fifty horses in our band. From his carcass thirty-five gallons of oil were obtained, and his skin, now in Washington, after being trimmed and dressed is still 8 feet 6 inches long (exclusive of the tail) and 6 feet 6 inches wide. Though but few larger than this have been taken, many but little inferior in size have been killed by different members of our parties. They seldom fail to cover with decaying logs, rubbish, or stones an elk or other animal they may kill, remaining near the body or returning nightly to it, as though a tempting dessert to their meal of grasshoppers, roots, and berries; for, human-like, they enjoy a mixed diet, though not so dainty as man in regard to its kind or quality. Although, save in defense of these carcasses or of its young, this bear seldom provokes attack upon man, it invariably resists one, and if wounded usually charges furiously, either to its own death or that of its foe, and not infrequently both. Indeed, it may truly be said to be the mountaineer's most dreaded foe.

Silver-tipped bear.—This animal is nearly destitute of a mane, and is somewhat smaller, less powerful and ferocious than the true grizzly;

moreover its coat of hair is much longer than the latter's, and is tipped at the ends with a glistening, silvery white; hence the name.

Cinnamon bear.—This is so called from its reddish-brown color. It is somewhat longer and more slender than the smut-faced bear, and nearly his equal in audacious ferocity.

Smut-faced bear.—This is a still smaller animal, with a brockled, impish-looking face—a true indicator of the character of the beast. It is the most meddlesome and pugnacious of the bear family.

Black bear.—This animal in the Park only differs from those of the East in his greater size and the greater length and fineness of his fur, and is as elsewhere, either wild or domesticated, uniformly a less ferocious animal than any of the above-described species.

"Silk bear."—This provincialism is the only designation I have heard applied to this smallest and rarest variety of the bear family. The few of which I have personal knowledge were found near the upper limit of timber, engaged in biting, in order to more easily break off for food, the cone-laden boughs of the piñon pines. They were all very fat, and had a coat of glistening black fur, fine and of extra length, rendering them more valuable than any of the species of the bear family.

All of these short-tailed varieties of bear hibernate in hollow trees, in caves, or more frequently in rude wickeups, amid the dense evergreen declivities of the mountains, to which they retire early in winter, and remain until the accumulated snows thaw in spring, when they scramble out, often very lean, and always tender-footed, but soon recruit strength by devouring roots and mountain moles at the nearest slopes clear of snow. Few mountain scenes are more ludicrously interesting than that of half a dozen bears, of assorted colors and sizes, engaged in the sport of catching the burrowing mole just below some melting snow-drift upon the steep and slippery mountain side. In ignorance of their mode of making details for duty, I can only say that it seems to be the especial task of one of each party to pull up the sage-brush, thereby unearthing the moles; the rest of them, in their efforts to catch and eat them, often falling pell-mell over each other, like Chippewa Indians engaged in a game of Lacrosse. A variation of this sport is occasionally caused by a shower of explosive bullets from the repeating rifle of a grim mountaineer, perched unseen upon some overlooking snow-field, cliff, or tree-top.

Wolverine, or long-tailed mud bear.—This animal, although considered a variety of the bear family, does not hibernate. It has a long tail, differing in this and other marked characteristics from other varieties; in fact, this audacious trap and camp plunderer seems in size and form, as well as in color, a strange blending of the black bear, the badger, and the coyote. In character, also, it combines the rapacious greed and pugnacity of all these animals with the Asiatic jackal's craving for carrion. His chosen haunts are the most densely timbered foot-hills of the mountains, where he is ever ready to steal what the bear, wolf, or lion slaughters. His extremely heavy fur, long outer hair, and thick, firm, and badger-like skin, seemingly much too large for him, allow him to squirm his body out of the jaws of nearly every other animal; and to these peculiar advantages for defense are added teeth and claws unrivaled for attack. Unlike other carnivora, their teeth do not puncture but lacerate, and, chisel-like in their powerful jaws, smoothly sever skin, bone, and tendon, inflicting such fearful wounds that most animals prefer relinquishing their game to hazarding combat.

MOUNTAIN LION OR COUGAR.

These animals are much larger, coarser-haired, and more ferocious than the animal known as the eastern panther, and during my first

explorations in the Park were exceedingly numerous and troublesome, less, however, from actual attacks upon our men or animals than by their sudden terribly sharp and prolonged screams, which reverberated in frightful intensity around our evening camp-fires in the deep and crag-hidden mountain defiles. This tantalizing tendency to start false Indian alarms and stampede the animals has led to persistent efforts of the mountaineers, with rifle, trap, and poison, to exterminate them, and so successful have their efforts proved that now the comparatively few survivors usually content themselves with slaughter of deer, antelope, and perhaps elk, at a respectful distance from camp.

WOLVES.

The large, ferocious gray or buffalo wolf, the sneaking, snarling coyote, and a species apparently between the two, of a dark-brown or black color, were once exceedingly numerous in all portions of the Park, but the value of their hides and their easy slaughter with strychnine-poisoned carcasses of animals have nearly led to their extermination.

FOXES.

Foxes are numerous and of various colors, the red, grey, black and the cross varieties (most valuable of all) predominating in the order named.

SKUNK.

In no region have I found these animals more numerous, audacious, or odoriferous than in the Park, and though I have no proof of their tendency to rabies, as is the case with those of Kansas and the Indian Territory, I have an instinctive dread of them. Hundreds of them were slaughtered before we could sleep peacefully at the Mammoth Hot Springs, and they are such an intolerable nuisance around old camping-places that tourists often slaughter several of them, and thoroughly permeate the atmosphere with their abominable stench, before they are able to secure repose.

BADGER.

These animals are similar, if not, indeed, identical, with those of the East in appearance and habits, and are numerous in most of the valleys and terraces of the Park, but are less abundant than is indicated by their countless burrows, which are annoyingly evident to horsemen long after their abandonment.

ROCK DOG.

The animal thus called, somewhat abounding in the Park, is similar in appearance and habits to the Eastern woodchuck or ground-hog, but much smaller, and utters a different cry of alarm while disappearing in its burrows amid the rocks.

PORCUPINE.

This animal is of an extraordinary size, and is occasionally found in the timbered portions of the Park.

RABBITS.

The jack-rabbit of the sage-brush plains is only found in the limited areas of that pestiferous shrub, but the large, web-footed, slit-lipped hare, gray in summer and white in winter, is simply numberless in the tangled thickets throughout the Park. Another variety, similar to the

cotton-tail, or common rabbit of the East, is also but only occasionally seen; while the plaintive notes of a smaller variety, called the cony, are often heard amid the débris of snow-slides or avalanches around the elevated timbered foot-hills of the mountains.

RATS.

There are no prairie-dogs within the Park, but the barking sedge-rat, which is somewhat similar in appearance to the prairie-dog, and burrows extensively, though not in towns, is numerous. So also is a species of long-eared and hairy-tailed mountain rat.

MICE.

Long-eared mice are here countless, and exceedingly troublesome around the camp and in the cabin.

BURROWING MOLES.

But few of the tourists who have traversed much of the Park on horse-back will soon forget the annoyance caused them by the countless loose hillocks and hidden burrows of this seldom-seen but ever-industrious animal, in the fertile valleys as well as in the sage-brush-covered foot-hills and on the terraced slopes of the mountain sides.

SQUIRRELS.

The only squirrel at all plentiful in this section is of a dark-brown or nearly black color, but not otherwise different from the red squirrel of the East.

CHIPMUNKS.

These are very plentiful, but in size and spotted color resemble the young of this animal in the East.

BEAVER.

Few regions, even less elevated, are so favorable as a haunt for the sagacious beaver or are so fully occupied by it as the National Park, which is one of the largest, as well as one of the most densely timbered regions of North America. Well supplied with rivulets invariably bordered with willows, and having numerous creeks of cold water, it also has countless geyser and other hot-spring outlets with a flow of tepid water as well as a surface elevation alike remarkably uniform. These outlets, relatively clear of ice, afford unusual advantages for burrow habitations in their banks, or for the construction, in their sloughs, of the ordinary two-story brush-and-turf houses of these animals; the sloughs and streams being used as canals for floating their winter food supplies of brush and small timber, dams being far fewer and smaller here than are usually necessary elsewhere. Unmolested by man, who is ever their most dangerous enemy, the conditions here mentioned are so favorable to their safety that soon they would construct dams upon so many of the cold-water streams as literally to flood the narrow valleys, terraced slopes, and passes, and thus render the Park uninhabitable for men as well as for many of the animals now within its confines. In consideration of this I have not seriously interfered with the trappers who have annually taken from the Park hundreds, if not thousands, of the valuable skins of these animals, without payment for the same—a custom, however, which should not be permitted to continue, since some

revenue should be derived by the government from these furs. A law should therefore be enacted or some regulation prescribed with a view to this end; but without a small police force it would be difficult to enforce any restriction in this respect.

OTTER, MINK, MUSKRAT, ETC.

Neither otter, mink, nor muskrat are numerous in the Park; nor are marten, sable, or ermine plentiful. The skins, however, of these animals, as well as those of the beaver and other animals that are obtained, are generally among the most valuable of their kinds, and, owing to the isolation and rigorous climate of the Park, are never out of season.

BIRDS OF THE PARK.

Eagles, of the usual mountain varieties, are common throughout the Park, and especially about the Yellowstone and other lakes. A very large black variety haunts and raises its young upon the inaccessible and tottering pinnacles of the eroded cliffs along the Grand, Gardiner, and other cañons, and is particularly numerous and audacious in the Hoodoo labyrinths.

This bird hovers about and terribly annoys the big-horn sheep to pick up the lame or wounded. In one instance it caused a lamb to fall from a towering cliff and thus secured a repast below; but from my position I was unable to observe whether the lamb was frightened from its place on the cliff, or hurled off after being crippled by the eagle's talons, breast, or wing. I incline, however, to think the latter was the case. It is also the opinion of Mr. Adam Miller, a most experienced mountaineer. On another occasion, when in company with this mountaineer, I experienced quite a lively time in saving from a flock of these eagles an antelope which we had shot on the East Fork, the birds only leaving the game after we had killed several of their number.

The great bald-headed turkey-buzzard or North American vulture will soon find a carcass in any portion of the Park, aided by their smaller, more numerous, and audacious friends, the raven.

The latter bird is here often called the crow, but erroneously, as there are few if any crows inhabiting these regions.

Blackbirds are countless in summer on the borders of lakes and streams.

Swan, pelican, geese, and brant are plentiful in all the streams and lakes of the Park, and hatch their young in vast numbers, notably near the mouths of the Upper Yellowstone trail and Pelican Creek tributaries of the Yellowstone Lake.

Ducks of several species are also found and in countless numbers, and hatch around the resorts of geese and swan as well as in the Fire Hole Basins. In these last-mentioned localities some of them remain late in autumn, if not indeed during the winter, as I saw them amid the dense fogs of the Norris Geyser Basin late in November of 1879, and on the 16th of November of this year I shot a fine one in the warm reservoir, at the Mammoth Hot Springs, when the thermometer ranged 10 degrees below zero.

Sage-hens or cock of the plains are sparingly found in the open portions of the park.

Pheasants, somewhat smaller and of a darker plumage than the drumming-partridge of the East, frequent the densely-timbered foot-hills of the mountain ranges.

The fool-hen variety of the grouse are numerous around the margins of hot springs, near the permanent snow-fields, and other varieties are abundant in lower elevations throughout the Park, affording fine sport and delicious food for the health and pleasure-seeking tourist.

Sand-hill cranes sound their morning reveillé in trumpet-tones from the Fire Hole Basins and marsh-bordered tepid-water ponds.

Hawks of various kinds by day and owls by night, prey upon the rabbits, moles, and grouse, as well as upon the chattering jack-daw and the gaudy blue-jay, the camp-pest of the mountains, there called whistling-bob.

FISHES OF THE PARK.

No peculiarity of these regions is better established than that of the presence of long, slender white worms in the intestines and flesh of the countless large and beautiful trout of the Yellowstone Lake, named by Professor Cope *Salmo pleuriticus*. All the trout of its cold-water tributaries below contain them, but not those above the first rapids; also the main Yellowstone above, but not below its first falls, as I have established by frequent examination of specimens of this fish. This clearly indicates that the cause of the presence of these worms exists in the lake; further than this, nothing has been established with regard to this phenomenon. My own theory of some years ago, as to the larvæ of the innumerable flies from the warm-stream tributaries (and well known to be devoured by the trout) hatching in the stomach of this fish, and the numerous other theories that have been advanced, have none of them proved to be correct. Can the cause be due to quantities of minute vegetable fragments which adulterate and discolor these otherwise clear, pure, cold waters, and, often thrown by the waves into windrows along the rocky shores, temporarily discolor them? I think not, since Lake Abundance, Trout Lake, and many other waters proverbial for excellent trout, are also enormously weedy, or impregnated with minerals of which there is comparatively little evidence in the Yellowstone Lake; while nowhere is this fish more abundant or excellent than in the main Yellowstone at Tower Falls, and thence on to its junction with the East Fork, and up the latter where the sulphur and other fumes arising from the water are so powerful as to be scarcely endurable. Nor have I in any region found trout more numerous or better than in the Soda Butte and Cache Creek branches of the East Fork, immediately below their famous mineral springs, notably in the latter, within the half mile below where the stream bubbles with hissing hot sulphur which impregnates and covers with a beautiful white and orange coating the rocky bed of the channel far below, and which this fish frequents.

Professor Leidy states that this worm is *Dibothrium cordiceps*, and is found in little sacks imbedded in fragments of flesh. He considers it as entirely different from the worms found in the European salmon. Owing, however, to the abundance of trout not affected with parasites, it may never be necessary for tourists to use those in question as an article of food. Still, no danger to health or life need be apprehended from eating the latter, as cooking absolutely destroys the worm; and in my opinion those epicures whose stomachs yearn for the trail of the woodcock or the intestinal contents of the snipe, need not hesitate at the insignificant parasites of the trout of Yellowstone Lake. This worm is not believed to be a constant parasite of this fish, however, since speci-

mens in good health are often taken, but showing scars or marks of outlets for them.

That in the Yellowstone Lake alone trout are infested with worms, notably where the Shoshone Lake trail strikes it; that they are here countless in number, in water bubbling with hot gases; that they voraciously take the bait, and that the angler can, without changing his position or removing the fish from the hook, rapidly boil them in seething pools, are not *statements* but *facts* capable of demonstration.

In addition to trout in the cool waters of the Yellowstone Creek and the Gallatin Fork of the Missouri, there may be found the mountain herring, one of the most delicious of fish. This, with the grayling, affords excellent sport for the fisherman; while the student of ichthyology will find numerous species of smaller fry to reward his collecting ardor.

REPTILES.

The large, yellowish spotted rattlesnake has been observed only in the Yellowstone Valley, below the Mammoth Hot Springs, and few reptiles of any variety have been found elsewhere in the Park.

INSECTS.

The indigenous and the migratory grasshoppers are found in vast numbers throughout the Park, and are useful for fish bait, as the trout of these regions do not usually take the artificial fly as well as those of the East. There are found extensive horizontal layers of these in some of the ancient snow and ice fields of the mountains, probably of the migratory species, chilled in their lofty flight, some of which, at least, do not revive to pestiferous activity in thawing, as is frequent with these insects.

The yellow gad-fly and several other varieties, aided by the musical mosquito, for a brief period of each summer, drive nearly all animals into "smudges" of smoke, or else high upon the snowy mountains to escape them.

There are no honey bees, and few if any of the other varieties of this insect, but wasps and a small but vindictive hornet abound in the valleys.

TIMBER OF THE PARK.

Much of interest and practical importance in reference to the forests of this proverbially timbered mountain park, is necessarily omitted from this report.

As stated in its proper connection, the ancient timber now found fossilized upon the mountain slopes, is evidently much larger and mainly of different varieties from that now growing in the Park, probably embracing a smaller proportion of the coniferæ.

Black or bastard fir is far the largest variety of timber now growing in the Park, and usually found scattered through forests of smaller timber near the Mammoth Hot Springs, Tower Falls, Upper Yellowstone, and other elevated terraces. It is often found from three to five feet in diameter and one hundred and fifty feet in height, and is not unlike the eastern hemlock in the irregular form of its branched-top as well as the coarse-grained, shaky, and inferior quality of its timber.

Black spruce, growing on the moist, sheltered slopes of the mountains, near the snow, though having a smaller trunk, is fully as tall as the black fir, and is a statelier tree and more valuable for timber or lumber.

Red fir is the next in size (which nearly equals that of the Norway pine of Michigan) and the first in value of any tree in the Park for hewn-timber for building bridges, &c., for which purposes it is admirably adapted. It is abundant in all except the very elevated regions.

White pine, rivaling in symmetrical beauty the white pine of the East, but much inferior in size, and somewhat in quality, is the prevailing timber of most of the elevated terrace groves, and occasionally of the narrow valleys and cañon passes of the mountains. It grows very densely, often rendering traveling among it upon horseback exceedingly difficult when standing and utterly impossible when burned and fallen, as it is over large areas of the Park, proving one of the greatest impediment to exploring as well as to improvement by roads and bridle-paths. It is the best material found in the Park for lumber, shingles, small timber, rafters, fence poles, &c.

Balsam fir, somewhat different from that of the Alleghanies, is abundant and very beautiful, singly or in dense groves or isolated clumps scattered over the grassy slopes, just below the mountain snow-fields.

Cedar of a red or spotted variety, growing low and very branched, but with timber valuable for fence-posts, is abundant.

Poplar or aspen is found in dense thickets among the sheltered foothills. Dwarf maple, with leaves often scarlet with fungus, is sparingly found, and innumerable dense thickets of willow; the main value of all these last named varieties being for the food use of beaver or for bait.

CLIMATE OF THE PARK.

I greatly regret the breakage of our thermometers and consequent want of weather records until they were replaced, but the records given in the Appendix have been kept with great care and are deemed accurate and reliable.

As stated in my last year's report the records strengthen my previous impressions that the Park is less a severely cold than a peculiarly moist and stormy portion of these mountain regions, save during a brief but beautiful summer. The cause or causes of these peculiarities of temperature and moisture in the Park appear to be neither remote or difficult to comprehend. The anomalous heat and humidity of the atmosphere in all of the Fire Hole Basins is evident and traditional during the warm seasons of the year, when they are the best known. In fact all known of them in cold weather is my own experience during the early part of last winter, which tends to the belief that these geyser regions are relatively warm and moist in winter also. The terraces of the Mammoth Hot Springs and the cones to the various geyser and geyserite rims to other hot springs and sulphur pits are certainly much warmer than other rocky formations; and the adjacent areas of surface, if not indeed much of that of the Park, is at least somewhat warmer than that of other regions, for the snow in much of the Park seldom remains long even during moderately cold weather, nor is the earth often long or deeply frozen. For these reasons the terrible winter storms which cross the Sierra-Shoshone Range become much modified before crossing the Park, which observation and experience alike indicate is much warmer in winter than the less elevated surrounding regions.

ROUTES TO THE PARK.

The northern route has the advantages of cool summer travel upon the great lakes and the Missouri and Yellowstone Rivers, and railroad con-

nections with Manitoba and other British possessions, and ere long with Oregon, Washington Territory, and the northern route to Asia via the Northern Pacific Railroad. This latter railroad has recently been extended into Montana, and probably will reach the Yellowstone River in time for the coming season's tourists to enjoy a steamboat trip upon that romantic stream to at least the mouth of the Big Horn, and thence a coach trip via Bozeman to the Mammoth Hot Springs within the Park.

The southern route via the Central Pacific Railroad to California, as well as the Denver Pacific and other railroads to Saint Louis, affords great facilities for the Southern and Southwestern States and Territories, and for the increasing class of scientists and retired military and naval officers, or those upon leave of absence, who, while making the grand tour of the world, now annually visit the Park. The Utah Northern Railroad has entered Montana, and doubtless will deliver the coming season's tourists to where a thirty-mile coach ride upon the line of Gilmer & Salesbury will land them in Virginia City. Thence the coach line of Marshall & Goff will (upon a good road, mainly constructed by the public-spirited citizens of Virginia City) carry passengers via Henry's Lake direct to their hotel at the forks of the Fire Hole Rivers within the Park.

One of these routes presents the greatest variety of scenery, modes of travel, and somewhat shortest distance; the other the most direct continuous railroad connection, least coach or horseback travel, and consequently requires the least time; but practically both are convenient and necessary, as most persons with time and means will prefer going one route and returning the other.

Camp outfit and provisions can be purchased without extortion at Bozeman and Virginia City. At these places also, as well as at the Mammoth Hot Springs and at the Forks of the Fire Hole, reliable guides, with saddle outfit complete, will always be obtainable.

There will doubtless be regular mail communications from both Virginia City and Bozeman.

Time really necessary to view the leading wonders of the Park, ten days, but many more may be enjoyed with benefit; season of the year for a visit, July, August, and early September; cost of trip, although one of the most important considerations with most persons, is, from their diverse positions, tastes, and modes of travel, the most difficult to state, even approximately, but will range from \$400 to \$800 for the entire expenses of a visit to the mystic wonder-land. The best plan is, as recommended in last year's report, to make the Park the main object and turning-point of a season's rambles, visiting at least the Salt Lake and the Yellowstone regions upon the outward or return route.

It is expected that terms of leaseholds for hotel sites in the Park will be extended from ten to thirty years, and that leases will be effected to responsible parties, and at least some hotels at prominent points of interest will be erected; also, that a small steamboat upon the Yellowstone Lake will be constructed during the coming season.

Tabular statements concerning routes and trails will be found in the Appendix, marked F.

CONCLUSION.

In closing this report I beg to state that my assistants, Messrs. Stephens and Yount, have efficiently and faithfully discharged their respective duties, and cheerfully rendered every assistance in their power in my endeavors to carry into effect the wise policy of the Department of the Interior with regard to the National Park.

I also have to thank Mr. Chittenden, formerly of the Hayden survey, and Dr. W. J. Hoffman, of Washington, for elaborating some of the Hoodoo sketches made by Mr. W. H. Parker, who accompanied me in the exploration of the Goblin land. I am also indebted to Mr. W. H. Holmes for assistance in the preparation of the eastern portion of the map accompanying this report.

Finally, I would be derelict in duty did I omit to express my thanks for, and high appreciation of, the unvarying kindness I have ever received at your hands and those of other officers of the department over which you preside.

I am, very respectfully, your obedient servant,

P. W. NORRIS,
Superintendent Yellowstone National Park.

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APPENDIX.

A.

REPORT OF GAMEKEEPER.

GAMEKEEPER'S CABIN,
YELLOWSTONE NATIONAL PARK,
November 25, 1880.

SIR: The notice of my appointment by the Hon. Carl Schurz, Secretary of the Interior, as gamekeeper of the Yellowstone National Park, with instructions to report to you as its superintendent for duty, reached me at Cheyenne, Wyoming Territory.

I at once accepted, but as the unusually deep snows and floods in the mountains prevented my crossing them from that direction, I proceeded by the railroad and coach-route, via Ogden and Bozeman, reporting at the headquarters of the Park July 6, and entering at once upon my duties.

My previous experience in the Park proved materially beneficial, as I knew the haunts and habits of the various animals and how to protect them from wanton slaughter by the numerous tourists.

Meeting the honorable Secretary of the Interior at the South Madison, near the southwestern corner of the Park, I accompanied him in his tour of its leading points of interest to the northeast corner at the cañon of Clark's Fork, where he left this region.

Returning to the Mammoth Hot Springs I outfitted and proceeded, via the Great Falls, to the foot and thumb of the Yellowstone Lake, and thence in a nearly direct route past Lake Riddle and a flat, open country, to Heart Lake at the foot of Mount Sheridan, some twenty-five miles from the Shoshone trail at the thumb of the Yellowstone Lake. From Heart Lake I crossed over to Barlow Valley at the foot of the Red Mountain range near the southern border of the Park, finding deer and elk in abundance, and some moose, and Heart Lake as well as all the cold streams teeming with extra fine trout and countless water-fowl.

Upon my return trip I explored the region around Lewis and Shoshone Lakes, finding along their northern terrace an excellent route for a trail of easy construction. I also found an excellent gravelly ford of Snake River, some two miles below Shoshone Lake.

Returning via the Yellowstone Lake and Falls to the Mammoth Hot Springs, I proceeded with men and animals to construct a cabin for my winter quarters at a good spring on the terrace commanding a fine view of both the East Fork and the Soda Butte Valleys. Here I purpose wintering so as to protect the game, especially elk and bison, in their sheltered chosen winter haunts, from the Clark's Fork and other miners.

I have, during the season, found elk, deer, and bear in all portions of the Park, antelope in most of the open regions, and moose in the willow beaver-swamps of the southern portion, and excellent trout in abundance in all the cold-water streams, excepting the Yellowstone, where, as well as in the lakes, this fish is infested with worms, and the Lewis and Shoshone, the waters of which, although remarkably cold and clear, are not inhabited by any species of the finny tribe.

Much of the game in the Park occasionally ranges over some of the adjacent regions, endangering their slaughter in the constantly advancing border settlements. Hence I would strongly recommend that all portions of the Park be well protected, that the game may remain, increase, and much of it soon become domesticated. But this cannot be done by any one man, and I would respectfully urge for the purpose the appointment of a small, active, reliable police force, to receive regular pay during the spring and summer at least, when animals are liable to be slaughtered by tourists and mountaineers. It is evident that such a force could, in addition to the protection of game, assist the superintendent of the Park in enforcing the laws, rules, and regulations for protection of guide-boards and bridges, and the preservation of the countless and widely scattered geyser-cones and other matchless wonders of the Park.

Most respectfully yours,

HARRY YOUNT.

Gamekeeper of the Yellowstone National Park.

Col. P. W. NORRIS,

Superintendent of the Yellowstone National Park.

B.

ACT OF DEDICATION.

AN ACT to set apart a certain tract of land lying near the headwaters 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 headwaters 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 the 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 pleasure ground for the benefit and enjoyment of the people; and all persons who shall locate, 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 purpose of merchandise or profit. He shall also cause all persons trespassing upon the same 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.

Approved March 1, 1872.

NOTE.—The boundaries of the Park have never been surveyed, but they are mainly crests of snow-capped basaltic mountains encircling the wonder-land of cataracts, cañons, fire-hole basins, geysers, salses, fumeroles, &c., unique and matchless, with an entire area from fifty to seventy-five miles square.

C.

RULES AND REGULATIONS.

1st. All hunting, fishing, or trapping within the limits of the Park, except for purposes of recreation, or to supply food for visitors or actual residents, is strictly prohibited; and no sales of fish or game taken within the Park shall be made outside of its boundaries.

2d. Persons residing within the Park, or visiting it for any purpose whatever, are required under severe penalties to extinguish all fires which it may be necessary to make, before leaving them. No fires must be made within the Park except for necessary purposes.

3d. No timber must be cut in the Park without a written permit from the superintendent.

4th. Breaking the siliceous or calcareous borders or deposits surrounding or in the vicinity of the springs or geysers for any purpose, and all removal, carrying away, or sale of specimens found within the Park, without the consent of the superintendent, is strictly prohibited.

5th. No person will be permitted to reside permanently within the limits of the Park without permission from the Department of the Interior, and any person now living

within the Park shall vacate the premises occupied by him within thirty days after having been served with a written notice so to do, by the superintendent or his deputy, said notice to be served upon him in person or left at his place of residence.

NOTE.—These rules and regulations are those adopted by the Hon. C. Delano, Secretary of the Interior, at the dedication of the Park.

D.

APPEAL.

To whom it may concern :

Under the above law, rules and regulations, and my peculiar circumstances of health, long acquaintance, and business interest in those regions, I have accepted the responsible, but as yet neither lucrative nor desirable position of superintendent of the Yellowstone National Park. Have appointed J. C. McCartney, esq., proprietor of the Mammoth Hot Springs Hotel, assistant until my arrival via the Yellowstone River route, which, I trust, will be in June, unless delayed by the Indians.

Meanwhile, *bona-fide* occupants of buildings, bridges, mines, &c., will, by due regard for the above rules and the future interests of the public in the Park, be allowed quietly to remain. The outburst of national enthusiasm at discovery of the matchless wonders of the fire-hole and geyser basins, amid the Rocky Mountains, secured their prompt dedication as a national park for the weary and worn business man, the tourist, and the scientist forever; also, provision for the appointment of a superintendent under proper rules and instructions, but not the necessary appropriations to reward the one for the enforcement of the other.

My predecessor, Mr. N. P. Langford, did all that was proper to expect under the circumstances while in Montana, but with his return East all restraint ceased, and for fully two years, careless use of fire, wanton slaughter of rare and valuable animals, and vandalism of matchless wonders have, as so truthfully published in letters of myself and others, been doing irreparable injury in all the explored portions of the Park.

Under these peculiar circumstances, in the interest of science and of the tourist now and in the future, the welfare and good fame of the people of Montana, Utah, and Wyoming in general, and especially to my old mountain comrades and friends, do I most earnestly appeal, to abstain, and use all influence in urging others to desist from future vandalism of all kinds in the lofty, romantic "wonder-land."

With the closing of the Sioux war, the extension of the Northern Pacific Railroad, the opening of the Yellowstone natural route and the Big Horn Mountains for exploration of their vast gold and silver mines, an influx of sturdy miners and herdsmen will soon gather wealth, build towns, and open safe and convenient routes of access to this now isolated, little known, but matchless national heritage of wonders.

That the spirit in which I write and act in this matter may extend to the press and the people of those mountain regions and the tourists who visit them is my ardent desire.

P. W. NORRIS,

Superintendent of the Yellowstone National Park.

E.

Weather record kept in the Yellowstone National Park during the season of 1880, at the Mammoth Hot Springs.

[Latitude, 44° 59' north; longitude 110° 42' west: elevation, 6,450 feet.]

Date.	Temperature.			Sky.	Snow.	Wind.			Remarks.
	Sunrise.	Noon.	Sunset.			Sunrise.	Noon.	Sunset.	
1880.					<i>Ins.</i>				
January 1.....	25	28	26	Cloudy	.....	SE.	SE.	SE.	Gale.
January 2.....	30	32	30	...do	2	SE.	SE.	SE.	Do.
January 3.....	26	30	28	...do	.....	SE.	SE.	SE.	Do.
January 4.....	26	44	30	Clear	.....	SE.	SE.	SE.	Do.
January 5.....	30	30	28	Cloudy	.....	SE.	SE.	SE.	Do.
January 6.....	30	30	30	...do	.....	SE.	SE.	SE.	Do.
January 7.....	28	46	30	...do	.....	SE.	SE.	SE.	Intermittent.

Weather record kept in the Yellowstone National Park, &c.—Continued.

Date.	Temperature.			Sky.	Snow.	Wind.			Remarks.
	Sunrise.	Noon.	Sunset.			Sunrise.	Noon.	Sunset.	
1880.					<i>Ins.</i>				
January 8.....	30	26	25	Cloudy	1	SE.	SE.	N.	Gale.
January 9.....	20	22	20	do	4	SE.	SE.	SE.	
January 10.....	14	16	10	Clear		SE.	SE.	SE.	
January 11.....	6	10	10	do		N.	SE.	SE.	
January 12.....	10	16	14	do		SE.	SE.	SE.	
January 13.....	22	30	28	do		SE.	SE.	SE.	
January 14.....	22	30	28	do		SE.	SE.	SE.	
January 15.....	30	32	30	do		E.	SE.	SE.	
January 16.....	28	32	32	do			W.	SW.	
January 17.....	30	50	32	do			SE.	S.	
January 18.....	30	44	38	do		SE.	SE.	SE.	
January 19.....	30	34	29	do		SE.	SE.	SE.	
January 20.....	20	32	28	do		SE.	SE.	SE.	
January 21.....	18	35	23	do		SE.	SE.	SE.	
January 22.....	22	24	23	do		SE.	SE.	SE.	
January 23.....	22	38	20	do		SE.	SE.	SE.	
January 24.....	22	26	20	do		SE.	SE.	SE.	
January 25.....	29	22	18	do		SE.	SE.	SE.	
January 26.....	8	29	18	Cloudy	6	N.	N.	N.	
January 27.....	— 8	18	— 4	Clear		N.	N.	N.	
January 28.....	— 4	26	6	Cloudy	6	N.	N.	N.	
January 29.....	—16	—36	0	Clear		N.	N.	N.	
January 30.....									Very little wind; Thermometer fell 26° in $\frac{1}{2}$ hour.
January 31.....	—16	15	4	do		N.	N.	N.	Calm.
	4	40	12	do					
Average of January ..	18	27	21						
Mean	22						
February 1.....	2	38	18	Cloudy	2	SE.	SE.		Gale.
February 2.....	2	28	20	do		SE.			
February 3.....	10	22	18	do	1	SE.	SE.	SE.	
February 4.....	12	18	10	do	1	N.	N.	N.	
February 5.....	12	24	16	do		SW.	SW.	SW.	
February 6.....	14	48	22	Clear		SE.	SE.	SE.	
February 7.....	14	48	18	do		SE.	SE.	SE.	
February 8.....	18	35	22	do		S.	S.	S.	
February 9.....	19	36	24	do		SW.	SW.	SW.	
February 10.....	17	36	25	do		SW.	SW.	SW.	
February 11.....	22	28	13	Cloudy	1	NW.	NW.	NW.	Gale.
February 12.....	2	24	10	Clear		S.	S.	S.	Gale.
February 13.....	12	21	11	Cloudy	3	N.	N.	N.	Gale.
February 14.....	14	24	22	do	3	SW.	SW.	SW.	
February 15.....	24	25	20	do	2	SW.	SW.	SW.	
February 16.....	10	14	1	do	1	SW.	SW.	SW.	
February 17.....	2	30	4	Clear		SW.	SW.	SW.	
February 18.....	4	30	18	do		SE.	SE.	SE.	
February 19.....	20	32	26	Cloudy	4	SE.	SE.	SE.	
February 20.....	20	42	30	Clear		SE.	SE.	SE.	
February 21.....	26	42	24	do		SE.	SE.	SE.	
February 22.....	26	62	36	do		SE.			
February 23.....	22	42	30	do			SE.	SE.	Flying snow.
February 24.....	22	37	24	Cloudy		SE.	SE.	SE.	
February 25.....	24	22	26	do	1	SE.	SE.	SE.	
February 26.....	18	20	18	do	1	NW.	NW.	NW.	
February 27.....	—16	6	— 6	Clear		NE.			
February 28.....	— 2	14	6	Cloudy		SW.	SW.	SW.	
February 29.....	6	12	17	do	1	SE.	SE.	SE.	
Average of February ..	12	28	18						
Mean	20						

Considerable snow on the ground; all the hollows full, with a very hard crust, sufficient to bear a horse up; heavy drifts on north side of hills; the pass on Geysers road almost level with snow.

Weather record kept in the Yellowstone National Park, &c.—Continued.

Date.	Temperature.			Sky.	Snow.	Wind.			Remarks.
	Sunrise.	Noon.	Sunset.			Sunrise.	Noon.	Sunset.	
1880.					Inch.				
March 1	22	32	33	Cloudy	.....	S.	SE.	SE.	Flying snow.
March 2	36	34	34	do	2	SE.	SE.	SE.	
March 3	20	28	28	do	1	SE.	SE.	SE.	
March 4	18	18	14	do	.....	SW.	NW.	SE.	Gale.
March 5	12	24	18	do	1½	NE.	SE.	SE.	
March 6	22	34	21	do	2	S.	NW.	N.	
March 7	14	26	22	do	½	SE.	S.	SE.	
March 8	22	34	18	Clear	.....	N.	NW.	W.	
March 9	0	30	20	do	.....	SE.	.....	W.	
March 10	18	26	26	Cloudy	6	SW.	SW.	SW.	
March 11	6	— 2	— 8	do	.....	NW.	NW.	NW.	
March 12	—30	— 2	—10	Clear	.....	N.	N.	SE.	
March 13	—40	— 0	—20	do	.....	.....	S.	S.	Mercury frozen.
March 14	14	20	18	do	.....	.....	.....	.....
March 15	— 4	20	8	do	.....	.....	.....	SE.	
March 16	— 2	20	14	do	.....	SE.	SE.	SE.	
March 17	0	40	22	do	.....	.....	.....	.....
March 18	14	30	23	Cloudy	.....	.....	.....	.....
March 19	20	50	28	Clear	.....	.....	.....	SW.	
March 20	18	32	24	do	.....	SE.	SE.	SE.	
March 21	20	50	28	do	.....	SE.	SE.	SE.	
March 22	22	48	36	do	.....	SE.	SE.	SE.	
March 23	21	*71	*48	do	.....	SE.	SE.	SE.	
March 24	28	50	40	do	.....	.....	SW.	E.	
March 25	36	43	34	do	1	.....	E.	E.	
March 26	20	36	24	do	.....	.....	E.	E.	
March 27	19	34	30	do	.....	SE.	SE.	SE.	
March 28	26	46	35	do	.....	.....	SE.	SE.	
March 29	23	38	26	do	.....	.....	.....	SE.	
March 30	18	22	22	do	.....	.....	.....	SE.	
March 31	18	22	30	do	.....	S.	S.	S.	
Average of March	13	30	22						
Mean	.....	22	.....					

* In sun.

Weather record kept in the Yellowstone National Park, &c.—Continued.

Date.	Temperature.			Remarks.
	Sunrise.	Noon.	Sunset.	
1880.				
July 1	42	50	46	Clear.
July 2	41	48	44	Do.
July 3	50	56	54	Do.
July 4	47	58	51	Do.
July 5	50	61	54	Do.
July 6	49	70	61	Do.
July 7	58	75	64	Do.
July 8	58	64	58	Do.
July 9	54	67	60	Do.
July 10	51	58	54	Do.
July 11	46	58	50	Do.
July 12	40	48	46	Do.
July 13	47	39	50	Do.
July 14	50	61	58	Do.
July 15	51	72	68	Do.
July 16	54	80	72	Do.
July 17	52	84	71	Rain.
July 18	58	85	66	Do.
July 19	61	86	68	Windy.

Weather record kept in the Yellowstone National Park, &c.—Continued.

Date.	Temperature.			Remarks.
	Sunrise.	Noon.	Sunset.	
1880.				
July 20.....	50	88	70	Clear.
July 21.....	53	92	71	Do.
July 22.....	54	84	69	Do.
July 23.....	55	80	69	Rain and hail.
July 24.....	55	76	65	Clear.
July 25.....	52	73	58	Showers.
July 26.....	48	72	60	Clear.
July 27.....	51	58	50	Rain.
July 28.....	41	52	50	Showers.
July 29.....	38	51	49	Do.
July 30.....	48	65	64	Clear.
July 31.....	57	68	63	Do.
Average of July.....	50	68	62	
Mean.....		60		
August 1.....	50	76	68	Rain.
August 2.....	48	73	64	Rain and hail.
August 3.....	49	74	68	Clear.
August 4.....	50	85	76	Do.
August 5.....	60	76	70	Do.
August 6.....	52	72	70	Do.
August 7.....	48	82	74	Do.
August 8.....	58	84	70	Do.
August 9.....	52	80	72	Do.
August 10.....	60	75	70	Do.
August 11.....	58	76	72	Do.
August 12.....	52	80	68	Rain.
August 13.....	53	62	67	Do.
August 14.....	48	89	54	Do.
August 15.....	50	74	67	Clear.
August 16.....	48	75	67	Do.
August 17.....	52	78	75	Do.
August 18.....	57	60	55	Rain.
August 19.....	46	64	58	Showers.
August 20.....	48	76	70	Clear.
August 21.....	48	76	68	Do.
August 22.....	50	76	67	Do.
August 23.....	50	84	74	Do.
August 24.....	52	76	62	Do.
August 25.....	44	55	60	Do.
August 26.....	50	65	60	Do.
August 27.....	45	65	60	Do.
August 28.....	46	68	66	Do.
August 29.....	48	50	44	Rain and hail.
August 30.....	38	52	42	
August 31.....	35	56	46	
Average of August.....	50	68	64	
Mean.....		61		

Weather record kept in the Yellowstone National Park, &c.—Continued.

Date.		Temperature.			Remarks.
		Sunrise.	Noon.	Sunset.	
1880.					
September 1.....	40	66	62	Clear.	
September 2.....	43	63	60	Do.	
September 3.....	44	64	62	Do.	
September 4.....	50	75	70	Do.	
September 5.....	48	80	68	Do.	
September 6.....	48	78	68	Do.	
September 7.....	48	78	68	Do.	
September 8.....	50	74	66	Do.	
September 9.....	48	69	67	Do.	
September 10.....	48	66	62	Do.	
September 11.....	32	56	45	Do.	
September 12.....	30	68	46	Do.	
September 13.....	40	68	58	Do.	
September 14.....	46	65	56	Do.	
September 15.....	42	68	62	Do.	
September 16.....	44	76	62	Do.	
September 17.....	49	72	62	Do.	
September 18.....	44	42	42	Rain.	
September 19.....	30	56	46	Clear.	
September 20.....	31	65	56	Do.	
September 21.....	38	68	55	Do.	
September 22.....	34	67	66	Do.	
September 23.....	54	60	54	Do.	
September 24.....	36	62	54	Do.	
September 25.....	42	58	42	Do.	
September 26.....	30	67	42	Do.	
September 27.....	42	62	58	Do.	
September 28.....	42	62	59	Do.	
September 29.....	38	73	60	Do.	
September 30.....	50	75	66	Do.	
Average of September.....	41	66	58		
Mean .....	.....	55	.....	
October 1.....	45	75	54	Clear.	
October 2.....	40	76	60	Do.	
October 3.....	39	78	67	Do.	
October 4.....	40	80	66	Do.	
October 5.....	40	76	62	Partly cloudy.	
October 6.....	44	78	60	Do.	
October 7.....	40	64	58	Do.	
October 8.....	40	60	38	Rain.	
October 9.....	42	58	32	Snow.	
October 10.....	26	32	26	Clear.	
October 11.....	14	46	34	Do.	
October 12.....	22	56	36	Do.	
October 13.....	34	44	36	Snow.	
October 14.....	30	34	28	Do.	
October 15.....	22	36	28	Do.	
October 16.....	29	34	26	Do.	
October 17.....	42	50	36	Misty.	
October 18.....	30	62	48	Clear.	
October 19.....	27	60	41	Do.	
October 20.....	28	62	40	Do.	
October 21.....	50	70	47	Do.	
October 22.....	32	72	48	Do.	
October 23.....	30	68	46	Do.	
October 24.....	30	66	43	Cloudy.	
October 25.....	42	55	43	Rain.	
October 26.....	39	55	44	Clear.	
October 27.....	35	55	49	Cloudy.	
October 28.....	48	55	42	Cloudy: snow in north.	
October 29.....	26	42	32	Clear.	
October 30.....	14	30	26	Do.	
October 31.....	15	43	32	Do.	
Average of October.....	32	57	42		
Mean .....	.....	44	.....	

Weather record kept in the Yellowstone National Park, &c.—Continued

Date.	Sunrise.	Noon.	Sunset.	Remarks.
November 1.....	28	56	40	Clear; wind southeast.
November 2.....	32	40	40	Do.
November 3.....	30	29	24	Cloudy; wind southeast.
November 4.....	10	28	26	Clear; wind southeast.
November 5.....	14	28	26	Do.
November 6.....	30	36	40	Clear; wind southwest.
November 7.....	32	36	36	Do.
November 8.....	16	38	32	Cloudy; wind southwest.
November 9.....	16	36	34	Cloudy.
November 10.....	20	34	32	Cloudy; breeze southeast.
November 11.....	7	33	15	Clear; breeze southeast.
November 12.....	10	41	16	Do.
November 13.....	10	41	32	Clear; wind southwest.
November 14.....	20	50	38	Do.
November 15.....	26	34	14	Cloudy; wind southwest.
November 16.....	- 3	- 8	-10	Cloudy; wind northwest.
November 17.....	-21	-10	-12	Do.
November 18.....	- 8	-12	-18	Clear; wind northwest.
November 19.....	-14	-16	-22	Snow, heavy; wind northwest.
November 20.....	-10	-12	- 8	Snow-squalls; wind northwest.
November 21.....	- 2	14	12	Clear; wind south.
November 22.....	- 8	12	16	Do.
November 23.....	-10	16	14	Do.
November 24.....	-10	20	16	Clear; wind northwest.
November 25.....	- 0	24	22	Do.
November 26.....	-18	2	20	Do.
November 27.....	- 2	24	22	Clear; wind southeast.
November 28.....	- 4	26	20	Do.
November 29.....	-12	30	18	Clear; wind northwest.
November 30.....	-14	-16	-18	Snow squalls; wind northwest.
Average of the month.....	5	24	17	Clear days, 20.
Mean.....	.....	15	.....	Heavy winds most of the month.

Date.	Sunrise.	Noon.	Sunset.	Remarks.		
				Snowfall.	Sky.	Wind.
December 1.....	-16	-26	-22	12 inches...	Cloudy.....	NW. Gale.
December 2.....	-12	- 6	- 8	18 inches...	do.....	NW. Gale.
December 3.....	-14	-18	-19	18 inches...	do.....	NW. Gale.
December 4.....	- 6	18	16	8 inches...	do.....	W.
December 5.....	14	34	20	.....	Clear.....	W.
December 6.....	22	36	28	.....	do.....	S.
December 7.....	20	42	25	.....	do.....	S.
December 8.....	30	49	37	.....	Partly cloudy..	S.
December 9.....	20	48	36	.....	Clear.....	S.
December 10.....	24	32	34	.....	do.....	S.
December 11.....	38	44	38	.....	do.....	S.
December 12.....	28	50	30	.....	do.....	S.
December 13.....	30	44	38	.....	do.....	S.
December 14.....	32	38	38	$\frac{1}{2}$ inch.....	Cloudy.....	W.
December 15.....	28	28	20	.....	do.....	SE.
December 16.....	19	27	20	.....	Clear.....	SE.
December 17.....	9	27	18	.....	do.....	SE.
December 18.....	19	36	28	.....	do.....	SE.
December 19.....	22	32	30	.....	do.....	SE.
December 20.....	26	32	32	$1\frac{1}{2}$ inch.....	Cloudy.....	SW. Gale.
December 21.....	18	24	22	$\frac{1}{2}$ inch.....	do.....	NW. Gale.
December 22.....	22	30	29	1 inch.....	do.....	SE.
December 23.....	27	32	30	2 inches.....	do.....	SE.
December 24.....	24	28	29	3 inches.....	do.....	SE.
December 25.....	30	36	36	2 inches.....	do.....	SE.
December 26.....	30	37	30	.....	do.....	SE.
December 27.....	26	11	- 6	.....	do.....	NW. Gale.
December 28.....	- 6	-12	- 4	4 inches.....	do.....	NW. Gale.
December 29.....	-20	- 6	- 6	3 inches.....	do.....	NW. Gale.
December 30.....	- 8	-10	-11	3 inches.....	do.....	SE.
December 31.....	14	26	28	2 inches.....	do.....	SE.
Average of the month.....	16	25	20	$78\frac{1}{2}$ inches, or 6 $\frac{1}{4}$ feet.	19 cloudy days and 3 heavy gales.	
Mean.....	.....	20	.....		

F.

ROUTES IN THE YELLOWSTONE NATIONAL PARK.

HENRY'S LAKE ROAD.

Route.	Between points.	Total.
	<i>Miles.</i>	<i>Miles.</i>
Henry's Lake Mail Station to—		
South Madison Station.....	10	.....
South Madison to—		
Riverside Station	10	20
Lookout Cliffs	3	23
Marshall's Park	5	28
Forks of the Fire Holes Station.....	7	35

MAMMOTH HOT SPRINGS ROAD.

Forks of the Fire Holes to—		
Lookout Terrace.....	3	.....
Forks of road.....	2	5
Earthquake Cliffs.....	2	7
Cañon Creek.....	4	11
Falls of the Gibbon	1	12
Cañon of the Gibbon	1	13
Head of Gibbon Cañon.....	3	16
Monument Geysers and return.....	2	18
Geyser Creek	2	20
Norris Geyser Basin	3	23
Norris Fork Station.....	1	24
Lake of the Woods	6	30
Obsidian Cliffs.....	4	34
Willow Park.....	2	36
Indian Creek.....	5	41
Swan Lake	2	43
Rustic Falls	2	45
Terrace Pass.....	2	47
Mammoth Hot Springs Station.....	3	50

ROAD TO BOZEMAN.

Mammoth Hot Springs to—		
Mouth of Gardiner River.....	5	.....
Second Cañon of the Yellowstone.....	13	18
Cañon Gap	4	22
Bottler's Ranch	12	34
Bozeman.....	40	74

MADISON CANON ROAD.

Forks of the Fire Holes to—		
Lookout Terrace.....	3	.....
Falls of the Madison.....	3	6
Mouth of the Gibbon	4	10
Gibbon, Fire Hole Basin, and return	2	12
Foot of Madison Cañon.....	6	18
Riverside Station	3	21

ROAD TO THE UPPER GEYSER BASIN.

Forks of the Fire Holes to—		
Prospect Point.....	1	.....
Lower Geyser Basin	1	2
Midway Geyser Basin	3	5
Upper Geyser Basin	5	10

Routes in the Yellowstone National Park—Continued.

NED PERCÉ FORD TRAIL.

Route.	Between points.	Total.
Indian Pond to—		
Pelican Valley	3	-----
Ford of Pelican Creek	3	6
Nez Percé Ford of the Yellowstone	6	12

GRAND CAÑON TRAIL.

Tower Falls to—		
Forks of Washburn Trail	3	-----
Rowland's Pass	3	6
Sulphur Basin	3	9
Meadow Camp	2	11
Brink of Grand Cañon	2	13
Lookout Point	2	15
Great Falls of Yellowstone	1	16

TWIN FALLS TRAIL.

Meadow Camp to—		
Head of Grand Cañon	2	-----
Safety-Valve Geyser	1	3
Twin Falls on Yellowstone River	1	4

SPRING CREEK TRAIL.

Great Falls of Yellowstone to—		
Spring Creek	2	-----
Great Spring	1	3
Cascade Creek	2	5

FOSSIL FOREST TRAIL.

Gamekeeper's Cabin to—		
Foot of mountain	3	-----
Summit of Amethyst Mountain	3	6
Orange Creek	5	11
Sulphur Hills	4	15
Forks of Pelican Creek	8	23
Indian Pond	5	28
Lower ford, Pelican Creek	3	31
Foot of Yellowstone Lake	3	34

STINKING WATER TRAIL.

Forks of the Pelican to—		
Summit of pass	4	-----
Cañon through first range	6	10

TRAIL AND PROPOSED ROAD TO THE YELLOWSTONE LAKE AND FALLS.

House in Upper Geyser Basin to—		
Cascades of the Fire Hole Rivers	3	-----
Norris Pass of the main divide	5	8
Shoshone Creek, 2 miles from the lake	-----	-----
Columbia River and Pacific waters	2	10
Two Ocean Pond	5	15
Hot Springs on Yellowstone Lake	7	22
Cliffs on lake	8	30
Bridge Creek Bay	12	42
Foot of Yellowstone Lake	5	47

Routes in the Yellowstone National Park—Continued.

TRAIL AND PROPOSED ROAD TO THE YELLOWSTONE LAKE AND FALLS—Continued.

Route.	Between points.	Total.
Mud Volcano	8	55
Sulphur Mountain	4	59
Alum Creek	3	62
Great Falls of the Yellowstone	3	65
Return to Alum Creek	3	68
Hot Sulphur Springs	11	79
Mary's Lake	3	82
Cold Spring Creek	9	91
Forks of the Fire Hole River	7	98

MIDDLE GARDINER TRAIL.

Mammoth Hot Springs to—		
The West Gardiner	2	-----
Falls of the Middle Gardiner	2	4
Sheepsteater Cliffs	2	6
Road to the Geysers	1	7

TRAIL TO FORKS OF THE YELLOWSTONE.

Mammoth Hot Springs to—		
Forks of the Gardiner	2	-----
Lower Falls of the East Fork of the Gardiner	1	3
Upper Falls of the Gardiner	1	4
Cascades of the Gardiner	1	5
Black Tail Creek	3	8
Dry Cañon or Devil's Cut	7	15
Pleasant Valley	3	18
Forks of the Yellowstone	2	20

MOUNT WASHBURN TRAIL.

Forks of the Yellowstone to—		
Tower Falls	3	-----
Snowy spur of Mount Washburn	6	9
Dunraven's Pass	3	12
Cascade Creek	4	16
Great Falls of the Yellowstone	4	20

MINERS' TRAIL TO CLARK'S FORK MINES.

Forks of Yellowstone to—		
Crystal Creek	5	-----
Amethyst Creek	5	10
Gamekeeper's Cabin	5	15
Soda Butte Medicinal Springs	3	18
Trout Lake	2	20
Smelter at mines (Cook City)	11	31
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ROUTE TO HOODOO BASIN.

Gamekeeper's Cabin to—		
Sulphur Springs	2	-----
Ford of Cache Creek	1	3
Alum Springs and return	4	7
Calfee Creek	7	14
Miller's Creek	5	19
Forks of Miller's Creek	10	29
Miller's Camp	6	35
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RECAPITULATION OF ROADS AND TRAILS WITHIN THE PARK.

Roads.

Miles.

Mammoth Hot Springs to northern line of the Park	6
Mammoth Hot Springs to Cañon of East Gardiner.....	3
Mammoth Hot Springs to Cañon of West Gardiner.....	2
Mammoth Hot Springs to Forks of the Fire Holes	50
Madison Cañon Road	18
Forks of the Fire Holes to west line of the Park	20
Forks of the Fire Holes to house in Upper Geysers.....	10
Total length of roads	109

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Nez Percé Ford	12
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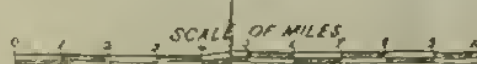
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MAP
OF THE
YELLOWSTONE
NATIONAL
PARK

WITH THE ADJACENT
HOODOO REGION
*Computed from the official explorations
and surveys of the*
SUPERINTENDENT OF THE PARK
*AND OTHER AUTHENTIC SOURCES
Under the direction of the*
Secretary of the Interior:
1880.



Head-Quarters,
Mammoth Hot Springs,
Yellowstone National Park
November 29, 1880.
R. L. Taylor
Superintendent

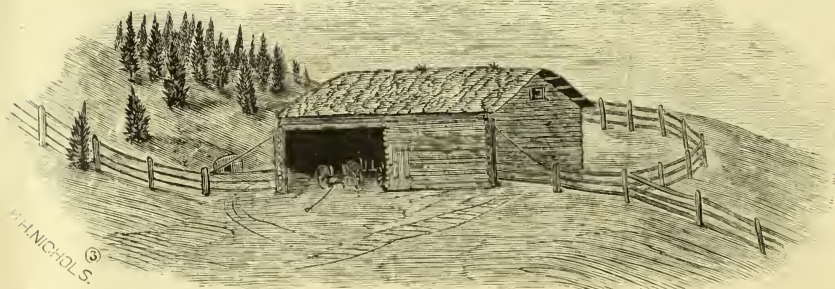
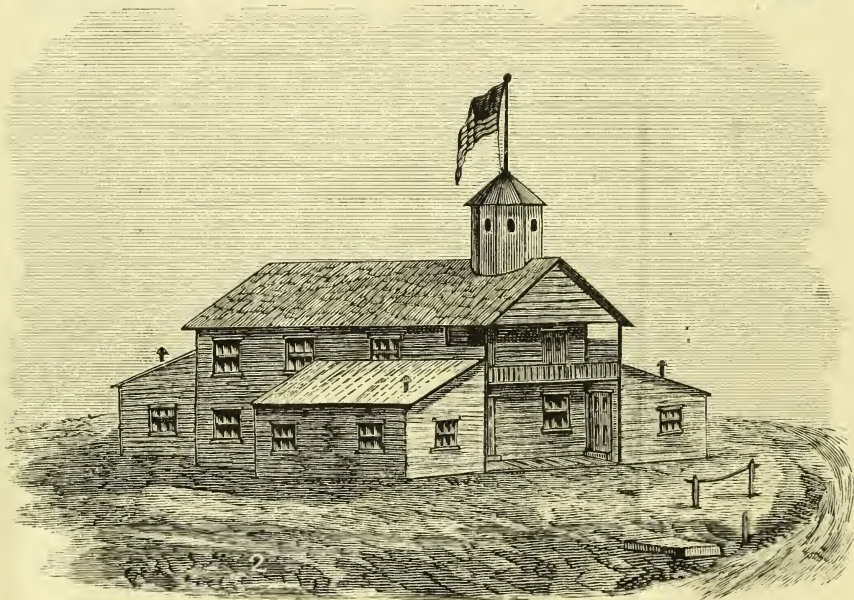
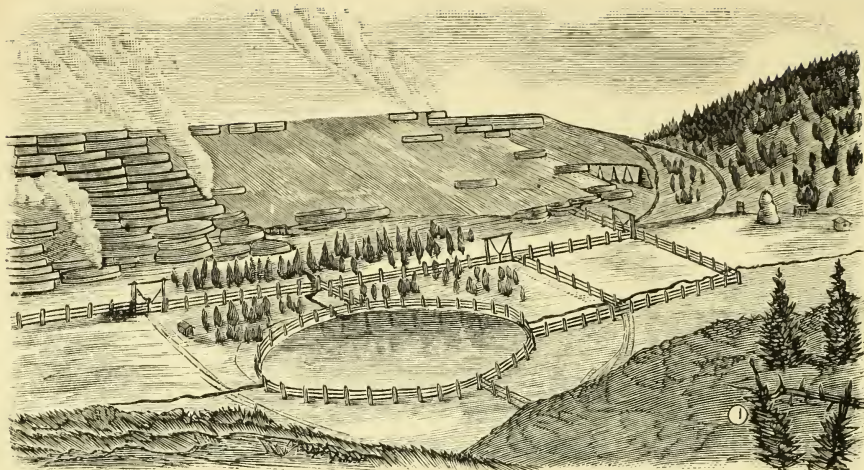


FIG. 1.—Mammoth Hot Springs. Liberty Cap, Reservoir, and Garden.
FIG. 2.—Headquarters Building. FIG. 3.—Barn and Corral.

FIFTH ANNUAL REPORT
OF THE
SUPERINTENDENT
OF THE
YELLOWSTONE NATIONAL PARK.

BY
P. W. NORRIS,
SUPERINTENDENT.

CONDUCTED UNDER THE AUTHORITY OF THE SECRETARY
OF THE INTERIOR.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1881.

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FIFTH ANNUAL REPORT

OF THE

SUPERINTENDENT OF THE YELLOWSTONE NATIONAL PARK.

By P. W. NORRIS, SUPERINTENDENT.

OFFICE OF THE SUPERINTENDENT OF
THE YELLOWSTONE NATIONAL PARK,
Mammoth Hot Springs, December 1, 1881.

SIR: I herewith submit my report of operations for the protection and improvement of the Yellowstone National Park during the year 1881, with the request that, if approved, it may be printed.

Very respectfully,

P. W. NORRIS,
Superintendent of the Yellowstone National Park.

Hon. S. J. KIRKWOOD,
Secretary of the Interior, Washington, D. C.

SIR: As you are doubtless aware, the winter of 1880-'81 commenced very early, with unusual severity, and with attendant heavy snows throughout the United States, and continued so in those portions east of the Rocky Mountains. Such was not the case in the regions amid and beyond them, in which localities the latter part of the winter was very mild, followed by a continuously pleasant early spring. This condition of affairs resulted in a prematurely heavy rise in many western rivers, notably the Bighorn, Yellowstone, and Missouri, whose united waters, swept a resistless, devastating flood over a great agricultural valley, still robed in winter's mantle of snow. From these floods the elevation of the National Park preserved it, and allowed the mild but continuous daily rays of an unclouded sun to render the deep-sheltered glens and valleys luxuriant with herbage and fragrant with brilliant flowers, while the winter snows still rested low and chill, upon the mountain slopes above and around them. Rarely has man witnessed scenes more strangely mingling the weird and repellent with the charmingly beautiful, than these borders to fire-hole basins, or the sheen of the slanting sunbeams from ice-clad cliffs begirting geyser basins of spouting hot water, or the sulphur-lined fumerole escape-vents of smothered fires. These were among the scenes which greeted my return to the Park. In the East I had left the frugal farmer, with shelter, grain and care, nursing his starveling animals, hoping for the scanty herbage of a tardy spring; upon the Platte and the Great Plains I had seen the carcasses of thousands of animals claimed by the princely-improvident, fortune-trusting herdsman of the border, decaying where they starved,

or frozen, fell; and, in the valleys of the Madison, the Gallatin, and the Upper Yellowstone, witnessed animals in only passable heart and flesh; while in the Park, at an elevation of 6,450 feet, in our little cliff-and-snow-girt valley, with its matchless hot springs, I found all our animals sleek, fat, and able, engaged in grading a road up the cañon of the east fork of the Gardiner River. In fact, the season in the valleys was as advanced by the middle of April, this year, as it was upon the 1st of July of last, and the roads in better condition; so that the limited amount of funds under my control available before the 1st of July alone prevented me from at once organizing my force and pushing improvements. Finding that, with the utmost prudence, I could keep only my assistant, C. M. Stephens, gamekeeper Harry Yount, and two additional men, I employed them in duties deemed most advantageous at this time. As Yount was no longer needed at the gamekeeper's cabin on the Soda Butte, and was a trusty person as well as an excellent hunter and scout, he was stationed at our headquarters (the gun-turret of which is a commanding lookout station) with instructions to daily scan, with a field-glass, our surroundings, visiting so much thereof as was convenient, paying attention to the repairing of roads and bridle-paths, and returning each night, with game when needed, to the proper care of our buildings and other property. With the remaining men, one wagon, team, necessary tents and other outfit, I moved to our grade in the cañon of the East Gardiner, about four miles distant. By this plan we daily saved an eight-mile trip; in addition to which, I, being weary of city life, books and writing, the men of a winter's confinement to the house, and all longing for the freedom of camp life and blanket, these longings were thus gratified.

This cañon of the East Fork of the Gardiner is 3 miles long, 2,000 feet deep, with no egress from its vertical basaltic-capped cliffs, save by our bridges over the East and the Middle Forks, near their confluence, towards our headquarters, or past the falls and cascades to the Blacktail plateau. At this point we made our camp, moving it to little sheltered grassy nooks or glades, as we pushed forward our grade between the roaring torrent and the craggy cliffs. Here, beneath cloudless skies, the stately bighorn, the ferocious grizzly, and the royal eagle watched us from the cliffs, while grouse, deer, and elk were ever in sight and often within pistol-shot of our camp-fire; there were countless speckled trout in the dashing snow-fed stream beside it, and our quiet animals were half-hidden in pasturage and flowers. These scenes, with nights of refreshing sleep and days of cheering progress upon our new route from the cañons of the Gardiner—in short, our sports, our labors, and surroundings, all combined to render these bright camp-fire days among the most pleasant of those which I have ever spent in the mountains.

Late in May, with Harry Yount, I visited the Fire Hole regions, and besides noting geyser eruptions and removing fallen timber from the roads, planned and marked out much of our season's work in that direction, and thence alone proceeded to our gamekeeper's cabin on the Soda Butte. Meeting Rowland there, we together explored and marked a bridle-path to where checked by snow-fields upon the slopes of the Hoodoo Mountain; and on the route of return made interesting discoveries of Indian fortifications and fossil forests. A succession of long hot days early in June were telling rapidly upon the elevated snow-fields of the Sierra Shoshone range; each little rill joining its fellow, that another, thus deeply furrowing and undermining the softening ice-field or tottering crag, until launched a resistless snow-slide or avalanche of ice, rock, and crushed and tangled timber, with roar of thunder, crashing into the streams, rendering them for a time as turbid as the Missouri of the plains, and from

their velocity and floating timber therein, far more dangerous to cross. I apprehend that three days of such experience as mine in crossing these mountain torrents while returning from the Soda Butte, would convey a more adequate conception of the resistless power of the mountain floods and their all-eroding effect upon the contour of mountains during countless ages, than the perusal of any work which has ever been written upon the subject.

Leaving the men to complete the cañon grade, I followed, noted, and sketched traces of the Indians, and of some unknown earlier occupants of these regions, from the Sheepsteater Cliffs and Sepulcher Mountain, above the Mammoth Hot Springs, to the borders of the Park in the Yellowstone Valley. Then, while en route to Bozeman, for the purpose of selecting and forwarding our season's supplies, I improved my first leisure from urgent duty since 1875, in tracing and sketching such remains through the second cañon and Gate of the Mountains, upon the Yellowstone, together with the first terrace below, and the Bottler Park between the first and second cañons, a distance of fully 60 miles; and thence proceeded along the Trail Pass to Bozeman. These explorations are a continuation of those reported in my communication of 1877, as may be found under the head of "Prehistoric Remains in Montana," pages 327 and 328 of the Smithsonian Report of 1879. As it is my purpose (should there be no official objection) to furnish a fully illustrated report of these, and other traces, tools, weapons, and utensils of a supposed prehistoric people, to the Bureau of Ethnology, Smithsonian Institution, under the charge of Maj. J. W. Powell, I will here only state that they are deemed of peculiar historic interest and value. For the purpose of economizing valuable time, the latter part of June was devoted to hiring men, and the selection and forwarding by government teams of our supplies of tools, provisions and other outfit, for use after the 1st of July, and to be paid for with funds then available. From experience, I considered it best to work simultaneously upon both the Yellowstone and the Fire Hole routes from the headquarters, keeping up our communication there by weekly couriers. The men, wagons, teams, tools, and provisions were divided, and in readiness for an early start upon the morning of the 1st day of July, when, as before stated, our season's funds for improvement of the Park first became available. At dawn of that day the members of each detail were in harmonious but spirited rivalry for the start, anterior to which I read the names and duties of the various members of each, as well as the following address and instructions, furnishing a copy to the foreman of each party:

OFFICE OF THE SUPERINTENDENT, MAMMOTH HOT SPRINGS,
Yellowstone National Park, July 1, 1881.

MOUNTAIN COMRADES: Organized as we are for the protection and improvement of the Park, every member is expected to faithfully obey all the recently published rules and regulations for its management, and to vigilantly assist in enforcing their observance by all persons visiting it.

While labor in the construction of roads and bridle-paths will be our main object, still, with trifling care and effort, much valuable knowledge may be obtained of the regions visited, especially by the hunters and scouts, all of which, including the discovery of mountain passes, geysers, and other hot springs, falls, and fossil forests, are to be promptly reported to the leader of each party.

As all civilized nations are now actively pushing explorations and researches for evidences of prehistoric peoples, careful scrutiny is required of all material handled in excavations; and all arrow, spear, or lance heads, stone axes and knives, or other weapons, utensils or ornaments; in short, all such objects of interest are to be regularly retained and turned over daily to the officer in charge of each party, for transmittal to the National Museum in Washington.

P. W. NORRIS.
Superintendent of Yellowstone National Park.

FIRST PARTY, YELLOWSTONE ROUTE.

P. W. NORRIS, *in charge*.

Thomas Scott, foreman and wagon-master; George H. Phelps, hunter and scout; Julius Beltezar, packmaster; Clement Ward, cook; N. D. Johnson, Andy Johnson, Patrick Kennedy, R. E. Cutler, and Philip Lynch.

Supplied by one government wagon, four-mule team, and pack-train, the saddle animal of each man, and a good outfit of tents, tools, and provisions.

SECOND PARTY.—FIRE HOLE ROUTE.

C. M. STEPHENS, *Assistant, in charge*.

James E. Ingersoll, foreman and wagon-master; Harry Yount, game-keeper, hunter and scout; John W. Davis, packmaster; George W. Graham, blacksmith; Robert Clayton, cook; George Rowland, Frank Roy, Andrew Hanson, James Jessen, John Cunningham, Henry Klammer, Samuel S. Mather, Thomas H. Smith, George R. Dow, William Jump.

Supplied by one heavy wagon and a four-horse team, hired for the season. One medium-sized government wagon and two-horse team, with the blacksmith's forge, tools, and also pack-train, tents, and supplies; besides, as usual, each man with his own saddle animal, outfit, and weapons.

C. H. Wyman, my comrade of 1875, in the Soda Butte region, was left sole occupant of our headquarters save when George Arnhold, as for the past three years, made his weekly visits with the mails and supplies of articles as needed, and our couriers, who then received them for each party, and kept up a regular communication between them. As nearly all these men had shared the toils, privations, and dangers of the snowy pass, the weary watch, and the welcome camp-fire, and had been employed for their known worth and fidelity, either continuously, or during each season of labor, for from one to four or five, and one of them for eighteen years, they were truly comrades, treated and trusted as such, and are believed to be worthy of the above record of their names and respective duties. Although thus organized upon this occasion, such is now their knowledge of the routes which we have traversed, of each other, and of the various duties, that, aside from the assistant, blacksmith, and wagon-master, they could be reorganized in nearly any desired manner (and in fact were during the season with some addition to their numbers), without seriously impairing their efficiency; and I confidently challenge the mountain regions to furnish an equal number of men who, in the situation, circumstances, and peculiar difficulties under which we have labored, ever have shown, or are capable of showing, a better record of caring for public property or of making public improvements than is theirs.

Our day of starting being upon Friday, that day and the next, July 1 and 2, were spent by Stephens and party in repairing the grades and bridges to and beyond Willow Park, where they camped, spending the Sabbath and the national anniversary of the fourth in welcome rest and successful hunting; and as there were no intoxicating stimulants in camp, there was neither wrangling then, nor head nor heart aches when, with an ardent spirit of emulation in the performance of duty, they commenced the labors of the next morning. Important repairs and improvements were rapidly made at Obsidian Cliffs and the Lake of the Woods, and again repaired after a terrific water-spout (here called clond-bursts), as well as at the Norris Geyser Basin and Gibbon Meadows; and the beautiful cone of a pulsating geyser, and some scalloped borders to adjacent pools, was, with

much labor and difficulty, got out of a secluded defile two miles above the Paint Pots, for conveyance to the National Museum in Washington. Improvements were also made at Cañon Creek and other localities to and throughout the Fire Hole Basin. Thence, Stephens with his pack train reopened the great bridle-path, via the Shoshone and Yellowstone Lakes, to the Natural Bridge and Great Falls of the Yellowstone, returning by way of Mary's Lake to his wagons, and commenced pushing a road up the East Fork of the Fire Hole River toward the Great Falls. Meanwhile, I had with my party built a bridge over the East Fork of the Gardiner, at the head of its middle falls, another at the forks of the Blacktail Creek, there camping, with no other stimulants than the excitement of the use of rod and gun in securing a good supply of trout and elk meat, during the Sabbath and Independence Day.

We had ascended fully 2,000 feet by the only route possible for a wagon-road from the cañon of the Gardiner to the open, beautiful plateau of the Blacktail, whence a greater and more abrupt descent was requisite to reach the Yellowstone River, where Baronette's Bridge spans it from its East Fork to Pleasant Valley, this being the only place of approach through its terrible cañons, from 2,000 to 3,000 feet deep, between the Great Falls and the confluence of the Gardiner River, a distance of more than 40 miles. Previous long and careful research having failed to reveal a satisfactory route for a road, the 3d and 4th days of July were spent by Baronette, builder of the first house within the Park and the first bridge upon the Yellowstone River, and myself in a terribly trying but fruitless and final effort for a roadway through the yawning fissure region. Adopting a route which I had previously explored through an open pass in the Blacktail divide, we constructed a road with only a moderate amount of grade and bridging in passing between the vertical basaltic walls of a very modern lava overflow, and an impassable fissure-vent fully 1,000 feet deep, to Elk Creek, and through a geode basin to the famous "Devil's Cut," or Dry Cañon (as I more politely if less appropriately call it), to the stream skirting Pleasant Valley. While grading down the terribly broken banks of this stream we unfortunately broke our plow beyond repair by any person nearer than our blacksmith with Stephens, to whom our energetic wagonmaster, Scott, with a four-mule team and heavy wagon, took our broken plow and the fragments of another from our shop at headquarters to Stephens at Cañon Creek, exchanged it for the one with his party and returned, making the round trip of 100 miles within four days.

We were compelled to scale a sharp hill to escape an impassable cañon in reaching Pleasant Valley, and to traverse a boggy cañon to avoid a craggy cliff in leaving it, near the forks of the Yellowstone, and by steep grading and climbing reached the cliffs overlooking Tower Falls. Without sufficient time or means to construct a road into the yawning cañon of Tower Creek, we left our wagon and carried our plow into and across it above the falls; then attaching a span of mules, we plowed a furrow for a present bridle-path and one track of a proposed wagon-road over the lovely terraces, the grassy glades, and up the long foot-hill slopes of Mount Washburn to the snowy line within a mile of Rowland's Pass, which, in distance and elevation, is about midway between the foaming river, in the yawning cañon, and the storm-swept summit of the mountain crest. From this place Scott returned with the team, wagon, and two men to the Mammoth Hot Springs, where he quickly repaired the fences, filled our barn, besides securing a rick of excellent hay. They then hoed and irrigated our garden, and, with a supply of potatoes and other delicious vegetables therefrom, and sup-

plies from Bozeman, proceeded to join Stephens in the Fire Hole regions. In the mean time, with the pack-train and the remainder of my party, I proceeded to greatly improve the bridle-path through Rowland's Pass, opened a new one two miles through timber, crags, and snowfields, to the summit of Mount Washburn, and, leaving the party to repair the bridle-path down the mountain and along the Grand Cañon to the Great Falls, I made a visit to Stephens and party, near the forks of the Fire Holes. Finding them energetically pushing the construction of a road towards Mary's Lake, I returned to my party, making ladders and various other improvements at and near the Great Falls, including a good bridle-path 5 miles below the falls to the roaring Yellowstone River in the Grand Cañon, where it is nearly 2,000 feet deep; and after planning and marking out a line of road, skirting Sulphur Mountain and the Mud Volcano, to the foot of Yellowstone Lake, united my party with that of Stephens.

After failing in a long-continued exploration for the discovery of a practicable pass through the Madison divide, towards the Yellowstone, we engineered a line of grade along its nearly vertical face, where little less than 1,000 feet high, and then through the cañon and along the route of General Howard in the Nez Percé campaign of 1877, to Mary's Lake. During the progress of this work, I embraced the first leisure of the season to visit the party of Justice Strong, Senators Sherman and Harrison, Governor Potts, the artist Bierstadt, and other gentlemen of prominence, accompanying them through the Fire Hole Basins, and with some of them—including Lieutenant Swigert, of Fort Ellis, in charge of their escort—to the Great Falls.

Prominent among the parties of visitors who were swarming to the Park early in August was that of Governor Hoyt and Col. J. W. Mason, the civil and military officers of regions embracing the Park, who were united in an expedition in search of a practicable pass for a wagon road from the inhabited portions of Wyoming to the National Park, of which they have a full appreciation and a pardonable pride. Having failed in a determined effort for the discovery of a pass at the head of the North Fork of the Wind River, after nearly a month of dauntless mountain climbing, they had just arrived at our camp, guided from the Two Ocean Pass by Harry Yount, whom I had sent to meet them.

Having been informed from Washington that want of funds would prevent the United States Geological Survey from making an exploration of these regions during this season, and deeming it very desirable to learn all possible regarding them in time for important legislation next winter concerning the Park and its boundaries, I accompanied Governor Hoyt, Colonel Mason, and party through the Sierra Shoshone Mountains to the head of the Great Cañon of the Stinkingwater, which they descended, while I completed the exploration, making important discoveries, and returned over the Soda Butte and Baronette's bridge from fearful snow-storms in the Goblin land, as will be shown under the head of explorations. While personally thus employed, and making but one brief visit to my men at the Mud Volcano, they, with highly commendable energy, completed a good road upon the line which I had laid out to the Yellowstone River, with a branch ascending it past the Mud Volcano to the foot of the lake, and another around the Sulphur Mountain to the mouth of Alum Creek, 4 miles above the Great Falls. They then returned through severe snow-storms, bringing in teams and outfit in good order to headquarters; and judging the employment of so large a force in autumn storms injudicious, most of the men were discharged, but provisionally engaged for next season if desired.

The remaining field operations with small parties were as follows: One with Davis, securing a fine collection of natural objects of interest and Indian relics from the fossil forests of the Soda Butte and Amethyst Mountain regions. Another was made, through severe snow-storms, to check vandalism and note geyser irruptions in the Fire Hole region, which was completed by Wyman and Rowland; another, by Stephens and Miller, in planning bridge sites and grades for next season upon the East Fork of the Yellowstone. My faithful gamekeeper, Harry Yount, having made his final tour and report, tendered his resignation; records of all of which will be found in their proper order.

The final trip of the season was made with the teams in October, hauling out to Fort Ellis, Montana, a large and valuable collection of natural and anthropological objects of interest for the National Museum in Washington; and then to Bozeman, 4 miles distant, for the purpose of closing the business affairs of the season, and the purchasing and forwarding of our winter's supplies.

Our buildings are well repaired, and wagons, tools, and other outfit secured for winter; during which it is my purpose to retain only my trusted assistant, Stephens, and Packmaster Davis, for the care and protection of the building, animals, and other public property.

The season for profitable labor in the Park closed, as it had commenced, unusually early; but the practical knowledge which has been acquired of the climate and peculiarities of these regions, the careful protection of teams, tools, and provisions, the excellent character and organization of my men, enabled me to make large and substantial improvements, and win the approbation of the candid, practical portion of the numerous and prominent tourists to the wonder-land. Neither myself nor others are as well satisfied with the season's protection of the forests from fire, or the geyser cones or other objects of natural interest from vandalism; all of which, with my suggestions as to a practical remedy, will be found in appropriate sections of this report.

The unavoidable failure of all my aneroid barometers to register correctly is a source of deep regret and a serious loss; but the thermometer readings, which have been regularly and carefully noted and preserved at the Mammoth Hot Springs during the entire season, as well as during my explorations of the Rocky and Sierra Shoshone Mountains, and those of Wyman in the Geyser basins, it is believed will be perused with interest, as greatly increasing our meager knowledge of the peculiar climate of those regions.

AREA OF THE PARK.

Two matters in connection with the Yellowstone National Park tend to great and general misapprehension regarding it. These are, first, its name, and second its area; or, as are perhaps best treated, inversely.

The large, beautiful, and (so far as then explored) correct map by Henry Gannet, M. E., topographer of the United States Geological Survey of the said Park during 1878, now in press, shows it to be an oblong square, 62 miles in length from north to south and 54 miles in width from east to west, containing 3,348 square miles. The extra census bulletin, by Mr. Gannet, now geographer of the tenth census of the United States, under date of September 30, 1881, page 4, shows that the area of the State of Delaware is 1,960 square miles; State of Rhode Island, 1,085 square miles; District of Columbia, 60 square miles; and page 17 of said bulletin shows the aggregate area of the counties of New York, King's, and Richmond, of the State of New York, is 150, equal

to 3,255 square miles. Thus the most recent and reliable authorities extant show that this great national land of wonders contains 93 square miles in excess of the aggregate area of two of the original thirteen States of the Union, the District of Columbia, containing the capital, and the three counties of the State of New York, which embrace the commercial emporium of the first and third cities of the nation, having an aggregate population of about 2,500,000. Nor is this a full statement of the case; as, if to this account were added the actual excess of surface measurements of this peculiarly broken region, over those relatively level eastern ones, it would (see bulletin, page 4) certainly exceed that of Connecticut, 4,845 miles, and, with the adjacent Goblin Land and other regions which I have explored during the past two seasons, fully equal that of New Jersey (bulletin, page 4)—7,455, or Massachusetts (same page)—8,040 square miles, or several other of the original States of the Union.

Prominent among the bordering points of observation of this vast region is Electric Peak, near the northwestern border, elevation 11,775 feet; Mount Norris in the northeast, 10,019; Mounts Chittenden, Hoyt, Langford, Stephenson, and others in the eastern Sierra Shoshone border, and Mounts Holmes and Bell's Peak upon the western, ranging between 10,000 and 11,000 feet high, and Mount Sheridan, near the southern border, 10,385 feet high, still backed by the Grand Teton, landmark of all those mountain regions, which is over 13,000 feet in height. But Mount Washburn, towering upon the brink of the yawning Grand Cañon waterway of the Yellowstone Falls and Lake, 10,340 feet high, is the most central, accessible, and commanding for a general view of the park and its surroundings. From its isolated summit can be plainly seen on a fair day, as upon an open map, not only this lake and cañon but many others also; countless flowery parks and valleys, misty sulphur and steaming geyser basins, dark pine and fir-clad slopes, broken foot-hills, craggy cliffs, and snowy summits of the sundering and surrounding mountains. No tourist should fail in securing this enchanting view, the best plan of obtaining which is, upon reaching the meandering rivulet-fed lawns of the Cascade, the Glade or the Antelope Creeks, to go into camp, and await the dawn of a cloudless summer's morning. Then, to the scientist, the artist, or the poet, and to the weary and worn pilgrims of health and pleasure, from our own and other lands, ardent to secure the acme of mountain-climbing enjoyment, or in viewing the lovely parks and yawning cañons, the crests of glistening ice and vales of blistering brimstone, the records of fire and flood, the evidences of marvelous eruptions and erosions of the present and the past, and day-dreams of the future in the commingling purgatory and paradise of the peerless Wonder Land of earth, I would say, leisurely ascend the terraced slopes of Mount Washburn, and from its oval summit, with throbbing heart but fearless eye and soul expanding, look around you. One day thus spent would more adequately impress the mind with the magnitude and marvels of the Park, and the vast amount of exploration and research necessary in finding routes, and the enormous amount of labor and hardship unavoidable in the construction of buildings, roads, bridle-paths, trails, and other improvements, even when unmolested by hostile Indians—as during the past two years only—than a perusal of all the reports and maps of the Park which have ever been published.

Owing to the lack of natural curiosities worth retaining, in the three-mile strip of the Crow reservation in Montana, upon the north, or the four-mile strip in Montana and Idaho upon the west, the desirability of having the entire Park under one jurisdiction, as well as for other and weighty reasons fully set forth in my report of 1880, I again earnestly

recommend re-ceding to the jurisdiction of those Territories all of the Park not embraced by the now surveyed northern and western boundaries of Wyoming, leaving to future explorations and development the fixing and surveying of the remaining borders. It is hoped this may be done next season by the United States Geological Survey.

This necessarily lengthy explanation of the first question as to the magnitude of the Park so nearly disposes of the second, as to the name, that I only add that although it is so vast and broken by mountains and cañons into countless partially or wholly isolated parks and valleys, still the whole of it is nearly encircled by snowy mountains with few passes, being thus park-like in character, and the name correct, or at least difficult to substitute by one more appropriate.

THE TWO MAIN APPROACHES TO THE PARK.

The explorations of myself and others, previous to my assuming the superintendency of the National Park, led to the correct conclusion that there were only two natural valley routes of access for wagon or railroads thereto, viz: the one up the Yellowstone River to the initial point on the northern boundaries of the Park, at the confluence of the Yellowstone and the Gardiner Rivers, some five miles below the Mammoth Hot Springs; and the other from the West via Henry's Lake and the Upper Madison River to its head at the confluence of the Fire Hole Rivers. The elevated passes over the Rocky and Sierra Shoshone ranges will be noted in their proper connections.

EASTERN APPROACHES TO THE PARK—THE VALLEY OF THE UPPER YELLOWSTONE AND THE TWO OCEAN PASS.

There are many and important indications that the towering lava cliffs which border the Yellowstone Valley above the lake were once lashed by the waves of its then extended little finger, fed by mountain torrents in yawning gulches, and drained through Two Ocean Pass into Snake River and to the Pacific Ocean, much as the ancient lake Bonneville (of which Salt Lake is a dwindled remnant) once drained through the Porte Neuf Cañon; and that the present Yellowstone and Bridger's Lakes, as well as the deep blue alpine-like appearing waters of the Upper River between them, are only remnants of this matchless mountain lake, since a less elevated outlet was elsewhere worn. Two Ocean Pass is either a natural gap or a broadly and smoothly eroded pass directly through the continental divide, trending from Bridger's Lake, near the head of the ancient one, southwesterly towards Jackson's Lake, at the foot of the Grand Tetons. Some 4 miles from the main valley this becomes a smooth open marshy meadow, fully half a mile wide; for the first 6 miles of which the waters creep sluggishly towards the Yellowstone, and then, in like manner, towards the Snake River. From these circumstances, the first slope is called the Atlantic, and the last the Pacific Creek; and are both fed along their courses by torrents from the snowy mountains upon each side as usual, the only novel feature heretofore known of this, being that one of these streams from the south enters the pass so near the summit that portions of its snow-fed waters discharge through these creeks towards both the Atlantic and Pacific Oceans, and hence the names of those creeks, the side creek, and the pass. Our camp of this year was made upon the left-hand side of the Pacific Creek, where a comparatively modern overflow of lava has not only pushed encroaching basaltic walls far into the pass from the north, but a narrow stream, of the same material 20 or 30 feet in thickness, entirely across, and for a time severing it and form-

ing the summit and divide of the pass. Through this, from erosion or other causes, two openings have been formed. I had never, from record or narrative, heard of a creek upon the north side, nor had I specially observed it until in crossing the mountain towards Barlow's Fork of Snake River I found that while the small but permanent and uniformly flowing Two Ocean Creek drained a snowy basin high above, but within a mile or two of the pass, a much larger one, in fact a fair-sized mill-stream, cuts a yawning gorge in descending over 2,000 feet within 4 miles from the snowy summit of the Rocky Mountains to the north of the pass. This enters directly opposite the other creek, a knowledge of which at once solves the whole mystery which has always shrouded this pass; for with but one feeder, no matter what its angle of entrance to the pass, it would have, as is commonly the case, cut and followed a channel to one ocean, not both, but, with both torrents cutting their gorges and depositing the débris directly opposite, a broad dam has slowly but steadily accumulated entirely across the pass (there less than a mile wide) from the convex or sloping ends and sides of which the streams, broken into smaller channels by the ever descending and changing masses of rock and timber, actually does divide the waters, and portions of each flow through thousands of miles of yawning cañons and mighty rivers to opposite oceans. Although, during this year, a somewhat larger portion of these waters drained into the Atlantic, there is a liability to fluctuation naturally, and little labor would be necessary each season to throw all of these waters, from off this sloping divide, into their former course to the Yellowstone, or through these two openings in the former lava divide, 200 yards upon the Pacific side of it.

In search, not of a better pass or approaches than that at the matchless "Two Ocean," but rather a shorter and better route than the one through dense, and, for the most part, fallen timber, through Trail Pass and by the fingers of the Yellowstone Lake, we sealed the main divide, and, shivering in the snow among the clouds, searched our maps and scanned the surroundings, especially those upon the desired route north-westerly. The scene was grand and inspiring, but the practical part of it was that we could distinctly trace the Grand Tetons, Mounts Sheridan, Hancock, and other familiar snowy peaks, with traces of the numerous fountain heads of the Snake River, and their valleys or cañons, and notably the main one, the Barlow Fork, apparently to our feet, and the desired pass in the main range to Pacific Creek, some miles below us. Buoyant with hope of a warmer region, we frightened scores of big-horn elk and grizzlies, in an impetuous descent of over 2,000 feet into a deep, narrow valley, connecting the Falls Fork of the Yellowstone with a stream which we were rapidly descending, hopeful of a nooning in the lovely Barlow Valley, when, with a sudden turn to the left, it cut directly through the mountain to the Pacific Creek, leaving us to follow the Barlow when we could find it. This we did by way of a pass and mountain spur, which certainly could not have been visited by Jones or Hayden, as neither these nor other portions of a region 6 or 8 miles in width are represented upon the maps of either of these gentlemen. But, as elsewhere stated, the pass to Fall Creek is evidently that traversed by Phelps in 1864, and hence given his name.

A thorough exploration of the region between the Barlow Valley, Mount Sheridan, and Heart Lake to Riddle Lake and the fingers and thumb of the Yellowstone, renders it evident that the route as proposed by Captain Jones and Professor Comstock, in 1873, and by Governor Hoyt and Colonel Mason this season, from Wind River over Tog-wa-tee Pass to the Buffalo Fork and Pacific Creek, waters of the Snake River,

can utilize the old Two Ocean and Upper Yellowstone route, or a new one through the lower end of Phelps Pass, and a side one from it, through which we reached the magnificent timber and charming valleys of the Barlow and the Heart Rivers, and the low timbered plateau summit of the Continental divide where there is no mountain, past Lake Riddle, to connect with our bridle-path from the Fire Holes and Shoshone Lake at the western end of the Thumb of the Yellowstone.

I may here add as an objection to the adoption of a water-shed as a boundary of the park, that in this exploration between Phelps Pass and Heart Lake, I traversed the main continental divide, following a tolerably direct course, no less than eleven times in one day.

The interlocking fountain-heads of stream in the Sierra Shoshone range render its water-shed equally tortuous and objectional.

NEW PASS OF THE SIERRA SHOSHONE RANGE.

The narrow elevated pass discovered by Captain Jones in 1873, south of Mount Chittenden, several similar ones explored by myself at various times north of it, and Sylvan Lake, discovered, named, and sketched, together with its supposed drainage, as correctly as possible in a snow-storm, by members of the Hayden expedition of 1878, was all known of passes in the entire Sierra Shoshone range prior to this season. From mountains at a distance I had often observed a deep depression in the serried crest of this range which could not be seen when among its broken foot-hills. The length of time expended by Governor Hoyt and Colonel Mason in their outward route from Wind River would not allow of the search for a pass there, in our crossing to the Stinkingwater, or while following it to its great cañon, which they descended, leaving me to prosecute the exploration. This I did, ascending several creeks, and from lofty peaks viewing all the others, as well as passes of the range above the cañon, finding few trails and no practical passes until on the north bank of the second creek below Jones's I found an ancient but very heavy lodge-pole trail, which I traced eight miles to the forks of the creek, and camped in a grove of cottonwood and other timber—indicating a sheltered and warmer location than is common at that elevation—and some pine trees 150 feet in height. Phelps caught trout, Roy kept camp and cooked supper, while Yount ascended the south and I the north fork of the creek. He reported impassable, snowy barriers; myself, indications of a pass some 5 miles distant; and the evening with the glistening of a glorious sunset and the haloes of the harvest moon of other lands upon the Giants' Castle, towering athwart the glittering stars, was spent in plans, preparation, and hopes of a morrow's crossing of the divide.

Pressing ahead of the packs in the morning, I was blazing the trail along the steep acclivity, when it dwindled, and, in Shoshone guttural, *kay-wut*; or, according to border provincialism, "played out," and a sharp turn to the right at once revealed the cause to be the branching of the trail for various elevations in ascending to a low, clear-cut, but very narrow pass directly through the range, unlike all others, which are elevated, with very steep, rocky climbing from one or both approaches to the sharp, narrow crest. We reached the summit in time for a romantic noon camp on a velvet lawn of grass and frost flowers, beside an Alpine lake supplied by a snow-fed rivulet, skipping in several fifty-foot leaps from the cliffs; and as meat was wanting, Yount killed a blacktail, myself an elk, the surplus of which, and want of other provisions, caused the return of Phelps and Roy, with the most of it and all the pack animals save one

each for Yount and myself, to our main camp at the Mud Volcano, they not returning to us. This pass has more the appearance of a natural gap, not quite closed by two mountains of eruption, than by the erosion of a narrow pass; but whatever the cause, it is a very low, direct one, with good approaches for a trail or wagon road, the only drawback being several heavy mountain slides, some very ancient, and others of comparatively recent occurrence, the latter with immense masses of angular rocks filling it for at least a mile from fifty to two hundred feet deep, and the former causing a chain of three lakes, the most western of which is evidently the Sylvan Lake of Hayden's map of the explorations of 1878. This is shown correctly, but not its drainage, which I did not find; but, as the next lake in the pass drains toward this, its outlet cannot be to the Stinkingwater—as the one at the cascade probably is—but even this only by percolating through these modern rock-slides. As this pass is nearly abreast the eastern side of the Yellowstone Lake, affording a fine route *via* Clear Creek to and a route each way around it, and there appears to have been comparatively little recent rock-sliding in the pass, it seems to promise its old pre-eminence as such of the range, by the making of a rocky road, as I did at the Obsidian Cliffs in 1878, over that portion of the pass which doubtless caused its abandonment by the Indians for at least a generation. In reply to my pressing inquiry of We-saw regarding a pass in that direction, while upon the range going out, his only answer was a French-like shrugging of the shoulders and ejaculation, "*Me no go there; maybe Bannock Indian, long time 'go.*"

DIRECT CONNECTING ROAD.

One of the early and important plans of the park was the exploration and opening of a line of wagon road, upon the most direct practicable route, from the headquarters across the park to and through the other entrance thereto, thus connecting them for the convenience of our laborers, the public, and the military for their protection.

Important explorations were made in 1877 upon my route of 1875, and were completed and a rough road opened during the Bannock raid of 1878. This was somewhat changed and shortened through the earthquake region, in order to meet the new entrance over the Plateau of the Madison instead of through its cañon, in 1880, and with the improvements since made at Cañon Creek and elsewhere only requires important grades to save crossing the Gibbon in its cañon, and opening of the routes through the Middle Gardiner Cañon, to render it a direct and permanent route connecting the two main entrances.

CIRCUIT OF ROADS.

Another improvement contemplated in the first general plan of developing the park, and which, though often delayed, has never been abandoned nor forgotten, but persistently pushed at every opportunity each year, has been the construction of a bridle-path upon a route to be mainly followed by a wagon road connecting these two main entrances, from the Mammoth Hot Springs via the Forks, Great Falls, and Lake of the Yellowstone, to the Forks of the Fire Holes, so that tourists could ultimately enter the park by one of these main approaches, visit the principal points of interest with wagons; those of less importance by branching bridle-paths, leaving it by either. Bridle-paths were early opened, and important changes made, with exploration and opportunity, until the whole line was planned, and although the greater part

of 1880 was unavoidably devoted to opening the new route over the Madison Plateau instead of its cañon, still, a good start was made in the cañon of the East Gardiner River, from the Mammoth Hot Springs at one end, and up the East Fire Hole River from their forks at the other, during 1880; and the main improvements of this season have been in the construction of this line of road from both ends. As elsewhere stated, the remarkably favorable spring of this season would have permitted the advantageous use of a much larger appropriation than was at my command, but what I had was promptly and prudently expended in the warm sheltered cañon of the East Gardiner.

After July 1, when this year's appropriation became available, until the untimely heavy snows of September rendered such field-work injudicious, the construction of this road was pushed with a vigor, skill, and success, resulting from thorough previous exploration, preparation, and experience, aided by a reliable and active assistant and force of veteran laborers, well understanding their duties and emulous in surmounting the attendant difficulties of climate and surroundings.

The proposition of responsible parties to introduce a portable steam saw-mill for the purpose of sawing lumber for a steamboat upon the Yellowstone Lake, hotels at its foot, and falls of the river, as well as for the government in the construction of bridges, added to the necessity of reaching the foot of the lake this season. After the construction of bridges, culverts, and grades in the open valley of the East Fire Hole, much of which was boggy, and the failure of long and laborious exploration to reveal a practicable pass through the precipitous Madison Divide, it was crossed by a long and uniformly excellent grade along its nearly vertical face to the narrow, dry cañon outlet of the ancient Mary's Lake, along the grove-girt border of its clear but brackish waters, uninhabited by any kind of fish, through the adjacent noisome sulphur basin to the deep valley and grassy lawns of Alum Creek. Thence, winding amid the bald, eroded, and still eroding hills of a short divide, down the open meadows of Sage Creek to the old trail near the Yellowstone River, midway between Sulphur Mountain and the Mud Volcano. From there, one branch was pushed up the river past the Mud Volcano, Nez Percé Ford, and a succession of enchanting groves and flowery lawns, beside the broad, placid, blue waters of the peerless Yellowstone, to Toppin's Point and miniature harbor at the foot of its lake. The other branch was constructed by winding ways, amid verdant hills, passing the stifling fumes of Sulphur Mountain, to the mouth of Alum Creek, four miles up the Yellowstone, above its Great Falls. The other end of this circling line of road was forced through the cliff-walled cañon of the East Gardiner, the grassy plateaus and lava beds of the Blacktail, beside the yawning, impassable fissure vents fronting Hellroaring Creek, through the Devil's Cut (which I am trying to rechristen Dry Cañon), and down the mountain slopes fully 2,000 feet to Pleasant Valley and the Forks of the Yellowstone, in this only practicable gap of the Grand Cañon for a distance of more than 40 miles. By careful research, we carried our road to the summit of the cliffs overlooking alike one of the finest views of the Grand Cañon, the Tower Falls, and the meeting of the foaming blue waters between them. This leaves a gap of less than 20 miles in distance between the Tower Falls and the terminus of the other end of our road at the mouth of Alum Creek, and hence the completion of our much-desired circuitous line of road to the main points of interest in the Park, situate west of the Yellowstone Lake and its Grand Cañon. As before shown, the two main routes of access, as well as the direct or Norris Geyser Basin route, being open, this little gap is all re-

maining to complete the plan of roads originally adopted and persistently adhered to through vexatious difficulties, and delays, and annoying public misapprehensions.

Although this gap is so short and some portions of it an excellent natural roadway, yet the yawning cañon of Tower Creek, with its vast amount of rock-work, culvert, and bridging above the Falls, the scaling of Mount Washburn through Rowland's Pass, extensive bridging, timber-cutting, and grading along the Grand Cañon and near the Triple Great Falls, together with the absolute necessity of several small bridges and extensive grading, or twice bridging the Yellowstone above the Falls, to connect with the other road at Alum Creek, renders it incomparably the most expensive of any equal portion of the route, and hence it was left until the last; and \$10,000 is deemed necessary, and is specifically recommended to be appropriated, for these purposes during the coming fiscal year. This sum, in addition to the amount annually appropriated, might perhaps complete this road, were all others neglected. But this would appear injudicious, as, although the road over the Madison Plateau is deemed an excellent one, save the grades at each end, and *they* as good as are possible to have been made there, with the limited time and means at my command when this was done, still, they are very steep for hauling heavy boilers or mill or steamboat machinery, and need extensive change of grade, or else of the entire line, and returning to the circuitous Cañon route, with its unavoidably long and expensive grades, or bridging, or both, and which cannot properly be longer delayed. With nearly equal force, this necessity pertains to the extension of the road up the East Fork of the Yellowstone and Soda Butte, as the only route to the gamekeeper's cabin, the fossil forests, medicinal springs, and extension to the borders of the park, of a very important at least bridle-path route via the Clark's Fork mines to the Big Horn Valley and Fort Custer.

There is also a necessity for important bridle-paths up the East Fork Valley to the Goblin Land, and by a newly-discovered pass to Pelican Creek and Steamboat Point, on the Yellowstone Lake. This route also necessitates the purchase of the Baronette Bridge, recognition of it as a toll bridge, or building another, with better approaches, near it. The great desirability of constructing a road via the Middle Gardiner Cañon is believed to be rendered evident in the section devoted to that subject. Nor should the views of the governor, the military officers, and leading citizens of Wyoming Territory, in which the park is mainly situated, their explorations for a route to this Wonder Land, and their efforts to open it, as elsewhere explained, be ignored, but at least a substantial bridle-path route should be opened from some of ours to the borders of the park near the Two Ocean Pass, or via the new one which I explored during the past season through the Sierra Shoshone Range to the Great Cañon of the Passamaria, or both of them. In this connection I may state that my former knowledge and this season's explorations alike sustain the views of Governor Hoyt and Colonel Mason as to the practicability and necessity of a wagon-road from the Wind River and Two Ocean or the Stinkingwater (Passamaria) route to the park; and, as such, I do most cordially indorse their report favoring the appropriation of a sum sufficient to open a good wagon-road from the Wind River Valley or from the Stinkingwater to the borders of the park.

CAÑON OF THE GARDINER RIVER.

In addition to long, yawning, and interesting cañons upon all of the forks of the Gardiner River, high in the snowy ranges not traversed by

any of our roads or trails and hence not necessarily mentioned here, there are four of great interest and importance within five miles distance and in plain view of our headquarters at the Mammoth Hot Springs, viz: One upon each of the three forks, or branches, cut in their precipitous descent of nearly 2,000 feet down the basaltic cliffs to our deep sheltered valley, by them eroded in some remote period, and another carved fully 1,000 feet deep by their united waters in escaping to the Yellowstone. Winding along the western terraces above the latter cañon, we have constructed our road to the main Yellowstone Valley, also one over the elevated Terrace Pass, around that portion of the cañon of the West Gardiner—which is utterly impassable for even a game trail—on our road towards the Fire Holes and through the beautiful cañon of the East Gardiner, ornamented by basaltic column-capped cliffs above and around the falls and cascades, on our road of this season to the Forks of the Yellowstone. The remaining cañon of the middle, and far the largest, fork is utterly impassable, but a bridle-path was made in 1879 along the precipitous face of Bunsen's Peak above it as preliminary to a road line. This bridle-path, as stated in some preceding report, has been in practical use and has demonstrated the feasibility of the route for a road to connect with that to the Fire Holes near Swan Lake. With no increase of distance this route will save several hundred feet in elevation, afford a picturesque view of the Mammoth Hot Springs, government buildings, and sheltered cliff-girt valley from one end of the pass, the upper valley with its rim of snow-capped mountains from the other, and within it the Sheepeater Glen, the vertical walls and uniquely interesting rotatory or fan shaped basaltic columns, the roaring falls and splashing cascades of the Middle Gardiner, in wild, majestic beauty second only to those of the Grand Cañon of the Yellowstone, in the Wonder Land. Long and careful search and engineering resulted in the selection of a route along our timber road to a terrace overlooking the lower cascades of the West Fork of the Gardiner, which is to be crossed upon a short but very high timber bridge, and thence by a moderate and uniform grade along the pine clad face of Bunsen's Peak to the summit of the pass, amid the spray and thunder of a cataract nearly 200 feet high, in an eroded cañon more than 1,000 feet deep—a route combining so much of surpassing interest and practical value that only the want of means to divert from the pressing necessity of opening new routes to the Great Falls and other leading points of attraction has prevented its construction, and will insure it, with the first means at my command to properly thus expend.

MOUNT WASHBURN BRIDLE-PATH.

Successive seasons of exploration and research have resulted in the partial abandonment of the old route, with its several steep ascents upon the cold snowy side of Mount Washburn, the gulches of Dunraven's Peak, and the beautiful, but, in places, boggy valley of Cascade Creek, for the bridle-path route of a road ascending by long, easy grades from the pleasant meadows of Antelope Creek to the elevated but only summit of the route, in Rowland's Pass, and thence in like manner down its warm sheltered face to the grassy glades and sulphur basin, between it and the Grand Cañon, and skirting the latter, with its matchless scenery, to the Great Falls. An easily accessible peak upon the very brink of the Grand Cañon, about half a mile east of Rowland's Pass, affords a commanding view of it in all its windings and yawning side cañons, from the Forks to the Great Falls of the Yellowstone, and the terribly

eroded, gashed, and repellant-looking unexplored region beyond it. By a short moderate ascent west from the summit of the pass, an open spur is reached, which, in less than two miles of gradual ascent, scales the highest peak of Mount Washburn if desired, although it is but little more elevated and commanding than portions of the snowy crest before reaching it.

PAINTED CLIFFS—BRIDLE PATH INTO THE GRAND CAÑON.

This path leaves the main one, from Mount Washburn, at the eastern end of an open marsh, about 5 miles below the Great Falls, and, passing fully a mile through an open pine forest, reaches the head of the cañon, and winds along the face of a mountain slide to the small; but beautiful and noisy, Safety Valve pulsating geyser, situated in the narrow valley between this slide and the mountain face. For a proper understanding of this location it is necessary to explain that, evidently at a comparatively recent period, the eroding river and the erupting fire-holes along it have undermined portions of the nearly vertical walls, some of which are fully a mile along it and nearly half as wide and high, precipitating them into and damming it until cut asunder by the resistless current of the foaming river, often leaving long portions of these enormous mountain-slides with the timber undisturbed upon them. It thus presents the appearance of a lower bank, or terrace, with a nearly vertical face of the peculiar ancient lake formations of this region, above and below it. Along the line of contact above this mountain slide, skirting the river below, and at the terribly ragged ends of it, is a line of noisy escape vents of smothered fire, of which one is the "Safety Valve," thus named at its discovery last year, from its powerful and distinct reverberations along the cliff, which were then much more audible than during this season. This is nearly a mile in distance, and 1,000 feet in descent, below the summit of the cliffs, or one half of the entire distance and descent in the cañon, the lower half of which was made through a line of mingled active and extinct and crumbling geyser and other hot-spring formations, along the ragged edge of the lower end of the mountain slide to the foaming river drainage of the mountain snows. This stream we found literally filled with delicious trout of rare size and beauty, and so gamy that all desired of them were caught at each of our visits of this year, during our brief nooning, using as bait some of the countless salmon flies which were crawling upon the rocks or on our clothing, upon hooks fastened to one end of a line, the other being merely held in the hand or attached to some chance fragment of drift-wood; but the sport seemed harder upon the hooks and lines than upon the trout, which were abundant, both in the river and out of it, after the loss of all our lines. Although this is strictly true in our experience, it is but just to state that some other persons who were there at a later hour of the day or period of the season, while seeing countless trout, found them less voracious.

The beautiful tinting of the cliffs in this locality, not unlike beauty elsewhere, seems only skin-deep; *i. e.*, the material beneath is often nearly white, and the brilliant coloring only brought out by surface oxidation of the various mineral constituents; and, although not deeming our path dangerous, I would suggest that anglers who may visit this place should not become so engaged with the beautiful speckled trout as to forget that their charming lady companions may need their nerve and assistance in the horseback ascent of the cliffs. Here, only, between Tower Creek and the Great Falls of the Yellowstone, does a





CRYSTAL FALLS AND GROTTO POOL, WITH BRIDGE AND LADDERS.

bridle-path reach the foaming, white surfaced, ultramarine blue waters of the "Mystic River," and the long, horizontal, cornice-like grooving of its clearly banded and rainbow-tinted walls and tottering cliffs; in short, the seclusion, the scenery, and the surroundings of this hidden glen of the Wonder Land render it one of the most uniquely attractive so that the few tourists who fail to visit it will never cease to regret their neglect.

THE TRIPLE OR GREAT FALLS OF THE YELLOWSTONE, AND THE BRIDLE-PATH AND TRAILS THERETO.

These, as is well known, are the Upper Falls, of 150 feet, or about the same height as those of Niagara; the Lower Falls, nearly one-half mile below, of about 350 feet; and upon the west side of the river, midway between them, the Crystal Falls, or Cascades of Cascade Creek, near its mouth, in height about equaling the Upper Falls. Upon the very brink of the latter the main bridle-path to the lake passes, affording a fine view of them—the foaming rapids above and the rippling river below them—to the head of the Lower Falls, which is reached by the 500-foot descent of a good trail from the main one, or bridle-path, which crosses the creek upon a good bridge constructed last year from two projecting trachite rocks, nearly 40 feet above the famous Grotto Pool, between the upper fall, of 21 feet, and the lower, of more than 50 feet, beside a leaping cascade below it. This pool is caused by the sheet of water in the upper fall being at right angles with the stream, thus facing and undermining the eastern wall, and beneath it forming a broad, deep pool of placid water, nearly hidden under the narrow shelf of rocks between the two leaps of the cataract, and from its peculiarities named by me, in 1875, Grotto Pool. From a pole railing to the cliff between the bridge and the brink of the cliff overlooking the lower leap I this year placed a substantial, well-supported ladder to a projection of the cliff, and from there another to the foot of the Grotto Pool, and also some benches, for the convenience of tourists, beneath an overhanging rock and the lofty bridge along the narrow way between the wall and the water beside it. (See Fig. 1.) A sudden but violent hail and thunder shower, peculiar to mountain regions, compelled us to utilize this newly-reached shelter before leaving it, and for a brief period the flood-gates of heaven and the torrents of earth, with their mingled thunders, combined in a carnival of surging elements and waters above, beneath, and beside us.

Near the rustic bridge spanning Spring Creek a long, rough, and dangerous trail descends to the foaming river, and a bridle path ascends to the Point Lookout Cliff, 1,000 feet above it, about one mile below and directly fronting the lower fall, inviting, within its barricade border of poles, the finest safe view of them from any quarter. From here the great notch near the northern and two smaller ones near the southern edge of the clear-cut and formerly smooth water-line of the fall are evident, at a glance, to any person familiar with the falls or photographs or correct sketches of them prior to this season. The detachment of great masses of the rocky face of the falls is the cause, but only the commencement of what will in time follow, and ultimately change the appearance of these falls, but probably not their aggregate height.

NATURAL BRIDGE AND BRIDLE-PATH TO IT.

Since the first description of this interesting freak of nature, which is situated near the Yellowstone Lake, was published on pages 22 and 23

of my report of 1880, I have so changed the route of the bridle-path as to invite an excellent view of the archway at several points of observation within the distance of a mile below or fronting it, and then, after crossing a warm creek near some beaver ponds, ascend by a winding way to and across it. Thence the trail, within a distance of two miles, descends through a beautiful pine forest, meanders along the shore of the nearly severed extension of Bridge Bay, and across some lovely grove-girt lawns to the old route upon the shore of the lake. The danger of a general conflagration alone deterred me from burning out several miles of nearly impassable fallen timber, thereby materially shortening the trail to the thumb of the lake. No other substantial natural bridges over a permanent water-course have been discovered, but several wind and storm worn tunnels, high amid the tottering crests of the Sierra Shoshone Range, were found and sketched; also one between the first and second peaks from the southwestern slopes of Mount Norris, nearly fronting the famous extinct geyser cone of Soda Butte, although high above and scarcely perceptible from it, but showing a clear cut outline of blue sky directly through the craggy crest, from the great terrace of Cache Creek. At that distance, and even nearer, this opening so closely resembles the adjacent snow-drifts that Rowland, who was with me at the time of its discovery, wagered me a new hat that it was one.

EXPLORATIONS.

Successive years of active exploration, hunting, and road or trail making in the park, have rendered the most of it, west of Yellowstone Lake and its Grand Cañon, so familiar that *research* is perhaps now more appropriate than exploration, for our observations therein. Still, there are now many localities of considerable area, as much of Mounts Stephens and Dunraven ranges, as little known as before Washburn scaled the peak which bears his name. Traversing such regions are truly explorations, prominent among which, of this season, is that of the Madison Divide, in search of a pass to avoid the cliffs near Mary's Lake. Those to the south were explored last year and found utterly impracticable, although a depression observed this year in the crest of the range to the north afforded a hope that a pass might be discovered there. The long, open, but unsafe valley of hot springs and sulphur vents on the head of Alum Creek was traced to its connection with a branch of the Rocky Fork of the East Fire Hole River, and one mountain feeder of this, through an elevated divide, to the seething brimstone basin of Violet Creek, and another to a similar repellent sulphur region overlooking the Norris Geyser Basin and Fork of the Gibbon, and thence down the Rocky Fork to our camp on the East Fire Hole, and the effort there abandoned. Although this exploration failed in its main object, it led to the discovery and opening of a fine bridle-path route from above the mouth of Rocky Fork, through the earthquake region to the Paint Pots on the main road, which proved a good 20 miles saving of distance for our couriers and pack-trains from the headquarters to our camp on the Mary's Lake route. It also greatly extended our knowledge of the fire holes in those regions, and afforded proof positive that a band of bison wintered there, at an elevation of nearly 9,000 feet. Much was also learned of the broad elevated timbered plateau of Elephant's Back, and its extension above the Natural Bridge; and exceedingly interesting knowledge was obtained of the apparently most recent shattering of the earth's crust, with still yawning impassable vents and lava overflow in this region of the Park, upon the various branches of the Blacktail, skirting the Great Cañon

of the Yellowstone between the mouth of Grevice Gulch, via the head of Pleasant Valley to Tower Creek. By far the most extensive, interesting, and valuable exploration of the season is that in connection with, or continuation of, that of Governor Hoyt and Colonel Mason, in the Sierra Shoshone and main Rocky Ranges, during twenty-six days of continuous and arduous cliff and cañon climbing among the snowy lava-capped crests of a region of as wild chaotic grandeur, and as little known or understood as any other in the United States, if not indeed in North America. A journal of the transactions of each day was regularly kept, water-courses mapped, prominent mountain peaks sketched, passes noted, and the weather and elevations recorded at least three times a day. Only the size and purposes of this report preclude its publication entire herein, but the preceding descriptions of the Two Ocean and other passes, the subjoined record of weather and elevations (the former accurate, and the latter, for want of reliability in the readings of the aneroid barometer, approximate only), the mountains and streams as shown upon the map, will be found tolerably correct, and it is hoped will prove of sufficient interest to encourage the attention of scientists better prepared and outfitted than myself to do this wonderful region justice.

HEADQUARTERS OF THE PARK.

One of my first and most important official duties in the Park was the search for a location for its headquarters, which should combine, in the fullest degree, nearness and accessibility throughout the year, through one of the two main entrances to the park, to the nearest permanent settlements of whites and a military post, remoteness from routes inviting Indian raids, and a proper site for defense therefrom, for ourselves, saddle and other animals, good pasturage, water, and timber, as well as accessibility to the other prominent points of interest in the Park. The want of any public funds in 1877 prevented other than exploration of routes to and throughout portions of the park (cut short by a severe injury at Tower Falls, just in advance of Chief Joseph's Nez Percé Indian raid), and the publication of a report.

The Bannock Indian raid of 1878 rendered unsafe the construction of public buildings or the retention of public property in the Park during the following winter, but the road constructed that year, connecting the two entrances from the Mammoth Hot Springs to the Forks of the Fire Holes, together with its value to myself in making other improvements, to the Hayden geological explorations, and to Generals Miles and Briscoe, in their military operations, confirmed my opinion, in which these gentlemen concurred, that the Mammoth Hot Springs was then, beyond question, the proper location for the headquarters of the Park. The buildings of hewn timber were mainly constructed in 1879, upon a commanding site for outlook and safety, the main one being surmounted by a loopholed gun-turret for defense from Indians. Subsequent explorations and improvements in the Park have justified the selection, alike of the location and of the building site. These are well shown, with the adjacent cliff fences to our large and valuable pasturage, in the frontispiece of the Park Reports of 1879 and of 1880; and the buildings as they now are in the frontispiece of this report.

As explained in my report of 1879, there was found at the Mammoth Hot Springs only one building site not overlooked by others, which one, besides its position commanding every locality within rifle range, was desirable from its gradual slopes and accessibility from the Upper Terraces, as well as direct connection with the matchless pastures and

meadows beside and below it. The elevation of this building site from actual measurements is found to be : Above the Cedar Grove toward the Great Terraces southwesterly, 84 feet ; above the Liberty Cap northwesterly, 152 feet ; above the Little Meadows southeasterly, 226 feet ; while towards the northeast the descent by terraces is nearly continuous for over a mile in distance, and fully 1,000 feet in descent, to the Great Medicinal Springs in the cañon of the Gardiner. Although so elevated and commanding a site for observation or defense, a depression down its least elevated side affords an excellent roadway upon each side of it, and between them a convenient location for a reservoir of warm water, which has proved alike useful for ourselves, for our animals, and for the purpose of irrigating our garden, especially for its protection during frosty nights. This hill was originally a sage-brush dotted, grassy mound, having a few dwarf firs and cedars upon it, and with a regular supply of cold water in a natural depression for a reservoir near the house, which might, with little expense, soon be shaded and screened by an ever-green grove, and with a supply of the terrace building water, furnish bathing rooms and ornament any desired portion of the slopes with peerless bathing pools like the ancient ones fronting it. For convenience, for symmetry, as well as for safety from gales, the main building, 40 by 18 feet, was built upon a stone foundation embracing our cellar, with one lean-to wing, 22 by 13 feet, for office and small bedroom, another, 25 by 13, for family sitting-room and bedroom, and a rear kitchen, 18 by 13 (see cut of ground plan, Fig. 2).

All these, together with the main edifice, are built of well-hewn logs notched and spiked or pinned together log by log as laid up, the attic portion of the wings thus sustaining the upper story of the main building, which is surmounted by an octagon turret 9 feet in diameter and 10 feet high from a solid foundation of timbers upon the plates, the upper ends of the well hewn and fitted timbers of which, extending above the roof, are loop-holed for rifles. From the evident infrequency of injury by lightning in the park, I ventured upon an additional mode of sustaining the building during wind-storms, as well as for providing a substantial flag-staff. This was done by planting a fine liberty-pole firmly in the rocky foundation of the building around which it was constructed, and to which it was firmly attached by several heavy iron bands, which allowed for the natural settling of the building, and thence extended through the center of the shingle-roofed octagon turret, above which, 53 feet from the main floor of the building, are the globe and flag-pulley. Altogether it is a sightly, substantial, and commodious building for a headquarters, only needing ceilings in the lower and partitions and ceilings in the upper story—both of which are high and airy—for its completion. The other buildings are an earth-roofed barn of hewn timber, 32 by 18, one end of the lower story of which is for a stable, and the other is an open front room for our wagons, &c. From the adjoining large and substantial corral, one gateway leads to the lane in front, and the other to the pasture in the rear.

A large, warm, and convenient henery in the hillside near the barn has proved less valuable than was anticipated from the ceaseless destruction of our domestic fowls by the ever pestiferous mountain skunks. In the cedar grove near the old corral and reservoir is our round-log, earth-roofed blacksmith shop, 20 by 14. Amid the cedars at the foot of the cliffs is our rude partitioned bath-house, and at a proper distance in the rear of our main building is a commodious out-house. A large wire-screened box in the cool, sheltered nook at the north angles of the build-

ing is found valuable as a protection from blow-flies upon the elk meat and venison, which seldom taints at any season of the year.

All these buildings are detached and isolated beyond danger of ordinary fires, the constant fear of which induced the recent construction of a fire, frost, and burglar-proof vault, 12 by 16 feet, in the face of the dug-

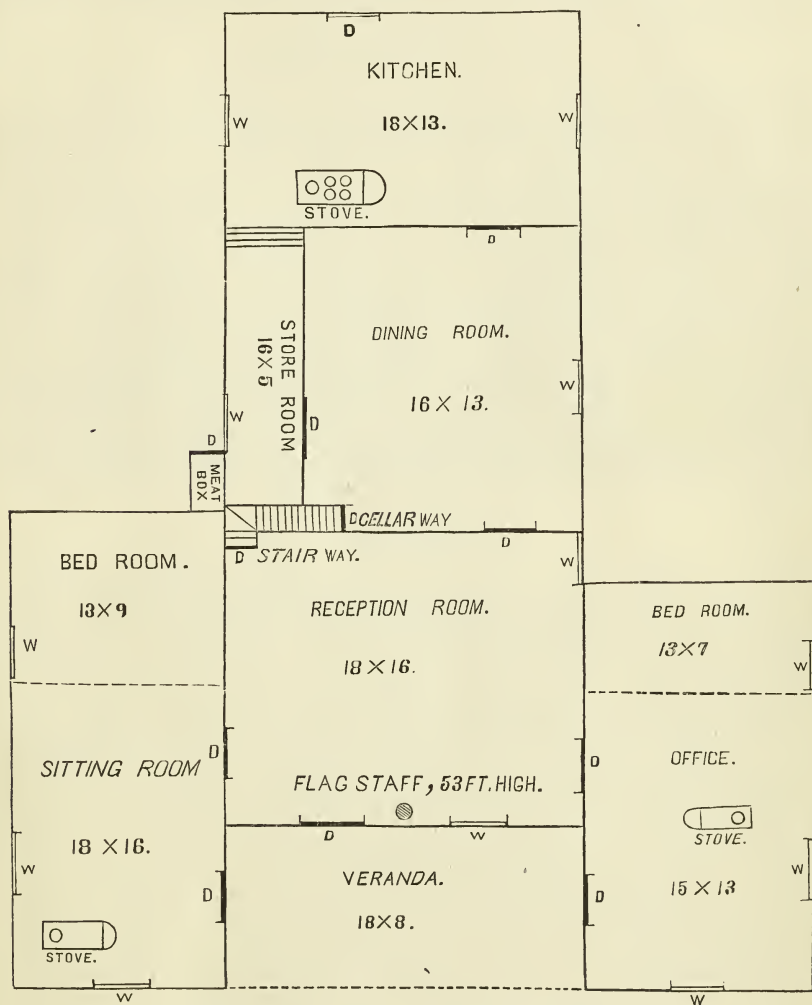


FIG. 2.—Ground plan of headquarters building.

way in rear of the main building, as a provision, tool, and outfit storehouse. These buildings have proved convenient, well adapted for the public purposes, and, saving improvement in a supply of good cold water, which is still more difficult to obtain in the Fire Hole regions, ample and substantial enough for headquarters, until the rapidly-approaching railroads demonstrate the necessity of others, and the proper location for them. This will admit of all the funds which may be appropriated for the park being expended for its protection, and the construction of roads, bridges, and other necessary improvements. Meanwhile some of the finest loca-

tions in the Fire Hole regions should be reserved from sale or leasehold to persons or railroad companies, from which to select a site for the headquarters of the superintendent or his assistant, as may then be deemed best; it being evident that after the completion of railroads to the Mammoth Hot Springs, and to the forks of the Fire Holes, a leading officer of the park, with adequate buildings, will be a necessity at each of these places.

MAMMOTH HOT SPRINGS.

The characteristic tendency of these springs to dwindle or fail in one place and burst forth in another not remote has been very marked during this season in both location and power. We have been compelled to culvert the outlet of a hot spring which burst forth in our road at the foot of the Devil's Thumb during the past winter, and which is still active, while the springs near McCartney's Hotel dwindled until it was necessary to remove his bath-houses, and then burst forth anew in full power. The water, which has heretofore been too hot for comfort at our bath-house, was this year too cold for that purpose, or to properly protect our garden by irrigation during frosty nights, while a new pool, too far below it for use, is a veritable boiling caldron, and similar changes are observable on all of the terraces. Not only this, but the aggregate quantity of water upon these terraces is evidently diminishing, while that of the Hot Creek, which is fully 1,000 feet below, near the McGuirk Spring, on the Gardiner River, is surely increasing; but is not now of the terrace building, but of the medicinal class of springs.

LIBERTY CAP.

The suggestions contained in my report of 1880, in reference to recoating this famous extinct geyser cone by a jet of water from the terrace building, Mammoth Hot Springs, having been approved, I decided to practically test whether these waters deposit at the orifice of a tube by evaporation only, or by deposition its whole length. For this purpose the open-ended double-barrels of a shot gun were placed where a current of the hot water in a boiling spring passed steadily through them to the muzzle end, which alone protruded from the scalloped border. Repeated trials, resulting in filling the barrels within a week, demonstrated that *these* springs do certainly fill a tube by deposition the whole length, and not by evaporation at its exposed extremity, as had been believed. Hence the negotiation for the purchase of gas-pipe was abandoned and water conveyed in troughs made for the purpose to the Devil's Thumb, and with perfect success, it having been covered and enlarged by a coating of beautiful white geyserite. The flow of water is now discontinued for the purpose of learning if this coating will endure the frosts of winter; and if so, it only requires about 300 feet of scaffolding from 25 to 45 feet high to conduct the water from the Devil's Thumb to the Liberty Cap, and by building around the base, filling the fractures, and recoating it to thus preserve and beautify one of the unique marvels of the Park.

LAWS RELATING TO THE PARK.

All the enactments by Congress in reference to the vast regions included in the Yellowstone National Park may be found, first, in two brief sections approved March 1, 1872, dedicating it as a national health and pleasure resort, and placing it absolutely under the appropriate control of the Department of the Interior; and, second, by virtue of the

annual appropriations during the past four years, aggregating up to July 1, 1882, the sum of \$50,000, to enable the honorable Secretary of the Interior to protect, preserve, and improve it. For a knowledge of the enactment, see appendix marked A and regarding the second, or a proper showing of the management of these funds, and the manner and results of the expenditure, reference is made to the annual reports of the honorable Secretary, containing those of the superintendent thereof. The park has been wholly managed without the aid of the civil or military authorities of those regions, (save occasional assistance by the latter in repelling hostile Indians) under rules and regulations as prescribed by the honorable Secretary of the Interior, somewhat modified by experience. Those now in force will be found in appendix marked B. While under these rules and management, as fully shown in these reports, and included in maps, plates, &c., much has been peacefully accomplished (so far as the whites are concerned), in both protection and improvement of the park, it is believed that additional provisions by Congress, by the council of Wyoming Territory, or by both of them, are necessary, as well as the proposed organization of a county of Wyoming, with a seat of justice near enough to insure legal co-operation and assistance in the management of the park, as it is neither desirable nor in accordance with the spirit of our institutions, or of our people, to continue the control of so vast a region, teeming with people from nearly every land, by mere moral suasion, occasionally sustained by more potent appeals from the muzzles of Winchester rifles.

GUIDES OF THE PARK.

From the statements and letters of persons who visited or attempted to visit the park, I have no more doubt that many persons have been deceived, and have suffered from the greed, ignorance, or inefficiency of persons in the adjacent regions professing to be able to properly convey or guide tourists to and throughout the park, than of my utter inability or power to prevent such impositions. In addition to my present purpose of publishing a complete and accurate map and guide book of the park, for use during the coming season, I may add that I know of many good, honorable men, thoroughly acquainted with the park, its approaches, and its wonders, who will neither deface nor destroy guide-boards or represent that the park is destitute of roads, and that valiant guides and an arsenal of arms are indispensable to reach or safely visit its marvels or swindle or neglect those employing and confiding in them. If, in compliance with the earnest request of such persons now pending, I should adopt the policy of granting licenses, operative during good behavior, each season, which should cost such persons only the expense of badges, license, and record, holding each in a degree interested and responsible for the prevention of fires and acts of vandalism, and observance of the other rules and regulations for the management of the park, by the parties in their charge, I cannot doubt the result would be far more beneficial to the park, and its visitors, than pleasant to the superintendent, from the machinations of those whom he might deem unworthy to receive or retain such a license.

SUGGESTIONS REGARDING A POLICE FORCE FOR THE PARK.

As will be found in the interesting report of the gamekeeper, his experience and observations, as such, leads to the conclusion that an officer especially for the protection of game is not necessary in the park, but

rather that there should be a small force of men, hired by the superintendent for their known worth, and subject to discharge for cause, or some of them, at the close of each season, in which opinion, from years of experience, I heartily concur. Selected as these men would be, from those hired as laborers, the hope of winning promotion to this more attractive and responsible duty would prove alike an incentive to win and faithfulness to retain it; and I am unaware of any other plan promising such efficient assistants in the indispensable protection of game, prevention of fire and vandalism, keeping regular records of the weather, and geyser eruptions, and in general assisting the worthy, and restraining the unworthy visitors of the various geyser basins, as well as for patrol for like purposes and for seeing to the roads and bridle-paths. There has not occurred a serious fire in the park since the Bannock raid from the camp fire of any of our laborers or of the mountaineers; but such is the inexcusable carelessness of many tourists, that without great watchfulness disastrous conflagrations, utterly impossible to check when once started, may yet destroy the matchless evergreen groves, and cover much of the park with impassable fallen timber.

Since writing the above, I am in receipt of a synopsis of Lieutenant-General Sheridan's report to the Adjutant-General of the Army, of his recent tour through the National Park, and his views and suggestions in reference thereto. Owing to his entrance to the Park from Fort Custer and and Clarke's Fork pass, he crossed the Yellowstone River at its forks, while Governor Hoyt, Colonel Mason, and myself were crossing it at the foot of the lake, some 40 miles above, en route to the Stinking-water, and hence I failed in a desired interview with him, but it is with great pleasure that I acknowledge, in behalf of the park, my obligations to him for authorizing the reconnaissance of Colonel Mason, Captain Stanton, and Lieutenant Steever, and also to the first of these gentlemen for the courtesy (and assistance when needed) which has ever characterized the military officers with whom I have met in the park, as well as for a manuscript synopsis of his past season's explorations; and to the last two officers for their tables of odometer measurements—the first ever made of any of our roads or bridle-paths within the park. From the route taken by General Sheridan, *via* Mount Washburn bridle-path, he was unable to visit our headquarters or main line of improvements then completed in the park, but the tone of his remarks upon the magnitude of the National Park, the difficulties of its protection and improvement, the inadequacy of the means heretofore provided therefor, and his views as to a remedy, evince alike his intuitive comprehension of a subject or a region, and his military stand-point of view in the management of them.

REGISTERING THE NAMES OF TOURISTS.

The register of the names of tourists at the headquarters, is so incomplete regarding those known to have been there as not to justify publication; that of Job's Hotel, at the Mammoth Hot Springs, has not been received, but that of the Marshall House at the Forks of the Fire Holes, the remaining residence within the Park, although very incomplete, is published, hoping that it may prompt more attention to the matter hereafter by all parties. Various suggestions have been made as to the best mode of obtaining the names of all visitors to the park, one of which is the establishment of a gate and keeper at each of the two main entrances to the Park to compel registration of names, residence, and dates, which, besides the cost of the gates and keepers, would, I fear, prove unreliable

to intercept or prevent false registration by those desirous of avoiding it, and which certainly would be incomplete, as the mountaineer tourists will hereafter enter the Park from nearly all quarters. Besides it may appear to many so like unjustifiable annoyance, that I incline to leave to time, the approaching railroads, increase of hotels, and wishes of the constantly multiplying number of tourists, for a solution of this matter.

REGISTER OF VISITORS.

Copy of the register of the Marshall Hotel at the forks of the Fire Hole rivers, Yellowstone National Park, from June 27 to August 25, 1881.

Date.	Name.	Residence.
1881.		
June 27	Charles R. Brodix	Bloomington, Ill.
July 14	Patrick Walsh	Virginia City, Mont.
25	James R. Johnson	Prickley Pear, Mont.
25	C. L. Dahler	Virginia City, Mont.
25	N. I. Davis	Do.
25	John McManus	Kirkville, Mont.
25	E. Panabacker	Do.
26	James R. Johnson	Prickley Pear, Mont.
26	Francis Collins	Pittsburgh, Pa.
26	R. K. Cooper	Silver City, Mont.
28	William Collins and wife	Glasgow, Scotland.
29	I. W. Thorne	Helena, Mont.
29	I. L. Mears	Wicks, Mont.
29	E. H. Metcalf	Do.
Aug. 3	George Huston and two men	Clarke's Fork, Mont.
3	E. Panabacker	Do.
3	R. Pearsall Smith	Philadelphia, Pa.
3	Hannah Whithall Smith	Do.
3	Mary W. Smith	Do.
3	Alys W. Smith	Do.
3	David Scull, jr	Do.
3	Edward L. Scull	Do.
3	William E. Scull	Do.
3	I. Tucker Burr	Boston, Mass.
3	Winthrop M. Burr	Do.
3	William S. Mills	Wilmington, Del.
3	Bond V. Thomas	Baltimore, Md.
6	Justice W. Strong	Washington, D. C.
6	Senator John Sherman	Ohio.
6	Senator Benjamin Harrison	Indiana.
6	Gov. B. T. Potts	Helena, Mont.
6	Albert Bierstadt, artist	New York.
6	P. W. Norris, sup. rintendent	National Park.
6	Judge W. H. Miller	Indiana.
6	Gen. Thomas A. Sharpe	Do.
6	E. Sharpe	Do.
6	Alfred M. Hoyt	New York.
6	E. W. Knight	Helena, Mont.
8	Dr. D. S. Suively	U. S. Army.
8	Lieut. W. D. Huntington	Do.
8	Miss H. D. Huntington	Fort Ellis, Mont.
8	Miss A. J. McKay	New York.
8	Z. H. Daniels	Bozeman, Mont.
9	Judge William Gaslin	Kearney, Neb.
9	Com. T. T. Oakes	New York.
9	James Gamble	San Francisco, Cal.
9	I. H. Hammond	Evanston, Ind.
9	Edward Stone	Walla Walla, Wash. Ter.
9	Gen. L. S. Willson	Bozeman, Mont.
9	L. W. Langhorne	Do.
9	E. L. Fridley	Do.
9	George Ashe	Do.
9	R. McDonald	Do.
9	I. V. Bogart	Do.
9	Fred. de Ganga	Senegambia.
9	Commodore Bell	Do.
13	Wm. F. Bowers	Boston, Mass.
14	Gov. John Hoyt	Cheyenne, Wyo.
14	Col. J. W. Mason	Fort Washakie Wyo.
14	Capt. John Cummings	Do.
14	P. W. Norris, superintendent	National Park.
14	Kepler Hoyt	Cheyenne, Wyo.
14	J. A. Mason	Fort Washakie, Wyo.
14	Harry Yount, gamekeeper	National Park.
14	G. W. Watkins	Towanda, Pa.

Copy of the register of the Marshall Hotel, &c.—Continued.

Date.	Name.	Residence.
1881.		
Aug. 14	Frank Grounds	Bozeman, Mont.
15	W. H. Young, sr.	Butte, Mont.
15	W. H. Young, jr., and wife	Do.
15	H. Romsbush	Do.
15	I. G. Corrie	Do.
15	Miss Lizzie Astde	Do.
15	Francis Frances	England.
15	V. W. Benzing	New York.
15	Lieut. Edgar Z. Steever	U. S. Army.
20	John F. Forbes	Butte, Mont.
20	W. T. Hawley	Do.
	J. V. Long	Do.
	John Farwell	Do.
	Geo. N. Givin	Do.
	I. F. Rumsey	Chicago, Ill.
	Prof. W. I. Marshall	Fitchburg, Mass.
20	C. R. Hermon	Saint Louis, Mo.
20	W. R. Larcey	Bozeman, Mont.
24	Walter Cooper	Do.
24	Geo. W. Wakefield	Do.
24	R. Koch	Do.
24	Fred. La Hare	Do.
25	Thomas Dennison	Cold Bluff, Pa.
25	W. C. Cady	New London, Ct.
25	P. W. Lytle	Oakdale, Pa.
25	A. J. Fisk	Helena, Mont.
25	Henry Cannon	Do.
25	G. R. Melten	Do.
25	W. E. Sanders	Do.
25	John Porter	Do.
25	C. A. Brown	Virginia City, Mont.

FISHES OF THE PARK.

Suckers, catfish, and the bony white mountain herring, abound in the Yellowstone River and some of the lakes, but far the larger portion of all the fishes found in the known waters of the Park are trout. These appear to me to be of many different varieties. Several of these are peculiar to a certain lake, as the red-gilled and red-finned trout of the famous Lake Abundance, at the head of Slough Creek, which has an area of less than a square mile. These trout are very beautiful as well as palatable when in flesh—then weighing nearly a pound each—but they often so overstock the lake as to become as voracious as sharks and too poor for food.

TROUT LAKE.

This noted lake or pond is situated about two miles above the famous Soda Butte, and is wholly supplied by a snow-fed rivulet less than a mile in length and only a good pace in width, and drained by another of similar dimensions, each having impassible cascades within one-fourth of that distance from it; and yet in this little isolated pond are found incredible numbers of one of the largest, most beautiful, and delicious trout of the entire mountain regions. In the spawning season of each year they literally fill the inlet, and can be caught in countless numbers. From my journal of June 3, 1881, I quote as follows:

Wishing a supply of trout for our men in the Gardiner Cañon, Rowland, Cutler, and myself rode to Trout Lake, and, after pacing around and sketching it, with brush and sods I slightly obstructed its inlet near the mouth. Within eight minutes thereafter the boys had driven down so many trout that we had upon the bank all that were desired, and the obstruction was removed, allowing the water to run off, and within three minutes thereafter we counted out 82 of them from 10 to 26 inches in length. Of these, 42 of the larger ones, aggregating over 100 pounds, were retained for use, 30 of the smaller ones returned to the lake unharmed, and the remaining 10 were,

together with a fine supply of spawn, distributed in Longfellow's and other adjacent ponds, which, although as large, and some of them apparently as favorable for fish as the Trout Lake, are wholly destitute of them.

Although the boys declared this was not a favorable morning for trout, and they do doubtless often make greater hauls, still this is as large a fish story as I dare publish, and qualify even this with the statement that the pond is unusually full of weeds and grass, and the food supply of insects so abundant that the fish are not reduced in numbers by the rod as in many other ponds, and hence the incredible number in its small inlet during the spawning season. Trout varying greatly in size and appearance are found in the snow-fed rivulet branches of Alum Creek and other streams, whose waters are too hot and too full of minerals to sustain ordinary life.

FISHES OF THE YELLOWSTONE LAKE.

The only variety of fishes known to inhabit this great lake is the yellowish speckled salmon trout, which are usually found of from 15 to 25 inches in length. These are proverbial alike for their taking the hook so near boiling pools at various localities along the shore line that they may with ease be cooked in them upon the line without the fisherman changing his position, and for the large number of them being infested with long slender white worms. The proportion of them thus diseased has increased from something over one half in 1870 until all are apparently infested, as I have neither seen nor heard of one of the countless numbers caught this season which was clear of these parasites; and so many were dying along the shores, and so great the quantity of weeds with adherent sacks of yellowish-green jelly, that they drift in lines—sometimes in small windrows—along the shore. Not only this, but it is the opinion of those the best acquainted with this lake that its waters are more discolored with these weeds and less pure than formerly. What degree of connection, if any, these various peculiarities hold to each other, is only conjectural, but to assist in an investigation I have sent the skin, a portion of the meat, entrails, and worms of one of these trout in a bottle of alcohol, and some of the sprigs of this weed and sacks, as well as porous yellowish stone tubes of some worm or insect which are found in abundance along the bank of the lake, to Prof. S. F. Baird, director of the Smithsonian and National Museum, and United States Commissioner of Fish and Fisheries. It has been suggested that some other more voracious fish might exterminate the trout and stock the lake, but whether the latter would prove any more exempt from the parasites, evidently depends upon whether the disease is peculiar to the trout, or to the lake; the evidence now known favoring the latter theory, as trout thus diseased are found only in this lake, or in waters so connected with it as to indicate that they frequent it. Thus, I have no knowledge of a worm-infested trout having been found in the Yellowstone River below the Great Falls; although many of the trout there are apparently of the same species with those of the lake, and presumably some of them may, at some period of their growth, have safely passed the falls; or, waiving this theory, trout of the same variety are never, as I am aware, found thus infested in the numerous mountain feeders of the Snake branch of the Columbia, which so interlock in the Two Ocean and other passes, that there is strong probability that the trout, like the waters, do actually intermingle, and would become diseased also did the cause pertain to the fish and not to the lake. These are the facts so far as now known, and the subject being one of both

scientific and practical importance, in connection with a lake of about 200 miles shore line, and far the largest of its elevation upon the globe, I earnestly invite a thorough investigation and pledge all the assistance in my power to render it as complete as possible.

Sufficient time has not elapsed as yet to determine the results of my experiments in stocking various lakes this season with trout, but I propose to extend the effort in larger lakes, like Shoshone and Lewis, and shall report progress from time to time.

In view of the paucity of species of fishes in the Park, it is my earnest intention during my next season's explorations to endeavor to find suitable waters in which to attempt the culture of carp, a subject which is now engrossing quite a large share of the attention of those interested in cheap and nutritious food fishes.

HISTORY OF THE PARK.

Since embracing in this chapter of my report of 1880 my previous private and official publications regarding the aboriginal inhabitants and early white rovers of the park, the accumulation of material from exploration, research, and the narratives of trappers and miners in these regions, as well as the perusal of rare publications in the east, is deemed sufficient to justify a synopsis of them herein. This material, for brevity and clearness, is arranged as follows:

First. Traces of a people who inhabited these regions prior to their occupancy by the present race of Indians.

Second. Remains of Indians.

Third. Evidence of early white trappers.

Fourth. Narrations of prospecting white men before the Washburn exploring expedition of 1870.

Fifth. Explorations of this year.

TRACES OF A SUPPOSED PREHISTORIC PEOPLE.

These consist mainly of utensils, weapons, and implements not now or known to have ever been used by the present race of Indians in or adjacent to the park. Also, rude stone-heap drive-ways for game, which I have recently found therein, or adjacent thereto, some of which are here represented.

Notes regarding ollas, vessels of stone, &c., found in the Yellowstone National Park in 1881.

Fig. 3. Fragment of steatite vessel, size restored about as follows:	Inches.
Greatest diameter	11
Height externally	10
Depth of vessel inside	8
Breadth of rim	1

Much thicker in the bottom, pecked into oval shape outside. No evidence of fire, but some pestle marks in the bottom of the cavity. Found upon the surface in the Upper Madison Cañon.

Fig. 4. Fragment of steatite vessel, size restored:	Inches.
Greatest diameter	8
Height externally	10
Depth of vessel inside	9
Breadth of rim	$\frac{1}{2}$

Very uniform throughout and finely finished, but not polished or ornamented; showing very evident *fire marks*. Found outside up, nearly

covered with washings from the volcanic cliffs, together with various rude stone lance-heads, knives, and scrapers, in the remains of ancient

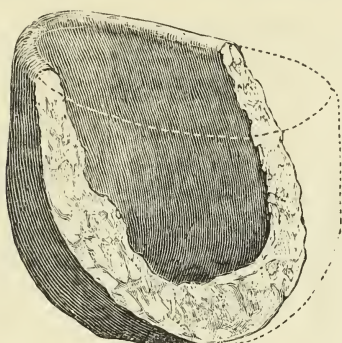


FIG. 3.

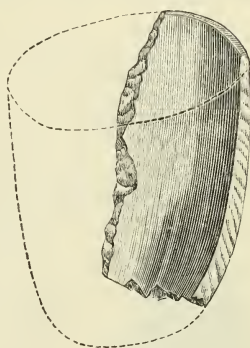


FIG. 4.

camp-fires disclosed by the recent burning of the forest border of the upper end of Pleasant Valley, on the right of where our road enters it from the cliffs.

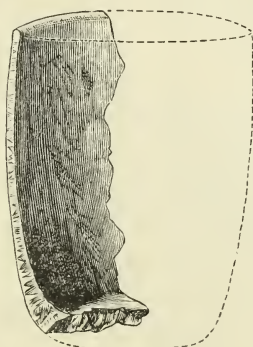


FIG. 5.

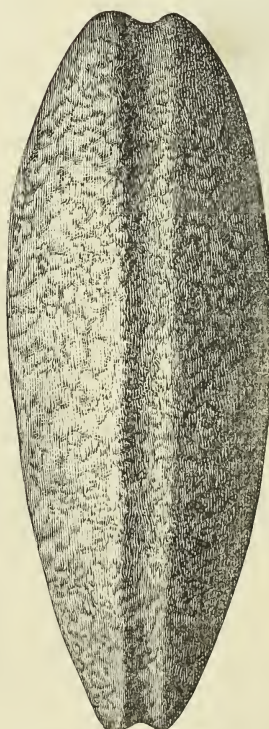


FIG. 7.

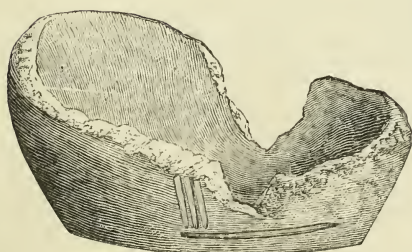


FIG. 6.

Fig. 5. Fragment of a steatite vessel, size restored:

	Inches.
Greatest diameter.....	7
Height externally.....	12
Depth of vessel inside.....	10
Breadth of rim.....	$\frac{5}{8}$

Very uniform, well finished outside, but showing much evidence of fine tool-marks inside. Found upon the surface of the mines at the head of Soda Butte.

Fig. 6. Soapstone or very soft steatite vessel, fragment :

Inches.

Greatest diameter	5
Smallest diameter	3 $\frac{1}{2}$
Height externally	2 $\frac{3}{4}$
Depth of vessel inside	2
Breadth of rim	$\frac{1}{2}$

Well finished inside and out, with flat bottom. No evidence of fire; found with fragments of pottery and rude lance-heads at an ancient camp on the eroding bank of the Blacktail Creek.

It may be mentioned that these steatite vessels are the first found between the Atlantic and Pacific coasts, and are entirely different in form from those found in either direction.

Fig. 7. Sinker: natural size.

Inches.

Length	3 $\frac{1}{2}$
Greatest thickness	1 $\frac{1}{4}$
Narrowest at ends	1

Grooved entirely around it, endwise; made of rough, volcanic sandstone.

Fig. 8. Sinker: natural size.

Inches.

Length	3 $\frac{3}{4}$
Greatest diameter	1 $\frac{1}{2}$

Hole, $\frac{5}{8}$ of an inch from one end; made of coarse, green-veined marble.

There is abundant evidence that the Sheep-eater Indians habitually made brush and timber driveways and arrow coverts to secure game, and little to show that their progenitors or predecessors ever found timber so scarce in the park as to require driveways to be made of long lines of small stone-heaps such as are found; and this year I traced and sketched from the commencement of the open valley of the Yellowstone, upon the borders of the park below the mouth of Gardiner River, through the Bottler Park and the Gate of the Mountains, to the open plains, a distance of fully 60 miles. As this is mainly outside of the park, and the exploration exhausted none of the funds appropriated therefor, the report and numerous sketches of these stone-heaps, the cliffs over which at least the buffalo were driven, traces of bone-heaps, rude stone foundations of dwellings, together with their burial cairns, mining-shafts, and the tools, ornaments, and weapons obtained from them, will be published elsewhere in due time.

Fig. 9 is a representation of a line of rude stone heaps, probably intended as a driveway for game over the cliffs upon the banks of the Yellowstone. The stone circles shown are evidently the foundations of very ancient dwellings, as the stones like those of the driveway are about one-half covered with accumulated débris. This sketch may be considered as typical of others, many of which are much larger.

I will only here add that there is proof positive of the early and long occupancy of these mountain parks and valleys by a people whose tools, weapons, burial cairns, and habits were very unlike those of the red Indians, and who were the makers of the steatite vessels, &c., we

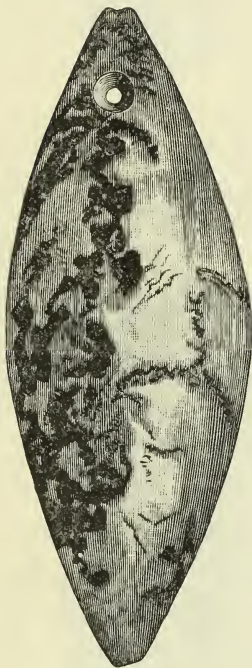


FIG. 8.

discovered; but whether they were a branch of the cliff-dwellers of the cañons of the Colorado, progenitors of the Sheepeaters, or both or

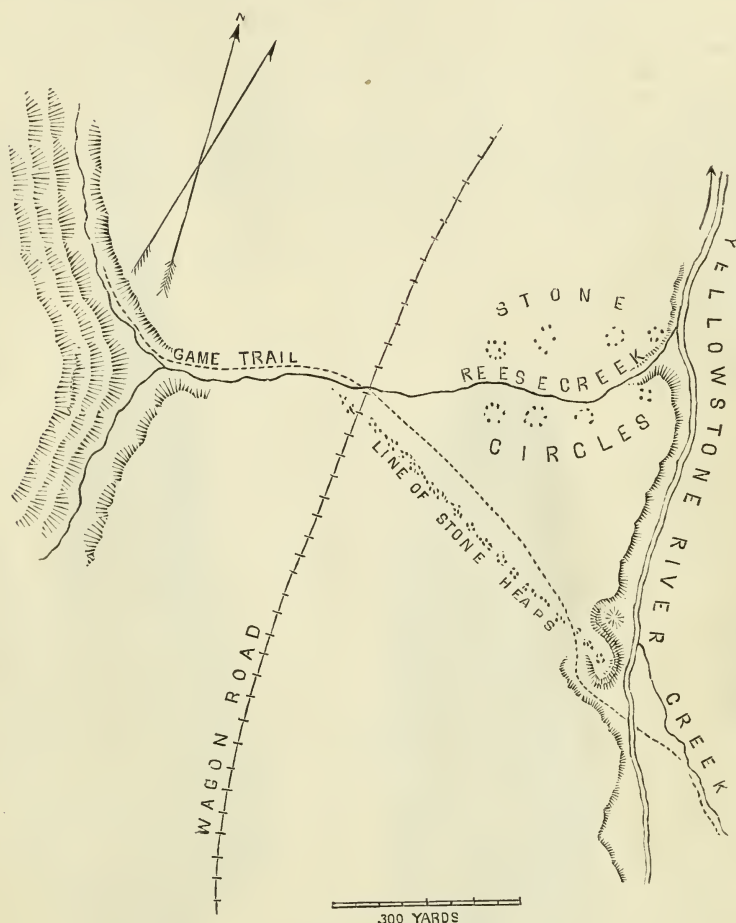


FIG. 9.—Driveway for game.

neither, are questions better understood with exploration and research in that direction, which I have commenced and hope may be continued.

INDIAN REMAINS.

These are, first, of the various kinds usually found in regions until recently only occasionally visited rather than inhabited by the nomadic hunter tribes, such as trails, lodge-poles, brush wick-e-ups, peeling of timber, and rude storm or timber wind-brakes upon commanding sites or narrow passes, for observation, ambush, or for protection from their enemies or the elements, as well as rude stone axes, or flint or obsidian knives, lance and arrow heads and scrapers; and, second, those pertaining to the timid Sheepeater occupants, such as remains of camp-fires in the secluded glens or cañons, and occasionally in caves or niches in

the cliffs, for shelter from the storms, or seclusion or defense from their enemies; timber driveways for animals to some well-chosen place for arrow-covert ambush and slaughter, and notably an occasional circular breastwork of timber or stone, or, as is common, partly of each, as to the real builders of which, and the purposes for which constructed, opinions differ. Four of these were discovered during this season, viz, one beside our camp, in a grove north of the crossing of Willow Creek, some three miles below Mary's Lake, which was seen by Hon. John Sherman and party, including the artist Bierstadt, who sketched it. It is about thirty feet long by twenty wide, and constructed of fragments of logs, stumps, poles, and stones, with ingenuity and skill proverbial

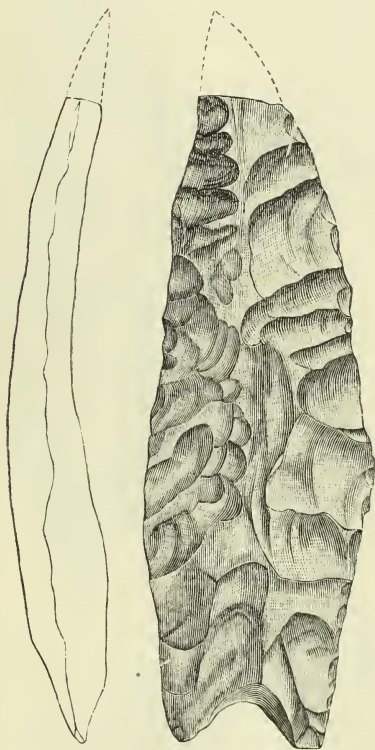


FIG.. 10.



FIG. 11.

to the beaver; nearly weather, wind, and bullet proof; about breast high, which is certainly less than when built, and situated, as usual, in a wind-fall then screened by a thicket of small pines, which are now large enough for bridge or building timber. A similar one was found upon the Stinkingwater side of the pass, which I discovered this season, in the Sierra Shoshone range, east of the Yellowstone Lake; another near Bridger's Lake, and the newest one on a small branch of Barlow Fork of Snake River. Although these and some of those previously found do not appear older than some of the evidences of white men, others certainly do, but none of them in any part of their construction as yet known show an iron ax or hatchet back upon them, and very few and faint marks of even stone tools or weapons. There is usually little

evidence of a door or gateway, and none of a roof, but abundant proof of a central fire, and usually of bones fractured lengthwise for the extraction of the marrow, as practiced by many barbaric peoples.

While these constructions much resemble a Blackfoot Indian fort, the infrequency of the visits of these Indians to a region of few horses, the



FIG. 13.



FIG. 14.



FIG. 15.

utter lack of marks of hatchets, which they have long possessed and always use, dispels this theory, and, as Sheep-eater wick-e-ups and polecoverts

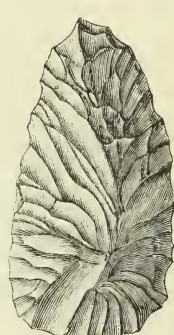


FIG. 12.

under low and heavily branched trees are common for summer use, and on cliffs for winter, the only remaining and most probable theory is that these are really winter lodges of the Sheep-eaters in the thicket borders of warm, sheltered

valleys, where the abundant timber of the decaying wind-falls, in which they are always found, could be liberally used in an inclosure so large as to not take fire, while it was a great protection against the cold, even

if, without being wholly or in part covered with the skins of animals, and as necessary against the prowling wolf and wolverine in winter, the ferocious grizzly in spring, or human foes on occasions. Two Shoshone Indian scouts and guides accompanied the exploring expedition of Governor Hoyt and Colonel Mason during the past season, one of whom, We-saw, had accompanied Captain Jones in his explorations of 1873. As arranged with Governor Hoyt at Mary's Lake, I en route tried the Nez Percé ford, and deeming it then barely passible for those well acquainted with the channel both sides of the island, posted a notice so informing him at the Mud Vol-



FIG. 16.

cano, and then ascended the river to its head, laid out some work for my laborers, constructed a raft, and crossed in time to intercept the governor and party, who, after visiting the Great Falls, had crossed at the Nez Percé ford under the skillful guidance of We-saw, although this was his first visit since the one with Captain Jones, eight

years before, and the channel had meanwhile changed materially. While the rest of the party were camped at Concretion Cove, We-saw and myself went over to the Jones trail on the Pelican, and thence followed it as near as possible for large areas of timber fallen since his visit, to the entrance of his pass of the Sierra Shoshone range, and in order to avoid this timber selected a route via the Hot Springs feeder of Turbid



FIG. 17.

Lake. During this and other occasions I could not fail to admire the intuitive accuracy of his judgment as to Jones's and other routes, even where no trace was visible, and in various conversations as well as comparisons of our daily sketches, which each regularly kept in his own style, obtained much valuable information. I found him an old but remarkably intelligent Indian, and so accurate in his sketches that I could readily trace them, although they were destitute of the point of compass, date, or word of explanation; and yet in that, as in all else,



FIG. 18.



FIG. 19.

he manifested the true Indian character, which, like their farms, *is all long and no wide, i. e.*, a keenness of perception rather than a broad or general comprehension of a subject, or even a region. Hence, although a person skilled in Indian sketching could by his map or sketch easily follow them through a long journey in all its turns and windings, neither one or both of them could therefrom make a general map of the region or of the relative positions of various mountains or other portions of the route, even approximately, and this is in fact the main difficulty with the maps and journals of white rovers also. We-saw states that he had neither knowledge nor tradition of any permanent occupants of the Park save the timid Sheepeaters, his account of whom is embraced in the history of them. He said that his people (Shoshones), the Bannocks, and Crows occasionally visited the Yellowstone Lake and river portions of the Park, but very seldom the geyser regions, which he declared were "*heap heap bad*," and never wintered there, as white men sometimes did with horses; that he had made several trips before the one with Captain Jones, one of which was, as I understood him, to assist some friends who had intermarried with the Sheepeaters to leave the Park after the great small-pox visitation some twenty years ago. Among the most recent as well as the most interesting of Indian remains are those heretofore reported of the rudely fortified camp of Chief Joseph and his Nez Percés in 1877. Of these, the corral east of Mary's Lake, corral and small breastwork between the Mud Volcano and the river, and others upon Pelican and Cache Creeks, and their dugways in descending into the cañons of Crandall and Clarke's Forks, possess peculiar historic interest. Figs. 10 to 24, inclusive, represent natural size scrapers, knives, lance or spear heads, perforators, and arrow-heads chipped from black obsidian. These were found in various places, such as caverns, driveways, or at the foot of cliffs over which animals had been driven to slaughter, and are typical of a collection of over two hundred such specimens collected this season.

EARLY WHITE ROVERS IN THE PARK—JOHN COULTER.

Since the publication in my report of 1880 of a reference to the trip of the Indian gauntlet-running Coulter across the National Park, in 1808 or 1809, I have, through the kindness of General O. M. Poe, Corps of Engineers, U. S. A., obtained a trace of the prior wanderings of this famous mountaineer, of which, as well as of the map exhibiting them, I had no previous knowledge. This map is contained in the first of three rare volumes now in the military library of the War Department, Washington, and is an English reprint in 1815 of the journals of Lewis and Clarke to the head of the Missouri River, and across the continent to the Pacific and return, during the years 1804-'05 and '06. The portion of this map showing the routes of these explorers, is remarkably accurate and the rest of it a fair representation of what was then known of those regions; but, as that was a medley of fact and fiction, of truth and romance, gleaned from the narratives of three centuries of Spanish rovers from Mexico, two of French missionaries or traders from Canada, and the more recent and more accurate accounts, English or Americans, between them, far the most valuable fact shown was the existence of an elevated snowy fountain-head and point of divergence for nearly all of the mighty rivers of central North America, while the real or relative location of the upper portion of all save those visited by Lewis and Clarke, as there shown, are at best only approximate, and are now known to be mainly erroneous. A knowledge of these facts is alike ne-

cessary to properly estimate the truth and the errors of this map, and especially those portions of the country shown to have been visited by Coulter in 1807. After his honorable discharge, as stated by Lewis and Clarke, in 1806, near the mouth of the Yellowstone, he ascended it to Prior's Creek, a southern branch of the Yellowstone, between the Clarke's Fork and the Bighorn, where he probably wintered, and, as shown by the map, the next year traversed the famous Prior Gap to the Clarke's Fork, which he ascended nearly to its head, and thence crossed the Amethlyst Mountain to the main Yellowstone River, and that at the best ford upon it. This is the famous Nez Percé ford at the Mud Volcano, the location of which is accurately shown under the name of Hot Brimstone Spring. But, most strangely, neither the Great Falls of the Yellowstone, 10 miles below, nor the lake, 8 miles above, are represented; but the river is correctly shown as a very wide one, not only to where the foot of the lake really is, but also incorrectly throughout its length, and the locating of one of the fingers to and as being the outlet of Eustus Lake, which he reached by crossing the main divide of the Rocky Mountains without knowing it. This is pardonable, as from the peculiar situation in the mountains of the lake he called Eustus (evidently Shoshone) Lake which was mistaken by Professor Hayden and others as Atlantic and not Pacific waters, only they thought it drained into the Madison, and Coulter supposed it drained into the Yellowstone, while it is in fact the head of one fork of the Snake River of the Columbia, although from its size (12 miles long) Coulter deemed it the large lake at the head of the Yellowstone, of which he must have heard.

From this lake his route seems to have been through or near Two Ocean and Tog-wo-tee Passes to lake Riddle, which, though far too large, is, from its location and drainage into the Upper Bighorn River, probably the Great Hot Spring at the present Fort Washakie, near the Wind River Shoshone Indian Agency. He thence traversed the mountains to Coulter's Fork of the Rio del Norte, as he naturally deemed it, discharging into the Gulf of Mexico, while it is in fact the Green River of the Colorado, of Major Powell's Grand Cañon to the Gulf of California. In traversing the South Pass he crossed the Continental Divide probably for the sixth time, without knowing it, to the Platte, which he calls the Rio de la Plata, and thence across the mountains and Bighorn River, through fossil regions, to the Salt (really South) Fork of the Stinkingwater, to the great Stinking Spring near the forks, and hence the name which, Indian-like, does not signify



FIG. 20.

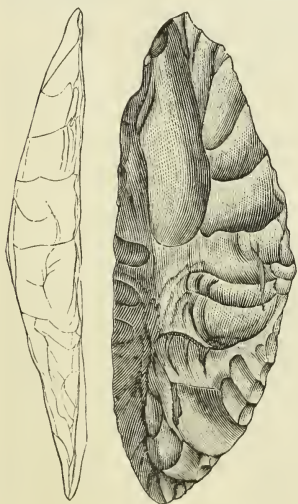


FIG. 21.

the Great Hot Spring at the present Fort Washakie, near the Wind River Shoshone Indian Agency. He thence traversed the mountains to Coulter's Fork of the Rio del Norte, as he naturally deemed it, discharging into the Gulf of Mexico, while it is in fact the Green River of the Colorado, of Major Powell's Grand Cañon to the Gulf of California. In traversing the South Pass he crossed the Continental Divide probably for the sixth time, without knowing it, to the Platte, which he calls the Rio de la Plata, and thence across the mountains and Bighorn River, through fossil regions, to the Salt (really South) Fork of the Stinkingwater, to the great Stinking Spring near the forks, and hence the name which, Indian-like, does not signify



FIG. 22.

the river of stinking water, but the river which passes or is near the stinking water.



FIG. 23.

From this are two trails, evidently a division of the unknown party, of probably whites and Crow or Shoshone Indians, one of which makes a cut-off to the outward trail on Clarke's Fork, and the other through much of the Bighorn region and a Gap Creek Pass to Prior's, and presumably the Yellowstone River at its mouth. This map shows a band of Snake (Shoshone) Indians, called *Yeppe*, of 1,000 souls, at the location of Pelican Creek and a valley, which, together with the Yellowstone Lake, as above shown, were neither visited nor correctly represented, but with little doubt this is the band to which the Shoshone Indian We-saw referred, as well as some of the evidences at Concretion Cove, in the preceding section upon Indian Remains. I have devoted unusual space to this matter, which I think is of great interest, as being the earliest known record of white men in any portion of the National Park, and is nearly as valuable for what is erroneously as well as for that which is correctly represented, from being a compilation by the highest authority of all that was at that period known of those vast mountain regions, and in no way conflicts with the account of the death of Potts, during Coulter's gauntlet-running expedition upon the Jefferson, or his return through the Park, as that was a subsequent expedition, and probably unknown to Lewis and Clarke at the time of their first publication of their journals, of which this English edition was mainly a reprint.



FIG. 24.

RECORDS OF THE EARLIEST WHITE MEN FOUND IN THE PARK.

The next earliest evidence of white men in the Park, of which I have any knowledge, was discovered by myself at our camp in the little glen, where our bridle-path from the lake makes its last approach to the rapids, one-fourth of a mile above the upper falls. About breast-high upon the west side of a smooth pine tree, about 20 inches in diameter, were found, legibly carved through the bark, and not materially obliterated by overgrowth or decay, in Roman capitals and Arabic numerals, the following record:



FIG. 25.

The camp was soon in excitement, the members of our party developing a marked diversity of opinion as to the real age of the record, the most experienced favoring the theory that it was really made at the

date as represented. Upon the other side of this tree were several small wooden pins, such as were formerly often used in fastening wolven and other skins while drying (of the actual age of which there was no clew further than that they were very old), but there were certain hatchet hacks near the record, which all agreed were of the same age, and that by cutting them out and counting the layers or annual growths the question should be decided. This was done, and although the layers were unusually thin, they were mainly distinct, and, in the minds of all present, decisive; and as this was upon the 29th day of July, it was only one month short of sixty-two years since some unknown white man had there stood and recorded his visit to the roaring rapids of the "Mystic River," before the birth of any of the band of stalwart but bronzed and grizzled mountaineers who were then grouped around it. This is all which was then or subsequently learned, or perhaps ever will be, of the maker of the record, unless a search which is now in progress results in proving these initials to be those of some early rover of these regions. Prominent among these was a famous Hudson Bay trapper, named Ross, whose grave I have often seen (the last time in going to the Bighole battlefield for the bones of Lieutenant Bradley, in 1879) where he was long since killed by the Blackfeet Indians in Ross's Hole—as parks were then called—at the head of the Ross Fork of Bitter Root branch of the Hell Gate, in Montana, and which was named after him; as was also, perhaps, the branch of Snake River in Idaho, where the Shoshone Indian Agency is situated. The "R" in the record suggests, rather than proves, identity, which, if established, would be important, as confirming the reality of the legendary visits of the Hudson Bay trappers to the Park at that early day. Thorough search of the grove in which this tree is situated only proved that it was a long-abandoned camping ground.] Our intelligent, observant mountaineer comrade, Phelps, upon this, as upon previous and subsequent occasions, favored the oldest date claimed by any one, of the traces of men, and, as usual, proved to be correct.

The narrowest place of the Yellowstone River of which I have any knowledge below the lake is between our camp of the Glen and the Upper Falls; and upon the eastern rock, just above the latter, I had often seen a medium-sized stump, which Phelps declared was cut by himself when returning with two or three comrades from James Stuart's fruitless Big Horn expedition of 1864, or seventeen years before this time, and that if we would cross the river he would show us the ruins of their camp-fire also. This we soon after did with a raft (as the river was then too high to cross as I have frequently done later in the season), in taking the measurements of the river for a future bridge, and where claimed by Phelps found the charred fire-brands of the camp, tent-poles, and even picket-pins for the lariats of the horses, intact, and, saving at the surface of the ground, but little decayed; in fact, the hatchet hacks upon all of the poles, including the ends of the pins, although of pine, in the ground, were uniformly clear and distinct. In company with this comrade I subsequently visited a scaffold for drying meat, at a ford of the Pelican, which I had often at a glance in passing deemed four or five years old, which he accurately described before reaching, and at once recognized as one of their camps of 1864, although he had not in the intervening time visited the vicinity. From the appearance of these and many other camps which were subsequently visited with him, or recognized by his description at various places in the mountains (including a pass near that of Two Ocean), and which I thus particularly mention as being, save those of Captain De Lacy hereafter mentioned, the oldest traces of

white men in the Park, of which we have positive data, I learned to judge of the relative age of certain marks, which, from signs hard to explain, were unmistakably recognized as the traces of unknown white men. In addition to the old loop-holed log ruin near the brink of the Grand Cañon below Mount Washburn; the cache of old Hudson Bay marten traps, near Obsidian Cliffs; decaying stumps of foot-logs over Hellroaring and Crevice streams, and other evidences of early white men, heretofore mentioned in my reports, I saw many during this season's explorations, a few only of which will be here noticed.

In the grove-girt border to the small lake back of Concretion Cove of Yellowstone Lake are the traces of very old tree and brush shelters for horses, larger and differently formed from those of Indians, and the numerous decaying bones of horses, proving that they died probably by starvation during some severe winter, or, as is less likely, were killed by the Indians in an attack before carrying the camp, (as they were not at that day properly armed with guns), for they would certainly have saved and not slaughtered them thereafter. Stumps of trees, remains of old camps, and the fragments of a rough dugout canoe, prove that white trappers long since frequented the famous willow swamps around the mouths of the Upper Yellowstone and the Beaver Dam Creek. Our first noon camp in ascending the east side of the Yellowstone above the lake was purposely made where Harry Yount found a human cranium in 1878. This skull we failed to find, but we utilized some of the wood cut and split, but not corded, by white men so long ago that, though the upper cross-sticks were apparently not decayed, they were dried into curvature from the heart and seams in the well-known manner of timber unearthed from peat bogs or beaver dams, and were easily broken over the knee by a sudden pressure of the hands upon the ends; also one end of a long pole for camp purposes, thrust through the fork of a pine, was there much overgrown. This camp was made near the eastern edge of a then new wind-fall of timber, as shown by the fragments of logs chopped, extending from the river to a lovely lawn skirting the towering cliffs; a well-chosen place for defense, or for secretion, unless betrayed by the presence of horses. A little distance above the camp are the stumps of trees cut and one of the logs not used in the construction of a raft. This wind-fall is now overgrown by trees, certainly not less than fifty or sixty years old; and the skull, fire-wood, raft log, and other circumstances indicate that a party of white men were attacked, and, after loss of horses, at least some of them hastily left their camp and attempted to escape by descending the river. Just south of the trail between the South Creek and the summit of the Two Ocean Pass is one standing and several fallen posts, and some poles of what may have been a very large oblong square tent, or more probably a conical lodge, as the appearance of the notches in the top of these posts, to sustain strong ridge and plate poles, seem to indicate that it was inclosed with skins and not canvas. But as the notches in the top of the posts were unquestionably made by white men, it was probably constructed for some grand council between the early trappers and the Indians, of which we have no other record or tradition than these decaying remnants.

The deep broad, and often branched bridle-paths up the Pelican Creek have usually been attributed to the thousands of horses of the retreating hostile Nez Percés or Bannocks and their white pursuers in 1877 and 1878, but this year I followed heavy trails from Camp Lovely, near the open pass from the South Fork of Pelican Creek, down an unknown branch (which these Indians did not follow) to the East Fork of the Yel-

lowstone, finding constant evidences of camps and other distinctly recognized traces of white men, made long years before the miles of burned and fallen timber—now much decayed—caused the abandonment of the route.

In closing this interesting subject it is only added that to tradition and slight published records I find abundant wide-spread, and, to my mind, conclusive evidence that white men frequented these regions nearly or quite from the visit of Coulter in 1807 until the waning of the fur trade after the discovery of gold in California, and in a lesser degree continuously thereafter. What portion of these rovers were trusty trappers and what hiding outlaws will never be known. Nor is it material to history, as the interest of each conduced to a successful concealment from the public of a knowledge of the cliff and snow girt parks and valleys of the National Park, fully two generations after the surrounding regions, some of which are fully as inaccessible, were well known, correctly mapped, and published to the world.

WHITE PROSPECTING MINERS.

The dwindling of placer mines in California, and their discovery elsewhere, greatly increased the numbers of the worthy prospecting successors of these roving trappers, and these were joined during the war of the rebellion by many deserters from the Union and Confederate armies, and by refugees from the devastated borders between them, and bold men from elsewhere, who preferred fighting Indians in the West to white men in the East, being mostly armed with long-range breech-loading rifles. Scarcely since the days of the Pilgrims of the Cross, and the wild crusade of the mailed warriors of Europe for the sacred tomb in Palestine, has the world witnessed an onset more wide-spread, daring, or resistless than that of the grim gold-seeking pilgrims to Wyoming, Idaho, and Montana. Streaming from the East, organized, often broken up and reorganized upon the plains, under Bridger, Bozeman, or other daring leaders, they, with wagon trains, pack trains, on horseback or afoot, collectively or separately, fought their way through the Cheyenne, the Sioux, and other of the fiercest fighting Indian nations of the plains, with bull-boat, raft, or wagon, afoot or on horseback, forded, ferried, or swam the mighty rivers, and in bands, in squads, or alone, poured a resistless stream through nearly every mountain pass, yawning gulch, and dangerous cañon, to all the main parks and valleys from the Platte to the Columbia.

Of some of these parties and pilgrims we have knowledge, but doubtless many prospectors have traversed these regions, visited portions of the park prior to 1870, but as they were seeking mines, and not marvels, and better skilled in fighting Indians than in reporting discoveries, the little known of them is being learned from their own recent publications, or by interviews with those of them still living, the list embracing many of the wealthiest and worthiest citizens of these regions, the narratives of some of which are added.

On page 113 of the first volume of the History of Montana is found the commencement of a very interesting narrative by Capt. W. W. De Lacy, now and long a prominent and esteemed surveyor and engineer of Montana, of the wanderings of himself and party of prospecting friends during the latter part of 1863. Leaving Alder Gulch, now Virginia City, in Montana, August 3, they crossed the main divide at Red Rock Creek, and proceeded thence, via Camas, Market Lake, and the forks of Snake River, and through the broken regions of East Fork, so graphically described in Irving's Astoria and Bonneville, reaching Jackson's Lake, at

the very foot of the towering Tetons. Here the party divided, one portion returning via Lewis Lake and the Fire Hole and Madison Rivers to Virginia City, while Captain De Lacy, with twenty-six men, missed Lewis Lake, but discovered and skirted a lake which was very properly called after their leader, De Lacy. This was named and published in maps for years before Professor Hayden or any of his men saw it; and some of them, for some unknown cause, gave it the name of Shoshone, which, though a fitting record of the name of the Indians who frequented it, is still in my view a gross injustice to its worthy discoverer, as, even if my interpretation of Coulter's visit in 1807 is correct, it was then unknown. From this lake De Lacy and party crossed the main divide of the Rocky Mountains to the East Fire Hole River, which they descended to the forks, and down the main Madison, through its upper cañon, then across the North Fork and through mountain defiles to the head of the west branch of the Gallatin Fork of the Missouri. The above narrative, the high character of its writer, his mainly correct description of the regions visited, and the traces which I have found of this party, proves alike its entire truthfulness, and the injustice of changing the name of De Lacy's Lake; and fearing it is now too late to restore the proper name to it, I have, as a small token of deserved justice, named the stream and park crossed by our trail above the Shoshone Lake after their discoverer.

The journey of G. H. Phelps and comrades connected with the armed expedition of James Stuart early in the spring of 1864, to the Bighorn regions, for the purpose of avenging the slaughter of some, and the terrible sufferings of the rest, of his party, in 1863; failing to find the Indians, they broke up into prospecting parties, that of Phelps wandering through the mountains to the Sweet Water, through the South Pass to Green River, then to the Buffalo Fork of Snake River, crossing the main divide in the pass near Two Ocean, which, as before stated, I recognized from his description, and attached his name. Thence they descended to Bridger's Lake, crossed the Upper Yellowstone, and continued upon the east side of it, as well as of the lake and lower river, past Pelican Creek and the falls, as before shown, to the trail of another party of white men, which they followed to Emigrant Gulch, near the Gate of the Mountains.

From a well-informed and truthful mountaineer, named Adam Miller, I learned the history of this party. In the spring of 1864, H. W. Wayant, now a leading citizen of Silver City, Idaho, William Hamilton, and other prospectors, to the number of forty men, with saddle horses, pack train, and outfit, ascended the east side of the Yellowstone from the Gate of the Mountains to Emigrant, Bear, and Crevice Gulches, forks of the Yellowstone, East Fork, and Soda Butte; thence over the western foothills of Mount Norris to the bluffs upon the south side of Cache Creek, where their horses were all stolen by some unknown Indians, but their only two donkeys would not stampede, and remained with them. Here the party broke up; Wayant, Harrison, and ten others, with one jack, and what he and the men could carry, ascended Cache Creek to Crandall Creek, Clarke's Fork, Heart Mountain, thence by way of Index Peak and the Soda Butte returned to the cache made by the other party of what they could not carry, aided by their donkey, from where set afoot, and hence called Cache Creek. They then crossed the East Fork, scaled the Amethyst Mountain, forded the main Yellowstone, at Tower Falls, and thence returned via the mouth of Gardiner River, Cinnabar, and Cañon Creek, where I saw traces of them in 1870, to Alder Gulch, now Virginia City, Montana. Meanwhile the other party had returned, and some of them assisted in planting the mining camps of Crevice, Bear, and Emigrant.

Later in the same season George Huston and party ascended the main Fire Hole River, and from the marvelous eruption of the Giantess and other geysers, and the suffocating fumes of brimstone, fearing they were nearing the infernal regions, hastily decamped. These, with the visit of Frederick Bottler, and H. Sprague, Barronette, and others mentioned in preceding reports, are the most important of those as yet known, until 1870.

Upon a pine tree, below the confluence of the North Fork of the Stinking Water and the creek which we ascended to the new pass, is plainly and recently carved as follows:



FIG. 26.

Evidently showing that some one, on the 5th day of some month, the name of which commences with A, failed in an effort to ascend the stream, and so informed some person or party, who would then have known the date and circumstances. This record may have been left by a member of A Company, Fifth Infantry, this company having been with General Miles in the Bannock campaign of 1878, or the famous mountaineer and guide, Yellowstone Kelley, may have carved it.

A square pen of logs, with a huge dead-fall at its only entrance, found on Orange Creek, is certainly a white man's bear-trap, and like many other traces is of uncertain date, and not of sufficient interest for further notice.

INDIAN TREATIES.

The first white visitors to the National Park found the timid, harmless Sheepstealer Indians the only permanent occupants of it; their nearest neighbors, the Bannocks, Shoshones, and Mountain Crows, its most frequent visitors; and the occasional prowlers therein, the rapacious Blackfeet and Sioux, robbers of their race, and the early white trappers of these regions. Decimation by war and disease, with the occupancy of intervening regions by whites, guarantee future safety from the Blackfeet; a nearly impassable mountain range and a cordon of military posts and armed ranchmen, from the Sioux.

SHEEPEATERS, BANNOCKS, AND SHOSHONES.

The recent sale of the National Park and adjacent regions by these Indians insured future freedom from any save small horse-stealing bands of these tribes also. To prevent these forays, in council at their agency on Ross Fork of Snake River, in Idaho, and in Ruby Valley, in Montana, early in 1880, I obtained a solemn pledge from them to not thereafter go east of Henry's Lake, in Montana, or north of Hart Lake, in Wyoming, to which, as stated on page 3 of my report of 1880, they faithfully adhered. This pledge was renewed at Ross Fork when I was *en route* from Washington this year, and has again been sacredly observed. Unable to visit the Lemhi Agency of these tribes, by letter I represented the matter, and sent printed copies of the rules and regulations for the

management of the Park to Maj. E. C. Stone, their agent, who, in reply under date of May 26, stated that, after mature deliberation in council, he felt justified in pledging that the Indians of his agency would not thereafter enter the Park. The only known disregard of this pledge was by a band of three lodges of hunters upon the North Branch of the Madison, which was promptly reported and checked, and is not likely to occur again.

MOUNTAIN CROWS.

These Indians, numbering about 3,000, have as a tribe never been hostile to the whites, but often their valuable allies in conflicts with others, and though beset with their proverbial craving for horses, without a special observance of brands or collar-marks, besides some minor failings too prevalent with other races also, they have by the sale of much of their lands, and granting the right of way for a railroad through the remainder, proven that, although in common with their race they may be the guilty possessors of a valuable region desired by the all-absorbing white man, still they are not intentional obstructors in the pathway of progress.

As shown in my preceding reports, sustained by memorials of the officers and other leading citizens of Montana, and proven by the records, the following facts are established:

First. No portion of the northern or western watershed of the Yellowstone Range, between the Gate of the Mountains and the borders of Wyoming, including a three-mile strip of the Yellowstone National Park in Montana, was ever occupied, owned, or even claimed by the Crows, save only as being embraced in the then unknown boundaries of their reservation as set off in 1868.

Second. In 1864, or four years prior to the cession of this land to the Crows, the Sheepeater Indians, owners of Emigrant, Bear, and Crevice Gulches, had been dispossessed by the white miners, who have since constantly occupied portions and controlled all of it, with the full knowledge and acquiescence of the Crows.

Third. Upon the discovery of mines upon the northeastern watershed of the said Yellowstone Range, below the Gate of the Mountains, which had always been owned and occupied by the Crows, they promptly sold the entire range, embracing alike that occupied by the miners and that by themselves, including the old agency, buildings and improvements, as well as valuable agricultural lands, and have for many months allowed white men to occupy it, although, by the delay of Congress to appropriate the funds, they are still without one dollar of pay therefor. Besides this, they have, as before stated, shown their peaceful and progressive tendencies by promptly granting for a mere nominal sum a very liberal right of way along the whole river front of the remainder of their reservation for a railroad artery of civilization. Meanwhile, mines, mills, ranches, and the site and buildings of at least one village (Emigrant, or Chico), with a United States post-office, are, in the absence of all lawful organization or protection, held only by actual possession, without legal right of transfer or even improvement, which are alike indispensable to attract capital for the development of a most promising mining and agricultural region. Hence, in justice and good faith alike to the white man and to the Indian—to the Crow who surrendered a region without remuneration, and to the miner who holds it without title; to the race dwindling away for want of civilization for the means which are their due of obtaining it; to the poor but dauntless path-finding prospector of boundless hidden wealth for the race of resistless destiny sure

reward for its discovery and development, and for the peaceful adjustment and legal occupancy of a border of the Wonder Land of earth, and the safety of those who may visit, improve, or occupy it, do I urge, through the active influence of the department, the speedy appropriation by Congress of the means to cancel treaty obligations by paying this confiding people for a valuable region long since peacefully surrendered..

As the hostile incursion of Chief Joseph and his Nez Percés in 1877 was the armed migration of a people, anomalous in all its features, and impossible to ever again occur, with the peaceful adjustment of these Crow difficulties closes all claims or danger of Indians in any portion of the Park, and with it the necessity or semblance of an excuse for tourists to traverse it stalking arsenals of long-range rifles and other weapons, merely to slaughter or frighten away the dwindling remnant of our noblest animals, which it should be the pride as it is the duty of our American people to here preserve from threatened extinction.

HOODOO OR GOBLIN LAND.

A trail was opened this season upon a nearer route than that followed last year, and some new discoveries made around the base of Mount Norris, upon Cache Creek, and thence in nearly a direct line to and beyond the Hoodoo Mountain to Mason's Creek, at the head of the Great Stinkingwater Cañon, near the forks of which is a yawning cañon bordered by unearthly goblin forms as hideous as any conjured in wildest dreams.

C. M. Stephens accompanied me from the Mud Volcano to Clarke's Fork, with his transit for the purpose of taking daily and nightly observations; but although in early September we were terribly annoyed by fogs and storms, from the summit of Mount Chittenden we, protected by overcoats and gloves, through occasional rifts in the fog-clouds, got fair views of the Yellowstone Lake and Pelican Creek regions, but not of the Hoodoo, and upon the latter during the entire day of September 6 we remained, amid chilling fogs which were ascending from the melting snows in all the adjacent valleys, standing behind our monument of last year with compass and field-glass, ready to catch every glimpse of sunshine or opening in the shifting mists below or about us, and at various times obtained fair bearings of most of the leading points of interest, save Index Peak, which was not visible during the entire day. We proposed renewing our observations the next day, and then descend the Middle Fork of Crandall Creek to an open grassy plateau which we had plainly seen from the mountain, but a few miles distant upon Clarke's Fork, to the northeast. But the terrific snow-storm, which had kept us in a clump of fir trees at our camp of last year during much of the 4th and all of the 5th, recommenced with such fury that we hastily descended along our new trail about 30 miles to the gamekeeper's cabin on the Soda Butte, where the weather was warm and pleasant, with little snow. Determined to complete the exploration, leaving our pack-animals and outfit, we ascended the Soda Butte 20 miles to Clarke's Fork Mines, and spent the rest of the day in viewing the pass to Clarke's Fork and a route to Crandall's Creek for the morrow's effort. With the dawn came a snow-storm so furious that we yielded to the inevitable, and pressing through the storm, which as we descended decreased to no snow and a bright sunset at the cabin that night. The next day I returned through mingled snow and sunshine, 35 miles, reaching our headquarters on the eve of September 10, which I had only visited once for a few moments since the morning of July 1.

METEOROLOGICAL RECORD.

Weather record, kept by P. W. Norris, during the exploration of the Sierra Shoshone and a portion of the Rocky ranges.

[*Indicates approximate elevation only.—P. W. N.]

Date.	Camp.	Location.	Time.	Elevation.	Ther.	Weather.	Wind.
1881.				<i>Feet.</i>	°		
Aug. 16	1	Two miles below Mary's Lake...	7 a. m...	7,500	51	Cloudy	SW.
16	N.	Mud Volcano.....	Noon	7,725	65	Rainy	SW.
16	2	West side of the foot of Yellow- stone Lake.	6 p. m...	7,738	61	Clear	S.
17	2	.....do.....	6 a. m...	7,738	41	.....do.....	N.
17	2	.....do.....	Noon	7,738	70	.....do.....	SW.
17	2	.....do.....	6 p. m...	7,738	62	Fair	SW.
18	2	.....do.....	6 a. m...	7,738	42	.....do.....	NE.
18	3	Concretion Cove, on Yellow- stone Lake.	Noon	7,738	68	Cloudy	SW.
18	3	.....do.....	Sunset..	7,738	51	Windy	S.
19	3	.....do.....	Sunrise ..	7,738	40	Cloudy	N.
19	N.	Jones' Pass of the Sierra Sho- shone Range.	Noon	9,444	60	.....do.....	SW.
19	4	Mouth of Jones' Creek, near Jones' Camp No. 36.	Sunset..	6,683	54	Fair	SW.
20	4	.....do.....	Sunrise ..	6,683	34	Clear	S.
20	5	Jones' Camp No. 35, at head of the Grand Stinkingwater Cañon.	1 p. m ..	6,319	85	.....do.....	N.
20	5	.....do.....	Sunset..	6,319	65	.....do.....	SW.
21	5	.....do.....	Sunrise ..	6,319	51	.....do.....	SW.
21	N.	Snow field on Bald Mountain...	1 p. m ..	*10,650	28	.....do.....	SW.
21	5	Camp No. 5, on the Stinking- water.	8 p. m...	6,319	65	.....do.....	SW.
22	5	.....do.....	Sunrise ..	6,319	64	Slight shower	NW.
22	N.	Noon halt on the Norris Creek...	Noon	*7,500	73	Clear	NW.
22	6	Forks of Norris Creek	Sunset..	*7,812	50	.....do.....	W.
23	6	.....do.....	Sunrise ..	7,812	31	.....do.....	W.
23	N.	At pond and cascade in pass.....	Noon	*8,476	43	.....do.....	NW.
23	7	Forks of Clear Creek.....	Sunset..	*7,950	70	.....do.....	W.
24	7	.....do.....	Sunrise ..	*7,950	51	.....do.....	W.
24	N.	Signal Point, Yellowstone Lake.	Noon	*7,500	70	.....do.....	NW.
24	8	Terrace at the head of the left finger of the Yellowstone Lake.	Sunset..	7,800	65	.....do.....	S.
25	8	.....do.....	Sunrise ..	7,800	50	Thunder- shower	SW.
25	N.	At Old Hunters' Camp on the east side of the Upper Yellow- stone.	Noon	7,910	65	Clear	S.
25	9	Near Bridger's Lake	Sunset..	7,950	58	Showery	E.
26	9	.....do.....	Sunrise ..	7,950	22	Clear	N.
26	10	Two Ocean Pass.....	Noon	8,081	60	.....do.....	SW.
26	10	.....do.....	Sunset..	8,081	51	.....do.....	SW.
27	10	.....do.....	Sunrise ..	8,081	23	.....do.....	NE.
27	N.	Continental Divide.....	10 a. m...	*10,100	45	.....do.....	NE.
27	N.	Barlow Valley	1 p. m ..	8,400	81	.....do.....	SW.
27	11	Branch of Barlow River.....	Sunset..	*8,600	60	.....do.....	N.
28	11	.....do.....	Sunrise ..	*8,600	21	.....do.....	N.
28	N.	Summit of pass from branch of Yellowstone to one of Heart Lake.	Noon	8,481	75	.....do.....	SW.
28	12	Head of Heart Lake.....	Sunset..	7,475	60	.....do.....	S.
29	12	.....do.....	Sunrise ..	7,475	23	.....do.....	N.
29	N.	Summit of Mount Sheridan	11 a. m...	10,386	60	.....do.....	S.
29	12	Head of Heart Lake	Sunset..	7,475	55	Cloudy	N.
30	12	.....do.....	Sunrise ..	7,475	32	Snowy	N.
30	N.	Head of the thumb of the Yel- lowstone Lake.	Noon	7,738	31	Snow squalls	SW.
30	13	Bridge Creek, near Natural Bridge.	Sunset..	7,908	41	.....do.....	SW.
31	13	.....do.....	Sunrise ..	7,908	19	Clear	W.
31	14	Mud Volcano on Yellowstone River.	Noon	7,725	60	Cloudy	W.
31	14	.....do.....	Sunset..	7,725	51	.....do.....	W.
Sep. 1	14	.....do.....	Sunrise ..	7,725	31	Hazy	SW.
1	N.	Pelican Creek	Noon	7,800	58	.....do.....	W.
1	15	Foot of Mount Chittenden	Sunset..	7,850	43	.....do.....	W.
2	15	.....do.....	Sunrise ..	7,850	22	Snow squalls	NW.
2	N.	Summit of Mount Chittenden...	9 a. m...	10,190	31	.....do.....	NW.
2	N.	Pelican Creek.....	Noon	8,000	48	.....do.....	NW.

Weather record, kept by P. W. Norris, &c.—Continued.

Date.	Camp.	Location.	Time.	Eleva- tion.	Ther.	Weather.	Wind.
1881. Sept. 2	16	Camp Lovely, in pass to the East Fork of the Yellowstone River.	Sunset..	*8, 241	55	Clear	W.
3	16	.....do.....	Sunrise..	*8, 241	14	....do.....	W.
3	N.	East Fork Valley.....	Noon ..	7, 180	55	Cloudy.....	SE.
3	17	Three miles up Miller's Creek...	Sunset..	7, 190	61	....do.....	SE.
4	17	.....do.....	Sunrise..	7, 190	50	....do.....	SE.
4	N.	Head of Miller's Valley.....	11 a. m.	*7, 350	48	....do.....	NW.
4	18	Old camp, one mile from Hoodoo Mountain.	Sunset..	*8, 490	35	Severe snow storm.	NE
5	18	.....do.....	Sunrise..	*8, 490	30	....do.....	NE.
5	18	.....do.....	Noon ..	*8, 490	35	....do.....	NE.
5	18	.....do.....	Sunset..	*8, 490	36	....do.....	NE.
6	18	.....do.....	Sunrise..	*8, 490	19	....do.....	E.
6	N.	Summit of Hood-o Mountain....	Noon ..	*10, 700	21	Fogs.....	NE.
6	19	Old camp, one mile from Hoodoo Mountain.	Sunset..	8, 490	50	Clear	W.
7	19	.....do.....	Sunrise..	8, 490	18	Snow squalls	E.
7	N.	East Fork of Yellowstone Valley	Noon ..	6, 825	40	Clear	S.
7	20	Game keeper's cabin.....	Sunset..	6, 410	24	....do.....	S.
8	20	.....do.....	Sunrise..	6, 410	22	....do.....	NW.
8	N.	Cook City or Clarke's Fork Mines	Noon ..	7, 590	36	Cloudy	NW.
8	21	Miller's Camp in the mines	Sunset..	8, 425	39	....do.....	NW.
9	21	.....do.....	Sunrise..	8, 42	12	Severe snow storms.	N.
9	N.	Soda Butte.....	Noon...	6, 500	26	....do.....	N.
9	22	Game keeper's cabin.....	Sunset..	6, 410	26	Clear	SE.
10	22	.....do.....	Sunrise..	6, 410	16	....do.....	SE.
10	N.	Forks of the Yellowstone.....	Noon...	6, 000	36	....do.....	SW.
10	23	Mammoth Hot Springs.....	Sunset..	6, 450	65	....do.....	SW.

4 Y P

Meteorological record for the season kept at the Mammoth Hot Springs.

KEY.—S. R., sunrise; M., noon; S. S., sunset; Cl., clear; Cd., cloudy. No wind gauge.

[Latitude 44° 59' north; longitude 110° 42' west; elevation, 6,450 feet.]

January, 1881.

Date.	Temperature.			Wind.	Snow or rain.	Sky.
	S. R.	M.	S. S.			
1	24	36	26	NW.	.....	Cd.
2	12	26	18	N.	.....	Cd.
3	12	26	18	E.	.....	Cd.
4	24	32	30	SE.	S.	Cd.
5	18	44	32	SE.	.....	Cl.
6	10	30	28	S.	S.	Cl.
7	6	4	2	N.	S.	Cd.
8	14	6	0	N.	S.	Cd.
9	4	10	12	SE.	.....	Cl.
10	16	20	22	S.	.....	Cd.
11	28	34	36	SE.	S.	Cd.
12	34	34	36	SE.	S.	Cd.
13	10	22	18	W.	.....	Cl.
14	18	32	34	SE.	S.	Cd.
15	28	50	40	SE.	.....	Cl.
16	4	28	24	SE.	.....	Cl.
17	1	27	25	SE.	.....	Cl.
18	20	32	30	SE.	.....	Cl.
19	30	48	20	NW.	.....	Cd.
20	12	28	20	NW.	.....	Cl.
21	18	28	26	SE.	.....	Cl.
22	8	22	24	E.	.....	Cl.
23	22	26	24	SE.	.....	Cd.
24	18	38	20	SE.	.....	Cd.
25	0	24	4	NE.	S.	Cd.
26	6	16	18	E.	.....	Cd.
27	22	32	35	SE.	.....	Cd.
28	32	30	34	SE.	S.	Cd.
29	28	36	32	SE.	S.	Cd.
30	30	34	36	SE.	S.	Cd.
31	28	40	38	SE.	.....	Cl.
19 29 25			(Mean 24.)			

February, 1881.

Date.	Temperature.			Wind.	Snow or rain.	Sky.
	S. R.	M.	S. S.			
1	30	36	38	S.	R.	Cd.
2	39	41	42	SE.	R.	Cd.
3	42	44	44	S.	R.	Cd.
4	39	42	40	S.	R.	Cd.
5	32	51	39	E.	.....	Cl.
6	29	50	39	.....	.....	Cl.
7	20	38	28	NW.	S.	Cd.
8	19	32	24	SE.	.....	Cd.
9	8	30	22	NE.	.....	Cd.
10	8	26	20	NE.	S.	Cd.
11	6	26	18	NE.	S.	Cd.
12	0	17	20	SE.	S.	Cd.
13	14	6	12	N.	S.	Cd.
14	4	14	2	W.	.....	Cl.
15	2	16	16	SE.	.....	Cl.
16	12	22	26	SE.	S.	Cd.
17	16	42	26	SE.	.....	Cd.
18	9	29	20	SE.	.....	Cl.
19	19	36	26	SE.	R. & S.	Cd.
20	9	24	22	SE.	.....	Cd.
21	28	33	30	SE.	.....	Cd.
22	32	39	36	W.	.....	Cl.
23	32	40	34	S.	.....	Cl.
24	32	42	38	S.	.....	Cl.
25	34	32	34	SE.	S.	Cd.
26	26	39	30	SE.	.....	Cl.
27	28	38	38	SE.	S.	Cd.
28	38	49	41	SE.	R.	Cd.
22 33 29			(Mean 28.)			

March, 1881.

1	32	38	34	SE.	.....	Cl.
2	22	36	28	SE.	.....	Cl.
3	26	38	32	SE.	.....	Cl.
4	30	42	36	SE.	.....	Cl.
5	22	44	35	SE.	.....	Cl.
6	37	38	30	N.	.....	Cd.
7	2	44	34	SE.	.....	Cl.
8	18	40	33	SE.	.....	Cl.
9	18	56	40	S.	.....	.....
10	41	48	41	S.	.....	Cd.
11	29	43	30	N.	.....	Cl.
12	22	32	22	S.	.....	Cl.
13	18	40	29	S.	.....	Cl.
14	12	38	28	S.	.....	Cl.
15	8	48	28	SE.	.....	Cl.
16	11	46	32	SW.	.....	Cl.
17	14	42	26	SE.	.....	Cl.
18	25	38	29	N.	.....	Cl.
19	26	52	32	SW.	.....	Cl.
20	32	44	44	SE.	.....	Cl.
21	28	50	40	SE.	.....	Cl.
22	26	58	43	SW.	.....	Cl.
23	30	50	54	SW.	.....	Cl.
24	38	50	30	SW.	.....	Cl.
25	28	48	45	SW.	.....	Cl.
26	40	48	43	NE.	.....	Cl.
27	40	48	43	NE.	.....	Cl.
28	25	61	46	NE.	.....	Cl.
29	32	66	50	SE.	.....	Cl.
30	35	68	53	W.	.....	Cl.
31	36	50	43	SE.	.....	Cl.
27 47 37			(Mean 37.)			

April, 1881.

1	36	66	65	SE.	.....	Cl.
2	36	53	41	SE.	.....	Cl.
3	30	66	50	SE.	.....	Cl.
4	34	68	54	SE.	.....	Cl.
5	40	58	54	SE.	.....	Cl.
6	44	50	40	SE.	R.	Cd.
7	24	35	30	NW.	.....	Cd.
8	22	38	38	NW.	.....	Cd.
9	24	32	24	NW.	S. & R.	Cd.
10	20	48	28	NW.	R.	Cd.
11	21	43	30	NW.	.....	Cd.
12	18	42	33	NW.	.....	Cl.
13	23	42	34	SE.	.....	Cl.
14	34	48	46	SE.	.....	Cl.
15	40	57	52	SE.	.....	Cl.
16	42	62	56	SE.	.....	Cl.
17	42	54	50	SE.	.....	Cl.
18	44	50	45	SE.	.....	Cl.
19	43	56	50	SE.	R.	Cd.
20	45	62	50	SE.	R.	Cd.
21	36	62	50	SE.	.....	Cl.
22	40	49	40	SE.	.....	Cl.
23	32	44	40	SE.	R.	Cd.
24	35	50	48	SE.	R. & S.	Cd.
25	40	48	42	SE.	.....	Cl.
26	35	42	42	SE.	.....	Cl.
27	37	50	47	SE.	.....	Cl.
28	32	48	46	SE.	R.	Cd.
29	40	58	55	SE.	.....	Cl.
30	40	56	50	SE.	.....	Cl.
34 51 44			(Mean 43.)			

Meteorological record for the season, &c.—Continued.

May, 1881.

Date.	Temperature.			Wind.	Snow or rain.	Sky.
	S. R.	M.	S. S.			
1	40	56	50	S.	.....	Cl.
2	40	60	50	SE.	.....	Cl.
3	32	50	40	SW.	.....	Cl.
4	40	60	56	S.	.....	Cl.
5	40	60	56	S.	.....	Cl.
6	35	55	50	S.	.....	Cd.
7	45	60	56	S.	.....	Cl.
8	48	65	60	SE.	.....	Cl.
9	45	65	60	SE.	.....	Cl.
10	49	70	65	SE.	.....	Cl.
11	40	60	56	SE.	.....	Cl.
12	35	56	50	SE.	.....	Cl.
13	35	45	40	SE.	.....	Cd.
14	37	40	40	SE.	.....	Cd.
15	35	48	45	SE.	.....	Cd.
16	40	50	45	SE.	.....	Cl.
17	45	60	57	SE.	.....	Cl.
18	50	65	60	SE.	.....	Cl.
19	50	66	60	SE.	.....	Cl.
20	53	60	58	SE.	.....	Cl.
21	50	62	60	SE.	.....	Cl.
22	50	65	60	SE.	.....	Cl.
23	50	65	60	SE.	.....	Cl.
24	50	65	60	SE.	.....	Cl.
25	45	60	58	SE.	.....	Cl.
26	48	63	60	SE.	.....	Cl.
27	50	65	60	SE.	.....	Cl.
28	55	70	65	SE.	.....	Cl.
29	50	65	63	SE.	.....	Cl.
30	52	67	60	SE.	.....	Cl.
31	54	68	62	SE.	.....	Cl.
45 60 56			(Mean 54.)			

June, 1881.

Date.	Temperature.			Wind.	Snow or rain.	Sky.
	S. R.	M.	S. S.			
1	50	70	62	SE.	.....	Cl.
2	48	83	74	SE.	.....	Cl.
3	48	74	70	SE.	.....	Cl.
4	42	65	60	SE.	.....	Cl.
5	45	68	60	SE.	R.	Cd.
6	41	68	50	S.	.....	Cd.
7	38	64	48	S.	.....	Cd.
8	46	60	48	SE.	R.	Cd.
9	46	48	48	SE.	R.	Cd.
10	40	55	38	SE.	R.	Cd.
11	40	50	38	SE.	R.	Cd.
12	44	58	50	SE.	R.	Cd.
13	44	66	55	SE.	R.	Cd.
14	52	58	58	SE.	R.	Cd.
15	50	58	58	SE.	R.	Cd.
16	50	58	50	SW.	R.	Cd.
17	40	58	50	E.	.....	Cl.
18	48	68	52	SE.	.....	Cl.
19	55	70	53	SE.	.....	Cl.
20	50	60	55	SE.	.....	Cl.
21	45	60	55	SE.	.....	Cl.
22	50	52	55	N.	.....	Cl.
23	45	50	45	NW.	.....	Cd.
24	50	80	45	S.	R.	R.
25	60	72	65	SE.	R.	R.
26	59	74	66	SE.	R.	R.
27	65	80	70	SE.	R.	R.
28	70	86	70	SE.	.....	Cl.
29	70	82	70	SE.	.....	Cl.
30	70	85	70	SE.	.....	Cl.
50 66 56			(Mean 57.)			

July, 1881.

				(*)	(*)	(*)
1	53	98	84	.....	.....	.....
2	70	88	84	.....	.....	.....
3	60	78	72	.....	.....	.....
4	55	75	70	.....	.....	.....
5	50	80	76	.....	.....	.....
6	68	82	78	.....	.....	.....
7	62	63	48	.....	.....	.....
8	33	62	60	.....	.....	.....
9	50	56	53	.....	.....	.....
10	47	68	55	.....	.....	.....
11	50	60	58	.....	.....	.....
12	53	78	74	.....	.....	.....
13	58	85	76	.....	.....	.....
14	60	80	74	.....	.....	.....
15	54	76	60	.....	.....	.....
16	56	76	60	.....	.....	.....
17	58	86	80	.....	.....	.....
18	68	90	82	.....	.....	.....
19	66	80	60	.....	.....	.....
20	54	64	59	.....	.....	.....
21	50	76	60	.....	.....	.....
22	50	82	70	.....	.....	.....
23	52	84	80	.....	.....	.....
24	52	80	58	.....	.....	.....
25	50	80	80	.....	.....	.....
26	54	74	68	.....	.....	.....
27	60	78	62	.....	.....	.....
28	53	82	70	.....	.....	.....
29	56	80	74	.....	.....	.....
30	54	84	80	.....	.....	.....
31	64	74	68	.....	.....	.....
55 77 69			(Mean 67.)			

August, 1881.

				(*)	(*)	(*)
1	44	72	65	.....	.....	.....
2	46	80	72	.....	.....	.....
3	60	90	62	.....	.....	.....
4	60	92	65	.....	.....	.....
5	52	95	72	.....	.....	.....
6	60	94	87	.....	.....	.....
7	72	80	66	.....	.....	.....
8	60	76	74	.....	.....	.....
9	50	68	55	.....	.....	.....
10	60	74	70	.....	.....	.....
11	50	78	60	.....	.....	.....
12	46	88	74	.....	.....	.....
13	50	88	74	.....	.....	.....
14	60	74	70	.....	.....	.....
15	50	76	70	.....	.....	.....
16	52	75	70	.....	.....	.....
17	45	74	70	.....	.....	.....
18	48	80	65	.....	.....	.....
19	46	78	64	.....	.....	.....
20	47	85	60	.....	.....	.....
21	50	82	60	.....	.....	.....
22	50	85	60	.....	.....	.....
23	40	72	70	.....	.....	.....
24	50	86	58	.....	.....	.....
25	46	74	60	.....	.....	.....
26	54	86	74	.....	.....	.....
27	48	72	64	.....	.....	.....
28	40	76	54	.....	.....	.....
29	42	78	62	.....	.....	.....
30	40	64	60	.....	.....	.....
31	34	68	60	.....	.....	.....
50 79 66			(Mean 65.)			

* No record of wind, rain, or sky.—C. M. S.

Meteorological record for the season, &c.—Continued.

September, 1881.

October, 1881.

Date.	Temperature.			Wind.	Snow or rain.	Sky.	Date.	Temperature.			Wind.	Snow or rain.	Sky.
	S. R.	M.	S. S.					S. R.	M.	S. S.			
1	50	62	56	(*)	(*)	(*)	1	40	50	48	SW.		
2	40	66	48	.....	.....	.....	2	20	68	64	S.		
3	38	74	60	.....	.....	.....	3	34	61	42	S.		
4	48	48	50	.....	.....	.....	4	35	63	46	SE.		
5	34	46	38	.....	.....	.....	5	38	68	50	E.		
6	30	58	58	.....	.....	.....	6	38	41	40	E.		
7	34	46	42	.....	.....	.....	7	32	38	42	NE.		
8	50	70	60	.....	.....	.....	8	31	51	39	E.		
9	40	60	44	.....	.....	.....	9	32	64	54	E.		
10	30	68	46	.....	.....	.....	10	39	68	58	SE.		
11	44	74	64	.....	.....	.....	11	34	40	32	N.		
12	40	80	74	.....	.....	.....	12	10	35	18	SE.		
13	40	80	68	.....	.....	.....	13	6	44	34	N.		
14	40	78	42	.....	.....	.....	14	12	24	20	SE.		
15	34	86	70	.....	.....	.....	15	9	30	28	NE.		
16	40	84	72	.....	.....	.....	16	18	34	25	E.		
17	50	64	42	.....	.....	.....	17	26	40	30	SE.		
18	36	74	62	.....	.....	.....	18	31	42	30	SE.		
19	36	60	58	.....	.....	.....	19	36	53	40	SE.		
20	34	64	60	.....	.....	Cd.	20	38	54	40	W.		Cl.
21	40	60	56	.....	.....	.....	21	34	47	42	.....		Cl.
22	40	58	54	.....	.....	.....	22	32	51	40	N.		Cl.
23	40	45	40	.....	.....	.....	23	25	63	40	SE.		Cl.
24	30	48	40	.....	S.	.....	24	26	64	40	SE.		Cl.
25	40	55	35	.....	R.	.....	25	28	55	44	SE.		Cd.
26	26	48	32	.....	S.	Cd.	26	32	48	42	SE.		Cd.
27	28	50	35	.....	.....	Cl.	27	30	50	40	SE.		Cl.
28	26	45	30	.....	S.	Cd.	28	30	48	41	SE.	S.	Cd.
29	25	50	36	.....	S.	Cd.	29	31	44	40	SE.		Cd.
30	28	40	35	.....	S.	Cd.	30	34	40	32	SE.	R.	Cd.
							31	28	30	34	NW.		Cd.
36 61 50				(Mean 49.)			29 49 39				(Mean 39.)		

November, 1881.

Date.	Temperature.			Wind.	Sky.	Remarks.
	S. R.	M.	S. S.			
1	30	35	31	NW.	Cd.	Rainy.
2	28	34	30	NW.	Cd.	
3	25	31	26	SE.	Cd.	Snow.
4	26	50	24	SE.	Cd.	Squally.
5	20	34	25	SE.	Cl.	
6	24	35	32	SE.	Cl.	
7	28	38	30	SE.	Cl.	
8	24	35	38	SE.	Cl.	
9	21	34	30	N.	Cl.	Windy.
10	20	31	24	N.	Cl.	Windy.
11	18	30	25	N.	Cd.	Snow squalls.
12	20	30	24	N.	Cd.	Snow squalls.
13	26	35	30	SE.	Cl.	
14	30	42	35	SE.	Cl.	
15	30	40	25	SE.	Cl.	
16	32	46	30	SE.	Cl.	
17	34	50	41	W.	Cd.	Rain.
18	34	46	38	W.	Cd.	Rain.
19	30	40	32	SW.	Cd.	Rain.
20	32	44	31	SW.	Cl.	
21	30	42	34	SW.	Cl.	
22	20	36	30	SE.	Cl.	
23	18	30	25	SE.	Cd.	
24	16	28	20	SE.	Cl.	
25	13	20	17	SE.	Cd.	Snow.
26	9	30	20	SE.	Cd.	Snow.
27	14	32	28	SE.	Cd.	Snow.
28	18	40	35	S.	Cl.	
29	19	40	30	S.	Cl.	
30	18	36	30	S.	Cl.	
23 39 26				(Mean 29.)		

SULPHUR.

The demand for this mineral, for the purpose of preventing and curing the skin and hoof diseases of the sheep, increases, as does the animal, grazing upon the grassy slopes and terraced foot-hills of these mountain regions, where they are proving very profitable to their owners; and, as no refining of the substance is necessary for this and similar purposes, all thus needed by ranchmen could be readily obtained in the National Park, if they are allowed to do so, which has not been done further than to test its fitness and invite propositions. At the suggestion of the Hon. John Sherman, while we were visiting Sulphur Mountain during the past season, several excavations were made in the sulphur deposits of that and other localities, in order to learn something of their depth and quality. The uniform result was the finding of sulphur somewhat mixed with geyserite and other substances, in strata, or banding to where we were forced to desist by scalding hot sulphur water, or the stifling fumes arising from the deposit, at depths ranging from 3 to 6 feet from the surface. Specimens of these have been forwarded, with those of obsidian, geyserite, &c., to the National Museum for exhibition, as well as to obtain an opinion regarding their practical value. Although in this first search for beds of sulphur no heavy deposits cold enough to be worked were found, still I deem it far from conclusive evidence that none such exist, which may yet be found and profitably worked, if it be considered best to allow its being done. Hence, I suggest the propriety of allowing the search to be made by some responsible person or company, under a lease, allowing the mining and sale thereof of a limited quantity, and for a restricted length of time, and under such regulations as may be thought necessary and proper. While I do not in this desire to represent that any great revenue will immediately accrue to assist in the protection and improvement of the park, I see little danger of loss or injury in exploring some of its nearly countless sulphur deposits, but a certainty of obtaining many specimens of the fragile but beautiful sulphur crystals, and perhaps beds of commercial value, or knowledge of scientific interest.

PAINT-POTS.

This is a provincialism, or local phrase for the dwindled remnants of salses or mud geysers, which are difficult to describe or comprehend otherwise than by actual view of them.

Having in detail described the various kinds of geysers in my last year's report, I here only need to add that from the choking of the supply pipe, or fissure, to the regular intermittent Geyser, or from the bursting out of new ones, many of them dwindle into salses, with only an occasional eruption of their seething, foaming, muddy contents, and still dwindling in power, while increasing in their density and coloring, as well as the fetid smell, and nauseous, often noxious gasses escaping therefrom in spasmodic, hissing or gurgling throes or eruptions, become what are called paint pots. These are sometimes in gulches or basins commingled with or bordering the other kinds of geysers, but usually in more or less detached localities, each of which generally exhibits a preponderance of red, yellow, or other coloring characteristic of the predominant iron, sulphur, or other mineral substances of the basin, but in many of them are found closely and irregularly intermingled pools or pots of seething nauseous paint-like substances of nearly every color and shade of coloring known to the arts, and with a fineness of material and brilliancy of tinting seldom equalled in the productions of man. Although so

brilliant, the colors of these paints are not permanent, but soon fade, and as the deposits are so numerous, accessible, and constantly accumulating, it is a question for scientific research to learn if the addition of lead or other minerals in proper proportions may not render these mineral paints practically valuable. There is direct evidence that the Indians used this paint liberally in adorning or besmearing their persons, their weapons, and their lodges. They also used a much more durable variety of red and yellow paint found in bands, layers, or detached masses, in the cliffs, a notable deposit of which was discovered by myself during the past season in the face of the almost vertical walls of a yawning, impassible earthquake fissure nearly opposite the mouth of Hellroaring Creek, which has evidently been visited by Indians in modern times.

INSTRUCTIONS TO WYMAN.

CAMP AT FORKS OF THE FIRE HOLE RIVER,
Yellowstone National Park, September 27, 1881.

C. H. WYMAN:

SIR: You are hereby instructed to proceed with George Rowland, and the necessary saddle, pack animals, outfit and provisions to the Lower, Midway, and Upper Geyser Basins, for the purpose of preventing vandalism of geyser cones and other objects of natural interest, and in general attend to the enforcement of the laws, rules, and regulations for the protection and management of the Yellowstone National Park.

For the prompt and full performance of this and other duties, you are hereby appointed an agent of the government, with full power of seizure of vandalized articles, and the outfits of those persons committing depredations, at your discretion, in accordance with article seven of the printed rules and regulations of the Superintendent of the Park and the Secretary of the Interior for the management thereof, published May 4, 1881, a copy of which is hereunto attached. (See appendix marked B.) You are also to use due diligence in keeping a record of the weather, making and recording observations of the periods and altitudes of the various geyser eruptions, and especially the Excelsior in the Midway Basin.

Weather permitting, you are expected to remain ten or twelve days, returning via the Norris Geyser Basin, there spending at least one day and two nights, carefully noting the geyser eruptions, and, upon reaching headquarters at the Mammoth Hot Springs, make a detailed report in writing.

P. W. NORRIS,
Superintendent Yellowstone National Park.

MAMMOTH HOT SPRINGS,
Yellowstone National Park, October 10, 1881.

P. W. NORRIS,
Superintendent of the Yellowstone National Park:

SIR: In compliance with your attached instructions of September 27, I proceeded through the Lower to the Midway Geyser Basin, carefully noting geyser eruptions, until the non-arrival of Rowland necessitated my descending the main Fire Hole River to the Marshall Hotel at night. Returned early upon the morning of the 28th, and Rowland having arrived at noon we made our camp upon the road across the Fire Hole River from the Excelsior Geyser, judging it the nearest safe place for viewing its eruptions, as well as the movements of tourists. A terribly swollen knee, from the effects of a horse kick while in the great cañon of the Gibbon, had not only thus delayed Rowland's arrival, but also, despite his earnest efforts, continued to seriously curtail his proposed observations of geyser eruptions in the Upper Basin while I was thus engaged in the Midway one. Although the attached report contains the main features of these eruptions, I may properly add that the subterranean rumblings and earth tremblings were often so fearful as to prevent sleep—so great the cloud ascending from the Excelsior Geyser, and so dense and widespread the descending spray, as to obscure the sun at mid-day, and the united mists and fogs as to saturate garments like the spray from a cataract, and often render the nights so pitchy dark as to prevent accurate observations.

Most of the rocks, hurled hundreds of feet above the column of water, fall in the foaming pond, but many are strewn over surrounding acres. This monster geyser now seems settling down to regular business, with less powerful but more frequent eruptions than during the summer, but its eruptions fully double the volume of water in

the Fire Hole River, here nearly 100 yards wide, 2 or 3 feet deep, here very rapid, rendering it too hot to ford for a long distance.

Owing to Rowland's lameness, and the dense fogs in the valleys, the eruptions of the adjacent geysers, as well as those of the Lower Basin and the Geyser Meadows, were not properly noted; and, although no concert of eruptions was observable, all were unusually active and powerful. Thus also, in the Upper Basin, as noted in the occasional visits of Rowland, as well as during our two days' continuous observations there. While Old Faithful was fully sustaining her proverbial reputation for reliability, the Grand, Beehive, Castle, Splendid, and others geysers, seemed struggling to rival it; in fact, all the evidence indicates greater power and activity than during my first visit in 1875, or at any intervening period.

The recent severe snow storms tend alike to clear the park of the tourists now in it, and restrict the number of future arrivals this fall, as well as the danger of forest fires and vandalism.

En route to the Norris Geyser Basin we had a distant view of geysers in eruption in the Monument Basin, nearly amid the clouds, and others in the cañon of the Gibbon, and the Paint Pots, the appearance of all of which, as well as in the Norris Basin, indicates unusual activity. In fact, there seems no room to question the marked increase of power and activity of the internal forces throughout the Fire Hole regions.

Most respectfully, yours,

C. H. WYMAN.

Record of the eruptions of the Excelsior Geyser in the Midway Basin, Yellowstone National Park.

Date.	Time of eruption.	Duration of eruption in minutes.	Height of the column of water in feet.	Remarks.
1880.				
Sept. 27	8. 00 a. m.	5	100	Witnessed the last eruption from a distance.
27	3. 30 p. m.	7	75	
27	5. 30 p. m.	7	100	
27	7. 15 p. m.	6	90	
28	9. 00 a. m.	5	60	Heavy fog in the morning, clear until sunset, and thence dense mists from the Excelsior Geyser, and fogs from the foaming, hot Fire Hole River.
28	10. 30 a. m.	7	75	
28	11. 48 a. m.	7	75	
28	3. 00 p. m.	5	100	
28	5. 20 p. m.	6	100	Heavy snow squalls, shutting off all observation after 7.20 p. m.
28	7. 30 p. m.	7	125	
29	9. 30 a. m.	7	60	
29	3. 30 p. m.	5	60	
29	5. 00 p. m.	5	70	Heavy clouds and mists much of the day.
29	7. 20 p. m.	7	75	
30	9. 00 a. m.	5	50	
30	3. 00 p. m.	7	100	
30	5. 20 p. m.	5	125	Mists too dense for observation at night.
30	7. 15 p. m.	5	75	
30	9. 30 p. m.	6	75	Cloudy and nearly dark all day.
Oct. 1	6. 15 a. m.	5	60	
1	8. 06 a. m.	10	150	
1	10. 10 a. m.	15	100	
1	12. 55 p. m.	10	200	Too dense fogs and mists to continue observations.
1	3. 50 p. m.	10	250	
1	5. 40 p. m.	10	225	
1	7. 10 p. m.	5	75	
1	9. 00 p. m.	5	75	Clear, but a very heavy wind down the valley, allowing approach upon the windward side, disclosing the fact that heavy masses of the horizontally-banded wall-rock were fractured and falling into the foaming cauldron, which was all that could be observed, save an occasional rock eruption.
2	12. 15 a. m.	5	75	
2	3. 30 a. m.	5	75	
2	6. 45 a. m.	5	75	
2	8. 15 a. m.	5	75	
2	10. 10 a. m.	5	75	
	12. 15 p. m.	4	60	

Record of the eruptions of the Excelsior Geyser in the Midway Basin, &c.—Continued.

Date.	Time of eruption.	Duration of eruption in minutes.	Height of the column of water in feet.	Remarks.
1880.				
Oct. 2	2. 15 p. m.	5	50	
2	4. 15 p. m.	7	200	
2	5. 30 p. m.	5	75	
2	7. 00 p. m.	5	50	
2	9. 05 p. m.	5	50	
2	11. 15 p. m.	5	60	
3	6. 30 a. m.	5	100	
3	8. 00 a. m.	10	150	Countless rocks, of many pounds weight, hurled like a rocket high above the column of water, some of which fell in and across the river, which is here 100 yards wide, and during much of the day was a foaming flood of hot water.
3	10. 10 a. m.	10	300	
3	12. 30 p. m.	10	75	
3	3. 00 p. m.	10	250	
3	4. 30 p. m.	7	75	
3	5. 45 p. m.	5	80	
3	7. 25 p. m.	6	75	
3	9. 20 p. m.	5	75	
3	11. 30 p. m.	5	75	
4	6. 00 a. m.	5	75	
4	7. 30 a. m.	5	75	Broke camp and went to the Upper Basin at 9 a. m.
4	9. 00 a. m.	7	75	
4	10. 20 a. m.	10	150	
4	11. 45 a. m.	5	150	
6	3. 00 p. m.	5	75	Returned through mist and snow squalls; weather quite cold.
6	5. 25 p. m.	7	100	
6	7. 19 p. m.	6	80	
6	9. 00 p. m.	7	120	
6	10. 40 p. m.	5	75	
7	3. 45 a. m.	6	80	Clear and cold, but dense fogs along the river for miles.
7	5. 20 a. m.	7	125	
7	6. 45 a. m.	5	100	
7	9. 08 a. m.	7	120	Left the basin for the Norris Geyser.

ERUPTIONS OF GEYSERS IN THE UPPER BASIN.

Old Faithful—This typical geyser during our visit seemed to be in greatest activity and power, having hourly eruptions of five minutes' duration, and columns of water 175 feet high.

GRAND.

Date.	Time of eruption.	Duration of eruption in minutes.	Height of the column of water in feet.	Remarks.
1881.				
Oct. 4	9.45 a. m.	20	200	Observed by Rowland. The column of water at all of these eruptions was vertical and of remarkable symmetry and beauty.
4	5.10 p. m.	25	200	
5	3.25 p. m.	20	200	
6	9.15 a. m.	20	200	
6	4.20 p. m.	20	200	

SPLENDID.

Date.	Time of eruption.	Duration of eruption in minutes.	Height of the column of water in feet.	Remarks.
1880.				
Oct. 4	7.15 a. m			Eruptions uniformly much like those of Old Faithful, but the form of the column of water less vertical and more spreading.
4	9 a. m			
4	11 a. m			
4	2.30 p. m			
4	6.30 p. m			
5	6 a. m			
5	8.20 a. m			
5	11.20 a. m			
5	1.15 p. m			
5	3.45 p. m			
5	6.30 p. m			
6	6 a. m			
6	8.30 a. m			
6	11 a. m			
6	1.20 p. m			

CASTLE.

Oct.	4	3 p. m	25	75	There was a constant agitation and several small eruptions.
	6	9.45 a. m	30	100	

BEEHIVE.

Oct.	4	9.45 p. m	5	175	Column of water always vertical, and of great symmetry and beauty.
	5	2.15 p. m	5	200	
	6	8.40 p. m	5	180	

GIANT.

Oct.	5	8 p. m	25	250	The accompanying earth-trembling was terrific.
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The Lion, Lioness, Grotto, Fan, Riverside, Saw-mill, and other geysers had eruptions during the night, which we failed to properly observe, but, from the noise of their spouting, all were in full force and activity.

LOWER GEYSER BASIN.

Fountain.—Usually had an eruption each forenoon, those observed being of from 10 to 15 minutes' duration, with water column from 60 to 90 feet high, and very spreading. Rowland's lameness and the dense fogs prevented extended observations in the Lower Basin, as well as in the Geyser Meadows.

NORRIS GEYSER BASIN.

Monarch.

Date.	Time of eruption.	Duration of eruption in minutes.	Height of the column of water in feet.	Remarks.
Oct.	8	6.20 a. m	20	The eruptions are simultaneously through three orifices—2 by 12, 2½ by 11, and 5 by 6 feet, respectively, their combined flow producing for the time a large sized stream of hot water.
	9	6.30 a. m	25	

New Crater.—Exhibits two kinds of eruptions—one of them, each half hour, 50 feet high, and another about 100 feet high daily.

Minute Man.—Eruptions 25 or 30 feet high each minute, with little variation.

Emerald.—Evidently has an occasional eruption, although none were observed.

Vixen.—Eruption from 40 to 50 feet high, each two or three hours.

Constant, Twins, Triplets, and many others in the Porcelain Vale, seem in nearly constant eruption, so that the spray and fogs greatly obscure the sun's rays by day, and render the nights dark, damp, and unpleasant.

Report of weather in the Geyser Basins.

MIDWAY BASIN.

Date.	Thermometer.			Remarks.
	Sunrise.	Noon.	Sunset.	
1881.				
Sept. 27 ..	32	50	38	Cloudy.
28 ..	38	49	42	Clear; heavy mist from the Excelsior Geyser.
29 ..	40	55	32	Snow-squalls.
30 ..	26	52	30	Heavy clouds and mist.
Oct. 1 ..	36	50	32	Do.
2 ..	32	60	44	Clear, but windy.
3 ..	34	61	40	Clear, but windy; dense mist at night.
4 ..	26	.....	.....

UPPER BASIN.

Oct. 4 ..	.....	64	46	Dense mists from geysers.
5 ..	25	68	42	Clear morning; thunder-shower at 2 p. m.
6 ..	32	38	.....	Snow-squalls and blinding mists.

MIDWAY BASIN.

Oct. 6 ..	.....	.....	30	Snow-squalls and blinding mists.
7 ..	33	.....	.....	Clear, but very winly. Went to the Norris Geyser Basin.

NORRIS BASIN.

Oct. 7	32	Clear and lovely. Clear day. Left for headquarters at 7.20 a. m., arrived at 12 m.
8 ..	18	50	40	
9 ..	16	.....	.....

GEYSERS.

The theories regarding these and other kinds of hot springs in the park were so fully treated of in my report of last year, and the records of their eruption, notably during the latter part of this season, in the foregoing trustworthy report of Wyman, leaves but little necessary to show that, with the exception of the local changes at the Mammoth Hot Springs and of the Safety-Valve Basin in the Grand Cañon, there is evidently a far greater development of power than ever before witnessed throughout the entire Fire-Hole regions. But as to the cause or causes, probable duration, or future tendencies, we only know that they are at variance with the accepted and apparently correct theory of their dwindling character, with one marked exception. This is in the Midway Basin of the Fire Hole River, where the evidence is conclusive of not only spasmodic, but continuous increase of power.

The following description is from Hayden's Report of 1871, pp. 114, 115:

About three miles up the Fire-Hole from Camp Reunion we meet with a small but quite interesting group of springs on both sides of the stream. There is a vast accumulation of silica, forming a hill 50 feet above the level of the river. Upon the summit is one of the largest springs yet seen, nearly circular 150 feet in diameter; boils up in the center, but overflows with such uniformity on all sides as to admit of the formation of no real rim, but forming a succession of little ornamental steps, from 1 to 3 inches in height, just as water would congeal from cold in flowing down a gentle declivity. There was the same transparent clearness, the same brilliancy of coloring to the waters; but the hot steam and the thinness of the rim prevented me from approaching it near enough to ascertain its temperature or observe its depth, except at one edge, where it was 180° . It is certainly one of the grandest hot springs ever seen by human eye. But



FIG. 27.—Excelsior Geyser, 1872.

the most formidable one of all is near the margin of the river. It seems to have broken out close by the river, to have continually enlarged its orifice by the breaking down of its sides. It evidently commenced on the east side, and the continual wear of the under side of the crust on the west side has caused the margin to fall in, until an aperture at least 250 feet in diameter has been formed, with walls or sides 20 to 30 feet high, showing the laminae of deposition perfectly. The water is intensely agitated all the time, boiling like a caldron, from which a vast column of steam is ever arising, filling the orifice. As the passing breeze sweeps it away for a moment, one looks down into this terrible, seething pit with terror. All around the sides are large masses of

the siliceous crust that have fallen from the rim. An immense column of water flows out of this caldron into the river. As it pours over the marginal slope, it descends by numerous small channels, with a large number of smaller ones spreading over a broad surface, and the marvelous beauty of the strikingly vivid coloring far surpasses anything of the kind we have seen in this land of wondrous beauty; every possible shade of color, from the vivid scarlet to a bright rose, and every shade of yellow to delicate cream, mingled with vivid green from minute vegetation. Some of the channels were lined with a very fine, delicate, yellow, silky material, which vibrates at every movement of the waters. Mr. Thomas Moran, the distinguished artist, obtained sketches of these beautiful springs, and from his well-known reputation as a colorist, we look for a painting that will convey some conception to the mind of the exquisite variety of colors around this spring. There was one most beautiful funnel-shaped spring, 20 feet in diameter at the top, but tapering down, lined inside and outside with the most delicate decorations. Indeed, to one looking down into its clear depths, it seemed like a fairy palace. The same jelly like substance or pulp to which I have before alluded covers a large area with the various shades of light red and green. The surface yields to the tread like a cushion. It is about 2 inches in thickness, and, although seldom so tenacious as to hold together, yet it may be taken up in quite large masses, and when it becomes dry it is blown about by the wind like fragments of variegated lichens.

The above, cut from the Hayden report of 1872, and the description thereof in that of 1871, are here republished, both for their accuracy and as a datum from which to trace subsequent and future developments. This clearly proves the comparatively recent outburst of the yawning pool of hot water, in border parlance heretofore called "Hell's Half Acre," which during the past season has fully justified the name and greatly exceeded the dimensions. Although noted for the deep ultramarine blue, ever-agitated waters, so characteristic of the true geyser when not in eruption, there was neither evidence nor indications of recent eruptions until late in August, 1878. I then distinctly heard its spoutings when near Old Faithful, 6 miles distant, but arrived too late to witness them, though not its effects upon the Fire Hole River, which was so swollen as to float out some of our bridges over rivulet branches below it.

Crossing the river above the geyser and hitching my horse, with bewildering astonishment I beheld the outlet at least tripled in size, and a furious torrent of hot water escaping from the pool, which was shrouded in steam, greatly hiding its spasmodic foamings. The pool was considerably enlarged, its immediate borders swept entirely clear of all movable fragments of rock, enough of which had been hurled or forced back to form a ridge from knee to breast high at a distance of from 20 to 50 feet from the ragged edge of the yawning chasm. Perhaps no published statement of mine in reference to the Wonder Land has ever more severely tested the credulity of friends or of the public; and even General Crook and Secretary Schurz, to whom I pointed out the decreasing proofs of this eruption, seemed to receive it with annoying evidences of distrust. The volume of steam arising from this pool continued to increase until, on reaching the Lookout lower border of the valley, late in November, 1880, it appeared so great as to cause me to visit it the next day, hopeful of seeing an eruption or evidences of a recent one. This I failed to find, but not a volume of steam which then shrouded all near it, as it did the whole of the lower valley before the next morning. In order to make the Mammoth Hot Springs, 40 miles distant, that day, I started early, and with the thermometer but little above zero groped my way through this fog, which chilled to the marrow, to the Lookout Terrace, 3 miles from the Forks of the Fire Holes and 8 from the geyser, and emerged therefrom by ascending above it into a broad and brilliant scene of beauty seldom witnessed by human vision. From the foaming half-acre caldron an enormous column of steam and vapor constantly arose, at first verti-

cally, then swayed by a moderate but steady southern wind northerly, increasing with the altitude, until intermingling with or forming a cloud at the proper elevation, from which a nearly imperceptible descending vapor, carried northerly, covered and loaded to pendency the southern branches of the dark pine and fir fringes to the terrace slopes and craggy cliffs of the Madison Plateau, to its great cañon beyond the Gibbon, fully 15 miles from this earthly Gehenna.

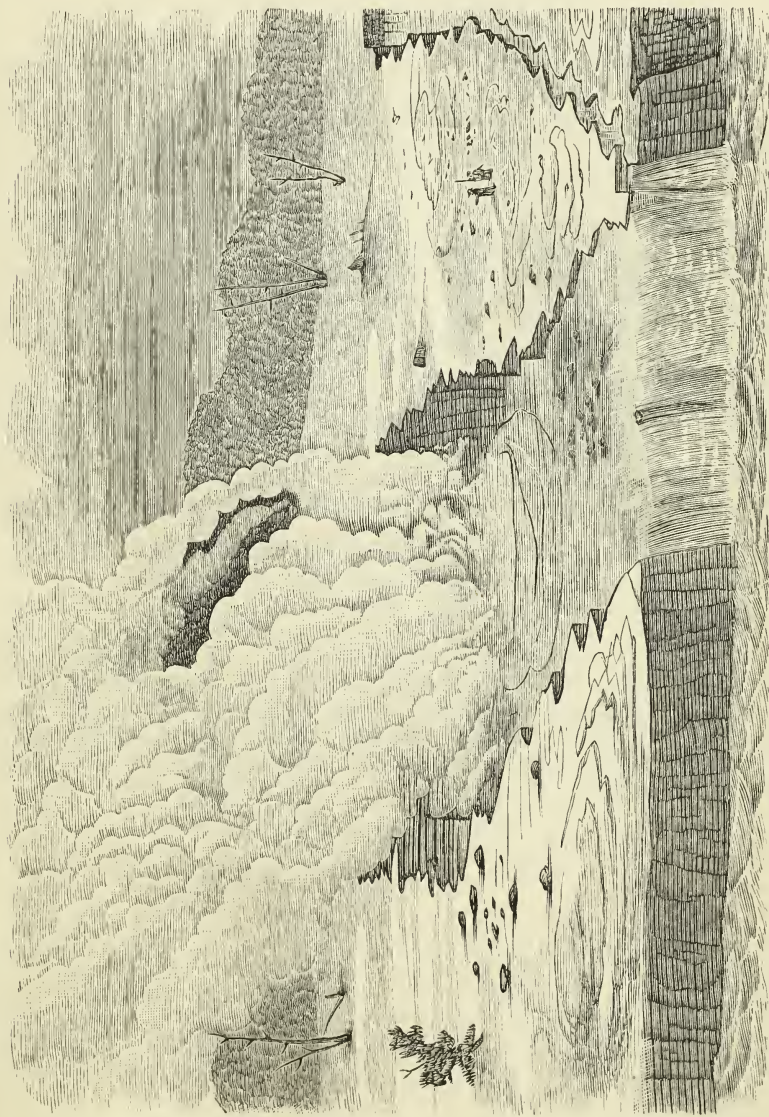


FIG. 28.—Excelsior Geyser, 1881.

Beneath this unique cloud-awning the low and seemingly distant rays of a cold, cloudless sun rising, in struggling through this vapor-laden atmosphere, formed a variety of tints and reflections from the inimitably beautiful festoons of frost formation, while commingled with a dark

green background of foliage, of somber cliffs and snowy mountains—a brilliancy of blended wavy shades and halos enchantingly beautiful. This was my parting view of that geyser last year; and before my return this season, great changes had occurred. From the statements of G. W. Marshall, at the Forks of the Fire Holes, February was ushered in by dense fogs and fearful rumblings and earth tremblings, which he ultimately traced to regular eruptions, daily, or rather nightly, commencing about 10 o'clock p. m., gradually recurring later, until by July 1 they were after daylight; and this eruption is now about 10 a. m., showing a loss of twelve hours in nine months. During much of the summer this eruption was simply incredible, elevating to heights of from 100 to 300 feet sufficient water to render the rapid Fire Hole River, nearly 100 yards wide, a foaming torrent of steaming hot water, and hurling rocks of from 1 to 100 pounds weight, like those from an exploded mine, over surrounding acres. By far the finest landmark that I ever beheld in all my mountain wanderings was the immense column of steam, even when the geyser was not in eruption, always arising from this monster, which was ever plainly visible to where, at the proper elevation, it formed a cloud that floated away in a long line to the leeward in the clearest summer's day, and was never to be mistaken for any other wherever seen, which was upon all the surrounding mountains, including the Rocky and Shoshone ranges, portions of which that I visited were fully 100 miles distant. In September the eruptions branched into one about 4 o'clock p. m., and soon after to others, until it now seems to be settling down to regular business as a two or three hour geyser, so immeasurably excelling any other, ancient or modern, known to history, that I find but one name fitting, and herein christen it the "Excelsior" until scientists, if able, shall invent a more appropriate one. This pool is now 400 paces in circumference.

The Fire Hole River is down a declivity of some 20 or 30 feet from where the outlet beside the horseman is shown in the Hayden view (Fig. 27), Wyman's camp being across the river, still eastward—and many rocks were hurled into or across it, and also to the great spring, with the steam cloud in the background, as well as another, sixty paces to the north of the geyser, whose brilliantly colored outlet is shown as joining that of the geyser upon the brink of the declivity to the river, in the above view from my sketch (Fig. 28), which was taken at a period of less activity between the regular daily eruptions early in the season than observed at any subsequent period.

REPORT OF GAMEKEEPER.

MAMMOTH HOT SPRINGS,
YELLOWSTONE NATIONAL PARK,
September 30, 1881.

SIR: I hereby respectfully submit the following report of my operations as gamekeeper of the park, for the protection of its animals, since furnishing my report of November 25, 1880, from the gamekeeper's cabin, near the confluence of the Soda Butte and the East Fork of the Yellowstone River. I there remained, sometimes having George Rowland or Adam Miller for a comrade, but often alone, during the entire winter, the early part of which was so severe that there were no mountain hunters—the Clarke's Fork miners twenty miles distant one way, and the boys at the headquarters nearly forty the other, being the nearest, and in fact the only men in these regions. The snowfall was unusually great, and remained very deep high in the mountains, but the winds and hot vapors from the Fire Hole Basin at the foot of Mount Norris kept the snow pretty clear along its western slopes, where there were abundance of mountain sheep, and some elk, all winter. Elk to the number of about 400 wintered in small bands in the valleys of the East Fork and Soda Butte, where the snow was about knee-deep. The Slough Creek and Hellroaring bands of bison did not venture near the cabin until February, nor did those of Amethyst Mountain at all; and the most of the deer and antelope descended into the lower Yellowstone Valley early in the winter.

The most of the Clarke's Fork miners seemed disposed to kill only what game they needed for food, and preserve the rest from slaughter for their hides only, and hence I returned to the headquarters in the spring, which opened very early and continued warm and pleasant. This allowed me to visit many other portions of the park, sometimes on snow-shoes and sometimes with saddle and pack-horses. "I found that very few of the deer or antelope wintered anywhere in the park; that a small band of bison wintered on Alam Creek, and another on the South Fork of the Madison; that there were elk in nearly all of the warm valleys, and moose around the Shoshone and the fingers of the Yellowstone lakes; big-horn sheep on all the mountain slopes; wolverine, marten, and various kinds of foxes, who do not leave the park in winter, nor do the bears of all kinds, as they hibernate." During the remainder of the season I have been active in the various duties of killing what game was necessary for our various parties of laborers, and protecting the rest from wanton slaughter by some of the tourists and a band of Bannock Indians on the North Madison. I also guided the party of Governor Hoyt and Colonel Mason from the Two Ocean Pass to the Fire Holes, and accompanied you in the long and arduous exploration of the Sierra Shoshone, and the Rocky Mountain, from Turbid Lake to Mount Sheridan; and in a final tour of the main roads and trails of the park close my services and resign my position as gamekeeper of the park to resume private enterprises now requiring my personal attention. The unfortunate breakage of my thermometer when it could not be replaced prevented my keeping other than a record of fair and stormy days, winds and rain and snow-fall during last winter, a synopsis of which is hereunto attached.

In conclusion, I may justly add that my relations with yourself, with your men, and with nearly all of the visitors to the park, as well as the surrounding miners and hunters have always been most cordial; but, as stated in my report of last year, I do not think that any one man appointed by the honorable Secretary, and specifically designated as a gamekeeper, is what is needed or can prove effective for certain necessary purposes, but a small and reliable police force of men, employed when needed, during good behavior, and dischargeable for cause by the superintendent of the park, is what is really the most practicable way of seeing that the game is protected from wanton slaughter, the forests from careless use of fire, and the enforcement of all the other laws, rules, and regulations for the protection and improvement of the park.

Most respectfully, yours,

HARRY YOUNT,
Gamekeeper.

P. W. NORRIS,
Superintendent of the Yellowstone National Park.

OBSERVATIONS OF WEATHER.

November.—From the 26th to the 30th, inclusive, snowy.

December.—During this month, one day was rainy, two hazy, six clear, cold, and windy, and twenty-two snowy.

January.—The 13th, 16th, 17th, 18th, 20th, 21st, 22d, 24th, and 25th, nine days, were clear; the remainder of the month snowy, and mainly very cold.

February.—The 2d and 3d, two days, rainy; 14th, one day, was clear; the 8th, snowy; the 9th, squally, and twenty-three days snowy.

March.—Twenty-four days were clear, and mostly mild, and some warm; one day rainy, two snowy, and four clondy.

April.—The 1st, 4th, 5th and 7th were clear, the 2d, 3d, and 6th rainy, and the snow so soft that traveling with my Norwegian snow shoes 14 feet long, was hard work, and leaving them at the middle fall of the Gardiner, went thence through the cañon to the boys at headquarters, they keeping the weather records correctly thereafter.

INTRODUCTION TO ROADS, BRIDLE-PATHS, AND TRAILS.

In preceding reports I have followed the usual custom of calling all traveled routes either roads or trails, but it having become, as it will continue, necessary to mention mountain, fire-hole, cliff, and cañon trails for footmen only, as well as those in common use for saddle and pack animals, the latter are herein tabled as bridle-paths, the former as trails; while the lodge-pole or Indian and game trails only are thus designated whenever mentioned in the body of this report. I have, also, in some of my preceding reports, stated that, as none of our roads, bridle-paths, or trails had ever been measured, the tables of them were at best only approximations, and the distances therein shown are more probably over than under estimated. This view the odometer measurements of Capt. W. S.

Stanton, Corps of Engineers, and of First Lieut. E. Z. Steever, Third Cavalry, made during July and August of the past season, have proven correct, and it is one of the amusing incidents in connection with these peculiar regions that while prominent judges, senators, governors, and other officers of the government were making me the subject of their raillery upon the annoying length of my estimated miles, other officers were by actual measure proving many of them far too short. This is especially noticeable in the direct or Mammoth Hot Spring road, estimated when made, in 1878, as 50 miles in length, and which was nearly correct at that time, but it having been materially shortened by changing the road from the cañon to the plateau of the Madison, a cut-off through the earthquake region and somewhat elsewhere, it is now found to be less than 37 miles long, which is only about one-half of the Mount Waba-h route, and can never be essentially shortened. The tables of distances, as received from Captain Stanton and Lieutenant Steever, were well arranged and computed, evincing accurate odometer measurements, and are accepted and used as such; but owing to the subsequent construction of new roads and bridle-paths, or changes in old ones, as well as from their want of knowledge of the names of many places which it is believed essential to mention, these tables are thus amended; but all portions of them have been accepted which were proper to use, and are credited and indicated by a *.

SYNOPSIS OF ROADS, BRIDLE-PATHS, AND TRAILS IN THE YELLOWSTONE NATIONAL PARK.

	Between points.	Total.
<i>Road towards Bozeman.</i>		
	<i>Miles.</i>	<i>Miles.</i>
* From headquarters at the Mammoth Hot Springs to northern boundary line of Wyoming.....		1.99
Northern boundary line of the National Park, below the mouth of the Gardiner River.....	5.00	6.99
<i>Direct road to the Forks of the Fire-Hole River.</i>		
* From headquarters at the Mammoth Hot Springs to Terrace Pass.....		1.93
* Swan Lake.....	3.21	5.14
* Crossing of Middle Fork of Gardiner River.....	2.33	7.47
Willow Park, upper end.....	3.50	10.97
* Obsidian Cliffs and Beaver Lake.....	1.37	12.34
* Green Creek.....	1.40	13.74
* Lake of the Woods.....	.76	14.50
* Hot Springs.....	1.68	16.18
* Norris Fork Crossing.....	4.17	20.35
* Norris Geyser Basin.....	.71	21.06
* Geyser Creek and Forks of the Paint-Pot trail.....	3.13	24.19
* Head of Cañon of the Gibbon and foot-bridge on trail to Monument Geysers.....	.72	24.91
* Falls of the Gibbon River.....	3.75	28.66
* Cañon Creek.....	.59	29.25
Earthquake Cliffs.....	3.00	32.25
* Lookout Terrace.....	1.50	33.75
* Marshall's Hotel, at the Forks of the Fire Hole River.....	2.43	36.18
<i>Road from Forks of the Fire Hole River to foot of the Yellowstone Lake.</i>		
From Marshall's Hotel to forks of the road near Prospect Point.....		1.00
* Hot Springs.....	1.08	2.08
* Rock Fork.....	3.86	5.94
Willow Creek.....	2.00	7.94
Foot of the grade up the Madison Divide.....	2.00	9.94
Upper end of Mary's Lake.....	1.91	11.85
* Sulphur Lakes and Hot Springs.....	1.12	12.97
Alum Creek Camp.....	2.00	14.97
Sage Creek Crossing.....	2.00	16.97
Fork of the road to the falls near the Yellowstone River.....	5.00	21.97
Mud Geysers.....	2.00	23.97
Grizzly Creek.....	3.00	26.97
* Foot of the Yellowstone Lake.....	3.26	30.23

Roads, bridle-paths, and trails in the Yellowstone National Park—Continued.

	Between points.	Total.
<i>Branch road to the Great Falls of the Yellowstone.</i>		
	<i>Miles.</i>	<i>Miles.</i>
From Forks of the Fire Hole River to forks of the lake road to the Great Falls, as above		21.97
Sulphur Mountain	1.50	23.47
* Alum Creek	1.61	25.08
* Upper Falls of the Yellowstone, bridle-path	3.26	28.34
* Crystal Falls and Grotto Pool, bridle-path .....	.40	28.74
* Lower (Great) Falls of the Yellowstone .....	.24	28.98
<i>Road to Tower Falls.</i>		
* Headquarters at the Mammoth Hot Springs to bridge over the Gardiner River		1.77
* Bridge over the East Fork of the Gardiner River .....	.38	2.15
* Upper Falls to East Fork of the Gardiner River	2.06	4.21
* Black Tail Deer Creek	2.70	6.91
Lava Beds	2.00	8.91
* Dry Cañon, or Devil's Cut	4.69	13.60
* Pleasant Valley	2.28	15.88
* Forks of the Yellowstone	2.48	18.36
* Tower Falls	3.19	21.55
<i>Geyser Basin road.</i>		
* Marshall's Hotel to forks of road at Prospect Point		1.00
* Old Camp Reunion	1.00	2.00
Fountain Geyser in the Lower Geyser Basin	1.00	3.00
* Excelsior Geyser, in the Midway Geyser Basin	2.00	5.00
* Old Faithful, in the Upper Geyser Basin	6.00	11.00
<i>Madison Plateau road.</i>		
Marshall's Hotel to Forest Spring		3.00
* Marshall's Park	2.12	5.12
* Lookout Cliffs	3.59	8.71
Riverside Station and Forks of Kirkwood or Lower Madison Cañon road to Virginia City	3.52	12.23
Bridge over South Madison River	11.53	23.76
<i>Madison Cañon road.</i>		
Marshall's Hotel to forks of road to the Mammoth Hot Springs		4.00
Mouth of the Gibbon River	5.00	9.00
Foot of the Madison Cañon	6.00	15.00
Riverside Station	3.00	18.00
<i>Queen's Laundry road.</i>		
Marshall's Hotel to crossing Laundry Creek		1.00
Twin Mounds	1.00	2.00
Queen's laundry and bath-house .....	.50	2.50
A bridle-path 3 miles long extends from there to the Madison Plateau road, and another is partially completed <i>via</i> Twin Buttes and Fairy Falls to the Midway Geyser Basin.		
<i>Middle Fork of the Gardiner bridle-path.</i>		
Headquarters at the Mammoth Hot Springs to the West Gardiner		2.00
Falls of the Middle Gardiner	2.00	4.00
Sheepeater Cliffs	2.00	6.00
Road to the Geysers	1.00	7.00
<i>Painted Cliff bridle-path.</i>		
Meadow Camp to head of Grand Cañon		1.00
Safety Valve Pulsating Geyser	1.00	2.00
Yellowstone River at Painted Cliffs	1.00	3.00
<i>Paint Pots bridle-path.</i>		
Mouth of Geyser Creek to the Paint Pots		1.00
Geyser Gorge	1.00	2.00
Earthquake Gorge	2.00	4.00
Rocky Fork Crossing	2.00	6.00
Mary's Lake Road, near Yellowstone Creek	5.00	11.00
<i>Mount Washburn bridle-path.</i>		
* Tower Falls to Forks of Trail		1.87
* To Summit of Mount Washburn	4.13	6.00
Cascade Creek	7.22	13.22
* Great Falls of the Yellowstone	2.00	15.22

Roads, bridle-paths, and trails in the Yellowstone National Park—Continued.

	Between points.	Total.
<i>Grand Cañon bridle-path.</i>		
	<i>Miles.</i>	<i>Miles.</i>
* Tower Falls to Forks of Trail		1.87
Antelope Creek	4.00	5.87
Rowland's Pass of Mount Washburn	2.00	7.87
Glade Creek	2.47	10.34
* Mud Geyser	1.00	11.34
* Hot Sulphur Springs .....	.83	12.17
* Meadow Camp and fork of Painted Cliffs bridle-path Trail	1.59	13.76
Brink of the Grand Cañon	1.00	14.76
* Lookout, Paint, and forks of trail into the cañon below the falls	2.19	16.95
* Great Falls of the Yellowstone .....	.74	17.69
<i>Shoshone Lake bridle-path.</i>		
* Old Faithful, in the Upper Geyser Basin, to Kepler's Cascades		1.94
* Leech Lake	2.72	4.66
Norris Pass, Continental Divide	3.00	7.66
DeLacey Creek, Pacific waters .....	.97	8.63
* Two-Ocean Pond, on Continental Divide	3.50	12.13
* Hot Springs, at head of thumb of the Yellowstone Lake	2.99	15.12
* Hot Spring, on Lake Shore	2.02	17.14
* Hot Spring Creek	4.00	21.14
* Natural Bridge	7.44	28.58
* Outlet of Yellowstone Lake	4.68	33.26
<i>Miners' bridle-path.</i>		
* Baronette's Bridge, at forks of the Yellowstone River, to Duck Lake		1.76
* Amethyst Creek	8.30	10.06
* Crossing, East Fork of Yellowstone River	2.16	12.22
Gamekeeper's Cabin .....	.50	12.72
* Soda Butte, medicinal springs	2.65	15.37
Trout Lake	2.00	17.37
* Round Prairie	3.00	20.37
North line of Wyoming	3.84	24.21
* Clarke's Forks Run Camp, near northeast corner of the park	3.18	27.39
<i>Hoodoo or Goblin Mountain bridle-path.</i>		
Gamekeeper's cabin, on the Soda Butte, to Hot Sulphur Springs		2
Ford of Cache Creek	1	3
Alum Springs and return	4	7
Calfee Creek	4	11
Miller's Creek	2	13
Mountain Terrace	8	21
Old Camp	5	26
Goblin Labyrinths	2	28
Monument on Hoodoo Mountain	1	29
<i>Fossil Forest bridle-path.</i>		
Summit of Amethyst Mountain		3
Gamekeeper's cabin to foot of Mountain	3	6
Orange Creek	5	11
Sulphur Hills	4	15
Forks of Pelican Creek	8	23
Indian Pond at Concretion Cove of the Yellowstone Lake	5	28
Lower Ford of Pelican Creek	3	31
Foot of the Yellowstone Lake	3	34
<i>Passamaria or Stinkingwater bridle-path.</i>		
Concretion Cove to Turbid Lake		3
Jones' Pass of the Sierra Shoshone Range	7	10
Confluence of the Jones and Stinkingwater Fork of the Passamaria River	12	22
<i>Nez Percé bridle-path.</i>		
Indian Pond to Pelican Valley		3
Ford of Pelican Creek	3	6
Nez Percé Ford of the Yellowstone	6	12
<i>Alum Creek bridle-path.</i>		
From the Great Falls of the Yellowstone, via Crystal Falls and Grotto Pool and the Upper Falls, to the mouth of Alum Creek	4	4

Roads, bridle-paths, and trails in the Yellowstone National Park—Continued.

	Between points.	Total.
<i>Terrace Mountain Trail.</i>		
	<i>Miles.</i>	<i>Miles.</i>
Headquarters at the Mammoth Hot Springs, amongst the numerous active and extinct Mammoth Springs, to foot of the Ancient Terraces		1
Up steep pine, fir, and cedar clad terraces, to summit of the mountain	1	2
Along the range of the vertical cliffs, for 400 to 800 feet high	2	4
Descent of South Terrace to Rustic Falls, 40 feet high, at the head of the impassable cañon of the West Fork of the Gardiner River	1	5
Upon the southern cliff, above these falls, is a Sheepeater arrow-covert, and the remains of an ancient game-driveway thereto.		
Swan Lake, on the Fire Hole road	1	6
<i>Trail to the Falls of the East Gardiner River.</i>		
From the road near the middle of the cañon along the eastern declivity, one mile		1
To the fall, not unlike the famous Minnehaha, and like which, allows a safe pathway between the sheet of water and the wall rock.		
<i>Monument Geyser Trail.</i>		
Foot-bridge at head of the cañon of the Gibbon, which ascends nearly 1,000 feet within a distance of one mile, some portions of which are exceedingly difficult for a horseman, and hence called a trail		1
The active and the extinct and crumbling geyser cones are alike uniquely interesting, and the outlook remarkably beautiful.		
<i>Trail, or footpath, to head of the Great Falls of the Yellowstone.</i>		
Leaves at the lower end of the camping ground above, and descends 500 or 600 feet within one-fourth of a mile to the pole-bordered outlook at the very head of the cataract.		
<i>Trail to the Yellowstone River below the Lower Falls of the Yellowstone.</i>		
This trail descends Spring Run from the rustic bridge nearly to its waterfall, thence along the steep declivity beneath Lookout Point, in a winding, dangerous way, to the foaming river, which cannot now be ascended, along it, as formerly, to the foot of the falls upon this side; but can be reached upon the other, via the timber-fringed gorge.		
The main danger is from detached fragments of rock, which attain incredible velocity before reaching the river.		
Besides these trails there are several others to fossil forests, cliffs, geyser or sulphur basins or falls, which will be fully noted in the forthcoming guide-book of the Park.		

RECAPITULATION OF DISTANCES, ROADS, BRIDLE-PATHS, AND TRAILS WITHIN THE PARK.

ROADS.		Miles.
1. Road to the north line of the Park, towards Bozeman, about		7.00
2. Direct road to the Forks of the Fire Hole Rivers		36.00
3. Road from Forks of the Fire Hole Rivers to the foot of the Yellowstone Lake, about		30.00
4. Branch road from Sage Creek to Alum Creek		4.00
5. Tower Falls road, about		21.50
6. Geyser Basin road		11.00
7. Madison Plateau		24.00
8. Madison Cañon		18.00
9. Queen's Laundry		2.50
		153.00
BRIDLE-PATHS.		Miles.
1. Middle Gardiner		7.00
2. Painted Cliffs		3.00
3. Paint Pots		11.00
4. Mount Washburn		15.00
5. Grand Cañon from the Forks, about		16.00
6. Shoshone Lake		33.00
7. Mines, to Clark's Fork, about		27.00
8. Hoedoo or Goblin Mountain		29.00
9. Fossil Forest		34.00

	Miles.
10. Passamaria	22. 00
11. Nez Percé Ford	12. 00
12. Alum Creek	4. 00
	<hr/> 213. 00

TRAILS.

1. Terrace Mountain	6. 00
2. Falls of the East Gardiner	1. 00
3. Monument Geyser	1. 00
4. To head of Great Falls of the Yellowstone, about 200 yards.	
5. To river below the Great Falls of the Yellowstone, 200 yards.	

8. 00

RAILROADS.

Two railroads have entered Montana, the Northern Pacific being now completed to the vicinity of Miles City, at the mouth of Tongue River, upon the Yellowstone, about 300 miles below its Gate of the Mountains, which they promise to reach during 1882, and soon thereafter run a branch up the tolerably smooth open valley of the Yellowstone to the mouth of the Gardiner, ascending it to the great Hot Medicinal Spring, where application has been made by desirable parties for the establishment of a sanitarium, one mile below the Mammoth Hot Springs and about sixty miles from their main line. The Utah Northern Railroad is completed from Ogden to Silver Bow, near Butte, and is now engaged in surveying the route of a branch by way of Ruby Valley, Virginia City, and the Upper Madison, to the Forks of the Fire Holes, a distance of about 140 or 150 miles from the main line at Dillon. With little doubt, one or both of these roads will enter the Park within two or three years hereafter, and ultimately a connection by the latter, through the valleys and cañoned branches of the Madison and the Gallatin, skirt the western border of the Park from the Forks of the Fire Holes to Bozeman, on the line of the Northern Pacific Railroad.

Should the mining developments of these mountain regions equal present indications, a railroad will reach the Park from the east via Clarke's Forks Mines or the Two Ocean Pass, or both of them, within a few years hereafter. The approach of these railroads—notably the Utah Northern—materially facilitates reaching the Park, which each road as they near it, will increase accessibility, and will soon invite a healthy competition for the patronage of tourists in making a cheap, rapid, and easy visit to the Wonder Land; planning it as the turning point, as well as the main region of attraction, in a season's ramble for health and enjoyment.

Should these anticipations be realized a visit to the Park will become national in character and popular with our people, so that ere long the flush of shame will tinge the cheeks of Americans who are obliged to acknowledge that they loiter along the antiquated paths to pigmy haunts of other lands, before seeking health, pleasure, and the soul expanding delights of a season's ramble amid the peerless snow and cliff encircled marvels of their own.

There is now assurance of increased facilities for conveyance of tourists from Bozeman, nearly 80 miles through Trail Pass, and up the Yellowstone Valley to the headquarters of the Park at the Mammoth Hot Springs, and from Virginia City some 95 miles via the old Henry's Lake route, or 90 miles by the new one up the Madison to Riverside, which was constructed during the past season by Judge Kirkwood for the spirited citizens of that town, to the Forks of the Fire Hole River, and also by the practical use of the old route via Henry's Fork and Lake, which

the odometer measurements of Lieutenant Steever during the past season make 103 miles from the Forks of the Fire Hole River to Beaver Cañon, and practically about the same distance to Camas Station, both upon the Utah Northern Railroad, in the Snake River Valley, below the mountains. Believing it to be a necessity, it is now my purpose to issue a guide-book of the Park, containing a map, illustrations, and descriptions of various objects of interest, routes of approach, list of articles necessary for camp outfit and provisions, approximate time, and cost of a tour of the Wonder Land, in time for the use of next season's tourists thereto.

CONDENSED SUMMARY OF THE SEASON'S EXPLORATIONS' WORK—RECOMMENDATIONS.

For the purpose of concisely showing what has been accomplished in the Park during the past season, as well as what is considered essential to be done therein during the next, the following synopsis of each is added:

SYNOPSIS OF THE PAST SEASON'S OPERATIONS.

The following explorations have been made: Nearly all of the Madison or Mary's Lake Divide, with several brimstone basins, and also passes to Violet Creek, to the Norris Fork of the Gibbon, and to the Paint Pots bordering the Gibbon Meadows, of a nearer route to the Hoodoo region, and additional Labyrinths of Goblins upon the Passamaria and elsewhere of an open lovely pass connecting the Pelican Valley with that of the East Fork of the Yellowstone. The first general exploration of the Sierra Shoshone range, or eastern border of the Park, which is known to have ever been made by white men, including a very low and direct pass from the Passamaria Cañon to the Yellowstone Lake. An examination was also made of the main Rocky Mountain portion of the southern border of the Park from the Two Ocean Pass via Phelps's Pass, and various unknown fountain heads of the Snake River branch of the Columbia, Mount Sheridan and Heart and Riddle Lakes to the Thumb of the Yellowstone, including the discovery of some fine valleys and passes.

IMPROVEMENTS MADE.

Buildings constructed.—Hopeful of a saw-mill and cheaper lumber, the only buildings constructed during the past season were:

A small, earth-covered vault or detached fire-proof store-room for the safety of much of our provision, tools, and camp outfit at our headquarters

A double-roomed earth-roofed bath house at the matchless Queen's Laundry, near the forks of the Fire Hole Rivers; together with wooden troughs for conveying water thereto, for the free use of the public. A line of wooden troughs for the purpose of conducting the Terrace-building waters to and successful recoating and building up of the extinct pulsatory Geyser Cone, called Devil's Thumb, at the Mammoth Hot Springs.

Bridges Constructed.—One amid the spray at the head of the Upper Falls of the east fork of the Gardiner River. A bridge over the main Blacktail Creek near its forks, and another over Elk Creek near the Dry Cañon. Three bridges in the valley of the East Fork of the Fire Hole, two upon Alum Creek; two upon Sage Creek and two upon Hot Spring Creek, all upon the new road to the Yellowstone Lake, and several others upon the Shoshone Bridle Path across the Continental divide

to the said lake. Also two foot bridges across the Fire Hole Rivers near their forks, and two over the main Fire Hole Rivers in the Upper Geyser basin. While none of these bridges are very large or costly, all are necessary and serviceable.

Roads.—One road was constructed from near the bridges of the Gardiner, through the East Fork Cañon, *via* the Dry Cañon and forks of the Yellowstone, to Tower Falls—distance, 20 miles.

A road from the forks of the Fire Hole River *via* the East Fork, Mary's Lake, and Mud Geyser, to the foot of the Yellowstone Lake, 30 miles.

Branch of the latter road from Sage Creek by Sulphur Mountain to the mouth of Alum Creek, 4 miles.

	Miles.
Aggregate of roads constructed.....	54

Bridle-paths opened as follows:

	Miles.
Paint Pot, length.....	11
Passamaria.....	22
Painted Cliffs.....	3
Hoodoo or Goblin Land.....	29
Aggregate of bridle paths constructed.....	65

Trails constructed:

	Miles.
Terrace Mountain.....	7
East Gardiner Falls.....	1
Monument Geyser Basin.....	1
Aggregate of trails constructed	9

The ladders and benches at the Crystal Falls and Grotto Pool, as well as the pole railings to the various points of observation around the different falls, although rude, are convenient and safe for the use of visitors, until a supply of lumber will allow of the construction of better ones. These improvements have been made in addition to the constant care and labor requisite for the removal of falling timber, repairs of bridges, grades, and causeways, and important additions to the latter, notably at Terrace Mountain, Obsidian Cliffs, and Cañon Creek, and a ceaseless vigilance in the prevention of needless forest fires, and wanton vandalism of natural curiosities.

It is believed that the discoveries of the weapons, utensils, and implements, as well as the stone-heap driveways for game, of the present race of Indians or of some unknown prior occupants of these regions, as herein

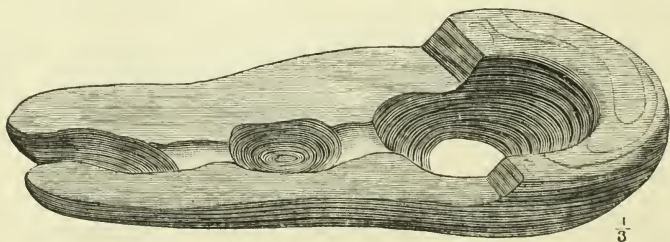


FIG. 29.

illustrated, possess peculiar interest, as well as encouragement for further research; and this is equally true regarding the records, narratives, and traces of early white men in the Park, herein referred to. Nor

can it be doubted that the permanent exhibition in the National Museum in Washington of the beautiful pulsating Geyser Cone, from a secluded gorge, and a large collection of geodes, concretions, amethysts, and fragments of fossil timber, obsidian, and other natural objects of interest from various portions of the Park, now in the National Museum, will

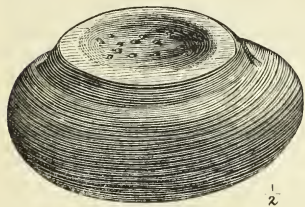


FIG. 30.

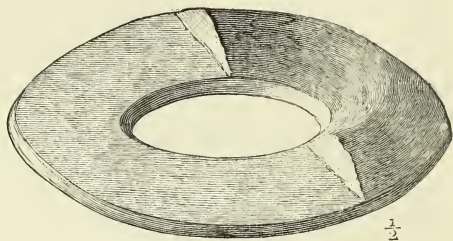


FIG. 31.

there greatly assist in disseminating a knowledge, an appreciation, and a desire to visit the enchanting scenery and matchless marvels of the distant Wonder Land. Figs. 29, 30, 31 exhibit curiously-formed water-worn concretions from the Yellowstone Lake, as described in my report of 1880, pp. 16, 17.

IMPROVEMENTS CONSIDERED IMPORTANT TO BE MADE DURING THE COMING SEASON.

Bridges.—As heretofore mentioned, it will be necessary to bridge the Yellowstone twice in order to avoid constructing several smaller bridges over branches, and heavy expensive grades in reaching the Great Falls from Alum Creek. A bridge between the mouth of this stream and that of Tower Creek nearly opposite, at a point where the river is fully 300 feet wide and very deep, but has a sluggish current, gravelly bottom, and fine approaches upon both sides, and another at the narrowest place upon the Yellowstone River below the lake, which is something less than 70 feet between the rocky abutments just above the Upper Falls where there are good approaches, if a bridge be built high above the dashing waters near the brink. A bridge at this point would render accessible far the most open, elevated, and commanding views of the falls and adjacent rapids, as well as the most desirable site for a hotel, application for a leasehold of which by desirable parties is now pending. Several bridges of considerable magnitude, and a number of heavy grades will be necessary in the construction of a road from the Great Falls to those of Tower Creek, where one very high and costly bridge or expensive rock excavation, and probably both, are unavoidable to reach the forks of the Yellowstone, and complete the circuit of roads to the leading wonders of the Park. For reasons heretofore shown, it is very important that the old miner's bridge at the forks of the Yellowstone should be legalized as a toll-bridge, purchased, or else a new one constructed where there are more favorable approaches, as well as another over the East Fork of the Yellowstone near the mouth of the Soda Butte, at that end of the Park, and very long, heavy, and expensive grades or bridges, or both, on the Madison Plateau or Cañon route at the other.

Although not indispensable it is very desirable to construct bridges over the Fire Hole Rivers near their forks, and upon the main fork in, above, and below the Upper Geyser basin, and also just above the mid-way Geysers as soon as the necessary lumber can be obtained from a

mill within the Park. A road from the Excelsior Geyser via the Twin Buttes to the Queen's Laundry, and thence to the forks of the Fire Holes with a bridle-path branch to the Fairy Falls, will be very valuable for its cost, as allowing tourists a choice of routes or a circuitous one upon each side of the river in a trip to the Upper Geyser basin. The desirability of the middle Gardiner Cañon route and of a bridle path to connect with the Two Ocean route to Wind River, the construction of troughs and scaffolding to carry the terrace building waters from the Devil's Thumb to the Liberty Cap for its preservation, and the necessity of a supply of cold water from the McCartney Creek or the West Gardiner in wooden troughs or iron pipes, have been heretofore treated of. Two other matters are of practical importance:

First. The cutting down of at least the dry timber along the main roads and bridle paths to a width sufficient to prevent the annoying obstructions constantly occurring along them.

Second. The removal of the uniformly low but troublesome stumps along the wagon roads, the necessity for both of which will, I am confident, be endorsed by all who have been jolted, or delayed by them. Nor can I believe that the prominent personages who have visited the Park, will consider my views as above expressed in reference to the necessity of additional legislation, registered guides, and an ample police force, far fetched, unnecessary, or impracticable.

SUGGESTIONS REGARDING LEASEHOLDS IN THE PARK.

The clause in the act setting apart the Yellowstone National Park, which refers to revenues from leaseholds for hotel sites and from other sources therein, to be expended in its improvement, renders it evident that it was not the purpose of Congress in dedicating this heritage of wonders as a matchless health and pleasure resort for the enjoyment of our people, to thereby legalize a perpetual drain upon their treasury, a cardinal feature which in the entire management of the Park has been neither overlooked nor forgotten.

But it is also evident that leaseholds cannot be effected to parties possessing the requisite capital and ability to construct and properly manage hotels, which should be adequate to the wants of the public and creditable to the Park, until permanently clear of Indians, and the construction of roads alike necessary for the convenience of visitors, and for the conveyance of a portable steam saw-mill to the proper localities for the manufacture of material for bridge and building purposes.

Hence the undeviating policy has been to encourage and assist in making treaties with the four Indian tribes owning or frequenting any portion of the Park, to cede and forever abandon it as well as the adjacent regions, and with the construction of only such buildings as were absolutely necessary for the safety and convenience of the government officers, employés, and property, crowding the exploration of routes, and the construction of roads, bridle-paths or trails to the leading points of interest throughout the Park; meanwhile making only temporary leases for hotel purposes, but carefully selecting sites and securing propositions for permanent ones.

Upon the accompanying map of the Park may be found in distinct colors the various Fire Hole regions, at which or at other leading points of interest differently colored, the sites properly marked and numbered, as selected for 10 hotels, 2 sanitariums, and 1 for a steamboat harbor and landing at the foot of the Yellowstone Lake, being No. 6 of these hotel sites.

Temporary leases have been made for sites of the hotels at the Forks of the Fire Holes and at the Mammoth Hot Springs, for which as well as for 3 additional sites for hotels, for both of the sanitariums, and for the steamboat wharf, written propositions for permanent leaseholds are now pending, as well as for the establishment of a portable steam saw-mill and zoological garden.

The settled policy of the department has been to grant no titles to any portion of the soil, nor licenses to persons or companies for toll roads or bridges, but rather to make and manage all the improvements of a general nature, such as roads, bridges, bridle-paths and trails, leaving to private enterprise those of a local or private nature, such as hotels, &c., upon leaseholds, under proper restrictions as to time (which, for the purpose of securing a better class of structures, I suggest should be for any period not exceeding 30 years), for a prescribed portion of the frontage for buildings and rear extension for pasturage and fuel purposes at each of these selected sites, leaving the remainder for public use or future leaseholds.

The portable steam saw-mill, together with a sticker planer and other attachments necessary for the proper manufacture of lumber and shingles, should be constructed and managed by private enterprise, under a judicious arrangement as to price, and option of the government as to the place, time, and quantity desired for buildings, bridges, &c., allowing a generous stumpage to the owners of the mill upon any additional quantity which they may wish to manufacture for their own use or for sale to others for the purpose of constructing hotels or other necessary improvements within the Park.

An examination of the accompanying map of the Park, showing the lines of our various roads, bridle-paths and trails, and relative distances, and perusal of the above statements regarding them, it is believed will show a gratifying progress towards the completion of a circle of roads, and a net work of bridle-paths and trails to the main and the minor routes of ingress as well as points of interest throughout the Park, and afford the assurance that appropriations for these purposes need not be perpetual, but that a point is nearly reached when, as above shown, responsible parties will secure leaseholds and make improvements which, without producing great immediate revenues, will soon add to the attractions and enjoyments of the Park, and ultimately at least assist materially in rendering it self-sustaining.

REMARKS ON THE MAP OF THE PARK.

The accompanying map, containing as it does the latest explorations and improvements, is believed to be far the most complete and accurate which has been made of the Park, and will be found reliable in all essential particulars. But as it is intended for practical use in the Park, it is upon a scale so small as to preclude showing many cliffs, cañons, and even some mountains throughout the Park, while the Two Ocean Pass, being outside its limits, is not shown, and the terrible cliffs and yawning cañons beyond the Sierra Shoshone range are mainly omitted in order to show the route of exploration along various creeks in that region. With care it is believed the route of this year's explorations can be traced along a fine continuous line, where, apart from roads or bridle-paths, and save No. 10 at the Two Ocean Pass, each of the 23 camps can be found by their numbers and guidons marked upon the map.

CONCLUSION.

In conclusion, I feel that I cannot in justice fail to express my thanks for the uniform kindness and assistance which I have ever received from yourself as well as from the other officers of the department over which you so ably preside, and it is hoped that any defects in the arrangement or the language of this report may be attributed to the fact that the writer thereof is more experienced in handling the weapons and the utensils of border warfare and life than the pen; but an earnest effort has, by a fair and full statement of facts, been made to show to Congress and the people of the United States, that the slender appropriations which have been made for the protection and improvement of the distant nearly unknown Wonder Land have not been misappropriated or misspent.

My own personal assistants in the Park know full well how thoroughly I appreciate their faithful and earnest services, and need no further recognition than that already made in different portions of this report. Without their cheerful and constant co-operation, my task in exploring and improving the Park, would have been indeed a hard one, and well-nigh impossible.

Very respectfully, yours,

P. W. NORRIS,
Superintendent of the Yellowstone National Park.

APPENDIX A.

ACT OF DEDICATION.

AN ACT to set apart a certain tract of land lying near the headwaters 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 headwaters 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 the 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 pleasure ground for the benefit and enjoyment of the people; and all persons who shall locate, 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 purpose of merchandise or profit. He shall also cause all

persons trespassing upon the same 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.

Approved March 1, 1872.

APPENDIX B.

RULES AND REGULATIONS OF THE YELLOWSTONE NATIONAL PARK.

DEPARTMENT OF THE INTERIOR,
Washington, D. C., May 4, 1881.

1. The cutting or spoliation of timber within the Park is strictly forbidden by law. Also the removing of mineral deposits, natural curiosities or wonders; or the displacement of the same from their natural condition.

2. Permission to use the necessary timber for purposes of fuel and such temporary buildings as may be required for shelter and like uses, and for the collection of such specimens of natural curiosities as can be removed without injury to the natural features or beauty of the grounds, must be obtained from the Superintendent; and must be subject at all times to his supervision and control.

3. Fires shall only be kindled when actually necessary, and shall be immediately extinguished when no longer required. Under no circumstances must they be left burning when the place where they have been kindled shall be vacated by the party requiring their use.

4. Hunting, trapping, and fishing, except for purposes of procuring food for visitors or actual residents, are prohibited by law; and no sales of game or fish taken inside the Park shall be made for purposes of profit within its boundaries or elsewhere.

5. No person will be permitted to reside permanently within the Park without permission from the Department of the Interior; and any person residing therein, except under lease, as provided in section 2475 of the Revised Statutes, shall vacate the premises within thirty days after being notified in writing so to do by the person in charge; notice to be served upon him in person or left at his place of residence.

6. *The sale of intoxicating liquors is strictly prohibited.*

7. All persons trespassing within the domain of said Park, or violating any of the foregoing rules, will be summarily removed therefrom by the Superintendent and his authorized employés, who are, by direction of the Secretary of the Interior, specially designated to carry into effect all necessary regulations for the protection and preservation of the Park, as required by the statute; which expressly provides that the same "shall be under the exclusive control of the Secretary of the Interior, whose duty it shall be to make and publish such rules and regulations as he shall deem necessary or proper;" and who, "generally, shall be authorized to take all such measures as shall be necessary or proper to fully carry out the object and purposes of this act."

Resistance to the authority of the Superintendent, or repetition of any offense against the foregoing regulations, shall subject the outfits of such offenders and all prohibited articles to seizure, at the discretion of the Superintendent or his assistant in charge.

P. W. NORRIS,
Superintendent.

Approved:

S. J. KIRKWOOD,
Secretary.

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ANNUAL REPORT
OF THE
SUPERINTENDENT
OF THE
YELLOWSTONE NATIONAL PARK
TO THE
SECRETARY OF THE INTERIOR.

P. H. CONGER,
SUPERINTENDENT.

FOR THE YEAR 1882.



WASHINGTON:
GOVERNMENT PRINTING OFFICE,
1882.

REPORT

OF THE

SUPERINTENDENT OF THE YELLOWSTONE NATIONAL PARK.

HEADQUARTERS YELLOWSTONE NATIONAL PARK,
Mammoth Hot Springs, Wyo., December 1, 1882.

SIR: I have the honor to submit the following as my annual report: I arrived in the Park on the 22d day of May, coming in by the Union Pacific Railroad from Omaha to Ogden, thence by the Utah Northern Railroad to Dillon, thence by stage to Virginia City, Mont. From there I was obliged to take private conveyance up the valley of the Madison River to its head in the great Fire-Hole Basin, a distance from Virginia City of 115 miles. After remaining there at the Marshall House two days, Mr. Marshall, with Mr. George Graham (a blacksmith, whom I had hired at Virginia City for the season), my son, and myself, set out on horseback for the Mammoth Hot Springs, the official headquarters of the Park, a distance of 50 miles over the mountains. It was a severe and perilous journey, on account of the snow and the swollen rivers and mountain streams that lay across our way. However, thanks to the experience and indomitable courage of my guides and the endurance of our faithful horses, we all reached headquarters in safety the second day out, a little before midnight.

On reaching the house all was dark and silent, but we soon made ourselves heard. A light gleamed through the windows, the door was thrown open, and we were invited in by Mr. Stephens, the superintendent in charge, with a generous cordiality seldom found elsewhere than in these mountains.

After spending a day or two at headquarters, and advising with Mr. Stephens, I started with two teams for Bozeman, Mont., our nearest market town (from this point 80 miles distant), to purchase us supplies and tools, hire a crew of men, and prepare for the season's campaign. The road was in a horrible condition, consequently we could haul but light loads, yet we succeeded in landing sufficient supplies to last until better roads.

We also hired a small crew of men which we set at work on the 5th of June, at the north side of the Park, near the Yellowstone River, at the foot of McCartney's hill. We also employed a carpenter and a mason, and set about repairing the headquarter's house, which we found to be in a sadly dilapidated condition, and hardly habitable for a white man. Our mason first burned a small limekiln, and then pointed the house from the ground to the roof, inside and out, and whitewashed the wall through all of the inside until it was white as snow, thereby destroying the vermin that infested the premises in such vast numbers that no person with a cuticle less sensitive than that of a rhinoceros could live in them through the summer months. Meantime our carpenter was at work repairing the doors, windows, roof, and other parts of

the building, putting up ceiling overhead with cotton cloth, for want of lumber; making domestic furniture, such as tables, bedsteads, and settees; the latter we covered with calico, making a convenient seat for the numerous callers that have visited us the past summer. So we can now say that the government buildings here are in a state of preservation, and comfortable, if not elegant.

Simultaneously with commencing work on this side of the Park, I had taken steps to organize and equip another party to begin work at Riverside, on the Madison River, near the west line of the Park, and near the point where the travel from Virginia City and a place on the Utah Northern Railroad called Beaver Cañon unite, and proceed together to the central attraction, the Fire-Hole Basin and the great geysers. Here I found it necessary to do some heavy grading. Heretofore the travel had been forced principally to reach the Fire-Hole Basin by following the river through a difficult and rough cañon, involving the fording of the stream five times in the short distance of about 10 miles. The Madison River at this point is a broad and rapid stream, and except in time of low water these crossings are both difficult and dangerous. A good road, however, can be made through this cañon when the government will supply the money. I estimate that it will cost not less than \$15,000 to bridge and grade about 20 miles of this route. Under these circumstances there seemed to me nothing left us but to try and scale the mighty mountains and hills that lie along the Madison, and between us and our objective point.

The Fire-Hole Basin work was begun here on the 8th of June, and after six weeks of hard digging, plowing, and scraping, the summit was attained, leaving behind us a road and grade up which our four-mule team has hauled repeatedly a load of freight weighing over 2,500 pounds. This party, headed by Mr. George Graham and my son, C. M. Conger (when not engaged in doing blacksmith work or hunting), proceeded on the road towards the Fire-Hole, removing the stumps and rocks from the path, putting in culverts and cross-ways or bridges over mirey ground and deep gulleys, until they reached the big hills on the verge of the basin, where another long and heavy grade had to be made to let us down to a level with the Fire-Hole River at Marshall Hotel.

In the meantime the party commencing work at McCartney's hill had been recruited to about a dozen men, and placed under the command of Capt. E. S. Topping. They worked up from McCartney's, making an excellent road, considering the high and rough character of the ground over which the road lies. Thence they pushed on over the immense mountains which surround the valley of the Gardiner River at this place, doing all that could be done to render passable the road out over this range, until a level plateau is reached, over which our way passes for a distance of about 8 miles, bringing us to the main branch of the Gardiner River, and about 12 miles from headquarters. Here we found it necessary to construct a bridge, as the river is deep and rapid, and an attempt to ford it, except at low water, is attended with great difficulty and danger. Indeed, a party of tourists went into camp for a week here, waiting for a decline of the water before venturing to cross. My assistant, Mr. G. L. Henderson, went with me out to the river, and, after a careful examination of the same for a mile or two, up and down, we agreed upon the most eligible point to locate the bridge, and upon the plan of its construction. Captain Topping and his men took hold of the work in earnest, and in less than two weeks they had finished a substantial structure across the river that we think reflects credit upon its builders. The bridge is built with abutments on each shore, well

out into the river. The abutments are made by a crib of logs firmly pinned together at the corners, and then filled with rock above high-water mark. The center pier we made in the shape of a V, fastened in the same manner at the corner, and filled, like the abutments, with rock; then the structure was covered with hewn logs five inches thick, the whole making a bridge that I think will stand any strain that is likely to happen it, either from the elements or otherwise. The cover of the bridge is 96 feet long. Up to this time it was the custom of Mr. Henderson or myself to be on the ground daily with the men; and, indeed, during the whole season one or both of us has been in the field nearly all of the time.

After the bridge was finished, the captain, with his party, pushed on south toward the Fire-Hole Basin, that being the grand center towards which both parties were aiming. Our route now runs up the Willow Creek to near the great obsidian or glass mountain, which is a marvelous thing in nature and well worth the journey to see. There was considerable work on this part of the road in taking out rocks in the path, and building and repairing culverts and cross-ways.

After passing the glass mountain we soon come upon high hills and rough country, requiring a great amount of labor to render the road passable. We are now leaving the waters that flow into the Gardiner River, and are climbing the mountains that separate the Gardiner from the Gibbon River. About here we pass a beautiful lake, called Lake of the Woods. I do not know what the altitude is at this point, but it cannot be less than 7,500 feet above sea level.

From thence we worked our way over a rough and hilly country to the Gibbon Basin, where the traveler is startled by his first sight of this wonderful Fire-Hole. Standing on the eminence that surrounds and overlooks this basin, with its thousand columns of hissing steam rising to the clouds, and its hundred spouting and boiling springs, all in active operation, hurling their heated waters high into the air, he sees a sight so novel and so sublime as to daze the beholder and fill him with awe. In this basin are several large geysers and a great number of lesser ones. We have now reached a point 30 miles nearly south of headquarters, or the Mammoth Hot Springs, and about 35 miles from the north line of the Park. It is yet 20 miles to the great Fire-Hole Basin. Our road is still in a mountainous and rugged country, requiring much labor and expense before it can be said to be a good road. Still we pushed on; but owing to the limited amount of the appropriation (and when you consider the extent of the territory and the great natural obstructions that have to be encountered, it seems to me it must be evident to you that the amount heretofore placed at the disposal of the Secretary of the Interior "for the protection and improvement of the Yellowstone National Park" is entirely inadequate) we are obliged to content ourselves by making such roads and improvements only as will render travel possible.

But to proceed with our road: we have to pass over some very high hills to reach the valley of the main Gibbon, where we encounter a wide, low bottom called the Geyser Meadows, a place where it will require a large amount of labor to make a good road. After passing this meadow our road enters the Gibbon Cañon, and follows the river down several miles, close on the edge of the stream, crossing the same three times in as many miles over difficult and dangerous crossings in time of high water. After passing through this cañon our road gains the highlands by a steep grade along the side of the mountain on the south side of the river. We soon come to the great falls of the Gibbon, where the

river plunges over a perpendicular precipice of 75 feet, which in the stillness of the evergreen forest that covers this country renders the scene as enchantingly beautiful as "fairy-land." We are now within 10 miles of our objective point, viz, the Lower Fire-Hole Basin; and as the character of the country differs little from that over which we have passed, I need not particularize further than to mention that we made two quite important grades on the way, changing the road from the old track, and materially lessening the difficulties over two high and rugged hills.

At last, through much tribulation, we have arrived at the head of the Madison River, which is formed by the junction of the two Fire-Hole Rivers at the northern edge of the Lower Fire-Hole Basin. When I tell you that at this point the Madison River is a deep and rapid stream, nearly or quite 200 feet in width, you will have some conception of the immense flow of boiling hot water that comes out of the earth within less than 15 miles of this point, and forms the two Fire-Hole Rivers which here unite.

My working force (both parties) were now here, and I found it an imperative necessity to build a storehouse and blacksmith shop in order properly to care for our provisions and supplies, the government having no building nearer than our headquarters, 50 miles distant. Besides, this point is the grand center of attraction, and a place to which every tourist who visits the Park is certain to come. One other reason why I selected this site for a storehouse was, on account of its central position working parties can be supplied from this depot in one day from almost any part of the Park. After having resolved to build, and decided upon the size and style of the buildings required, I drafted the plans and set part of the men to getting out the timber for the proposed buildings.

The rest of the men, under Captain Topping, continued work on the road. I directed them first to go over the road to the Yellowstone Lake, a distance of 35 miles from this point, and put the same in good repair, and then turned their attention toward the Great Falls and the Grand Cañon of the Yellowstone, about 20 miles below the lake. The work was comparatively light on the road from the Fire-Hole to the lake; but when we neared the falls and cañon I found it necessary to cut a new road along the bank of the river for over three miles to enable tourists to ride to the falls. Heretofore they have been compelled to abandon their carriages, and climb almost impassable mountains on the back of a pony or on foot. This road along the river was a difficult and costly piece to build, requiring heavy excavation along the side of the steep mountain for nearly the whole distance. But it is finished, and we have received the commendation and thanks of every person who has passed over the road, for having built it.

Meantime our buildings are progressing at the Fire-Hole Basin, the place we now call our summer headquarters. The government storehouse here in dimensions is 34 by 22 feet, built of hewn logs, substantially and neatly put up, one story high, with solid log partition framed into the structure, making two rooms in the building. One room is floored with hewn logs, 5 inches thick, neatly fitted together, for the storage of provisions; this heavy partition and floor being necessary to protect our supplies from the ravages of the mountain rats and squirrels that here abound. The other room is not yet floored, as we have no lumber except what we manufacture with an ax; but by putting in an old cooking stove, which I was fortunate enough to obtain here, it makes a very convenient and comfortable place for us when at work in this

vicinity, besides being a great accommodation to tourists who desire to leave a portion of their luggage while they visit the lake, the Grand Cañon, and the Great Falls of the Yellowstone. We have a strong door on the storeroom, and one window in the same; also an outside door, and two windows in the front room.

The blacksmith shop is similar in construction, 20 by 20 feet, with a door and two windows. Convenient to the shop is a coal-house, 10 by 15 feet, in which I have a quantity of charcoal left over after the season's business, from a pit that we burned early in the season. The buildings are all carefully chinked on the inside and daubed on the outside, and thoroughly covered with dirt roofs, which we consider storm-proof, and will probably answer the purpose for which they were constructed, for many years.

Mr. Secretary, I would gladly have consulted you in regard to these buildings before they were begun, but the demand was so urgent, and it takes so very long to communicate by mail, in these far-off mountains, with your office, that I ventured on my own judgment to proceed without specific authority, trusting that what I might do would receive your sanction and approval.

After the buildings were completed I sent the men who had been there employed with a pack-train and outfit over to the falls to improve the trails and bridle-paths around them and the Grand Cañon, also to open a new and better bridle path from the falls along the base of Mount Washburn, via Tower Falls, to intersect the Clark's Fork wagon road near Barronett's bridge, thus enabling tourists to make a complete circuit of the Park, and to see most of the marvelous wonders of nature that so abound in this our nation's great play-ground, and which I am assured by eminent travelers are not to be found elsewhere on the globe.

It is September. Our bridle-paths are finished; our grades along the banks of the Yellowstone are completed; and the gathering snows on the distant mountain tops admonish us that we must soon seek a lesser altitude. We therefore take a parting glance at the Great Falls, the Grand Cañon, and the glorious snow-crowned mountains, and all depart for our summer headquarters in the Lower Fire-Hole Basin. Arrived there we still find plenty of work that requires our attention, notably the building of three foot-bridges, two of them across the Great Fire-Hole River, and the other across the Little Fire-Hole, near our storehouse. The bridges across the larger river are 130 feet in length, and the one across the lesser stream is 50 feet long. These bridges are built by hewing long timbers flat, and placing two pieces side by side upon strong benches standing in the river, and securely fastened together, then putting up a hand-rail along one side, enabling any person to cross with ease and safety. These foot-bridges have long been a necessity, and will prove a great convenience to ourselves as well as the public.

September 14 I took my departure for the Mammoth Hot Springs, to give attention to my office work, which I confess I had too long neglected. But (as I have before written you), deeming it of the first importance that the money appropriated by Congress for the improvement of the Park be judiciously and properly expended, I felt it to be my first duty to remain in the field to direct and supervise the work. Before leaving, I directed Captain Topping with his party to work back over the road to the Mammoth Hot Springs, and repair some crossways that had become badly demoralized by the heavy military trains and others passing over them during the summer. I left Mr. Graham and

my son with their men to finish the foot-bridges, to take an inventory of the stock and tools to be left there, to close up and lock the buildings, and then to come to the springs and construct a bridge across the Gardiner River, which had recently been destroyed by a devastating fire that had swept over a large tract of the Park in the immediate neighborhood of headquarters. I spent a few days in my office, and then took stage for Bozeman, Mont., to settle with the merchants of that bright and busy mountain city for the supplies that they had so generously advanced me for the use of the government during the season. I was thus occupied there for several days, when I again took the stage for Virginia City, Mont., another trade center in these mountains, to whose liberal merchants I was under like obligations for the same kind of favors. I closed my business here, and returned by the same route, reaching home in time to see the last plank fastened down upon our new bridge across the Gardiner. The bridge is a splendid one of the kind, and is constructed after the pattern before described. I then settled with the few men that had still stuck to the work until it was finished, which was on the 25th day of October.

The snow was now getting deep all over the Park. The bell had summoned all ashore who were not going to sail, and, not desiring to be blockaded here all winter, I bade farewell to my assistant, Mr. G. L. Henderson, and his son, whom we left in charge, and myself and wife made our escape down the valley of the Yellowstone to the North Pacific Railroad, and thence to the green fields of Iowa, our home.

Mr. Secretary, I desire to say, in concluding this prosy report, that we do not claim to have written our names upon the mountain tops here, and will be content if you shall approve, and the great public, from whose verdict there is no appeal, shall concede, that we have left our mark upon the roads, trails, and bridle-paths of this great National Park.

I have the honor to be, very respectfully, your obedient servant,

P. H. CONGER,

Superintendent Yellowstone National Park.

THE PARK.

I consider the man entitled to all honor who first had the foresight to propose to the Congress of the United States the project of setting apart this wonderful country for all time for the use and pleasure of the people. So grand an idea could emanate only from the brain of a wise and far-seeing statesman. No nation on earth has ever bequeathed to its people a nobler gift. Its area is not accurately known, but enough is known to be certain that it contains more square miles than either of two of the States in this Union. The donation was a grand one, made upon a truly American scale, and the people of this country will demand of their representatives that this great Park be opened and improved, so that the present generation may enjoy it. In this connection I would call the attention of members of Congress to the fact that heretofore the annual allowance for all purposes in the Park has been only \$15,000; and I beg them to inquire of themselves how far this sum would go toward building and repairing the roads in their State or district, and also to bear in mind that this Park is on the top of the Rocky Mountains, and that everything that enters into use there costs at the least twice as much as the same would cost in almost any of the States.

VANDALISM IN THE PARK.

I have hardly the patience to discuss this subject without passion. The most of the depredations committed seem to me so entirely purposeless that I am unable to conceive the cause that impels men and women to wantonly destroy, purely for destruction's sake. What are we to think of a man that will pack long poles, as heavy as he can carry, a great distance, for the purpose of thrusting them into the cone and down the throat of these great geysers, when the only possible effect must be to obstruct their flow and mar their beauty? This is done repeatedly, although I have neglected no opportunity to warn, admonish, and entreat all tourists whom I have met in the Park not on any account to do so. I have also by published order, forbidden the collection of any specimens and cautioned all persons having occasion to build a fire in the Park to be certain to extinguish the same before leaving camp. But, notwithstanding all this, tourists go into the Park with iron bars and picks secreted in their wagons, with the express intent to disregard the law and defy the superintendent. The cones of the great geysers are already badly defaced, and vast tracts of the beautiful forests that adorn this Wonder-Land are laid waste by fire annually through the wanton carelessness and neglect of visitors.

Another source of great annoyance is the hunters in the Park. I am sure you will agree with me that it is not possible for a single game-keeper to guard so vast a territory as the National Park and prevent the breach of the laws in regard to the killing of game. When we consider the temptation, and the opportunity which these vast solitudes afford, we need not wonder that the laws are broken, and the orders disobeyed. But I leave it for the superior wisdom of the honorable Secretary of the Interior to suggest some remedy for these evils.

VISITORS TO THE PARK.

Many eminent people have visited the Park the past summer, both from our own and foreign lands. A few among the more prominent names I will mention:

United States Senator Bayard, of Delaware; Commander Gorringe, of the United States Navy; Lloyd S. Bryce, of New York City; Mr. Fuller, of London, England; and Mr. Merrill, of Philadelphia, with a cavalry escort, composed the Senator's party.

General P. H. Sheridan, Col. M. P. Sheridan, General Anson Stager, of New York City; Mr. John McCullough, the great actor; General D. B. Sackett, U. S. A.; Col. James F. Gregory, U. S. A.; Mr. H. R. Bishop, New York; Mr. Charles D. Rhodes, Chicago; General W. E. Strong, Chicago; Capt. W. P. Clark, U. S. A.; Capt. J. U. Wheeler, commanding escort, with 150 men and 300 horses and pack-mules.

Mr. Edw. Massicott, a great traveler, Paris, France.

B. A. Coloma, United States Coast and Geodetic Survey.

Bishop Hurst, of the Methodist Episcopal Church, Iowa.

Rev. C. H. Fowler, New York.

Joseph Moore, jr., esq., Philadelphia, a great traveler in foreign lands, and eminent author.

Captain Gibson and Lieutenant Spellman, Seventh United States Cavalry, with large party.

Dr. Sanderson, U. S. A.

Major Gordon and family, Fort Ellis, N. Y., with escort.

Major Hughes, Saint Paul, Minn.

A large party from the Omaha Board of Trade, headed by their president, Mr. Clark (a number of them having their families with them), Mr. Fitch, of the Omaha Bee, and many others.

Prof. S. C. Armstrong, Hampton, Va.

Henry W. Foote and Arthur Lyman, Boston, Mass.

Rev. Geo. Comfort and wife, with a large party of friends from Bozeman, Mont.

Dr. J. H. Warren, Janesville, Wis.

M. V. Nichols, Osage, Iowa.

Lord S. George Littledale and lady, England.

Mr. J. O. Hussey, with a large party, White Sulphur Springs, Mont.

Samuel Mallory and wife, with friends, Montana.

Alanson Trask, esq., with family and friends, Brooklyn, N. Y.

Hon. J. C. Burrows, M. C., Michigan.

Earl Hope, of Hopeton, Scotland, with cousin and large retinue of servants.

A. T. Argens, Copenhagen, LL. D. and envoy of the King of Denmark.

We had also a German count, and many other people of distinction whom I must omit to name.

We had on our register at headquarters on the 15th of October 815 names, and we estimate that not one-tenth part of the visitors to the Park the past season came to headquarters at all. Taking this estimate as a basis, there could not have been less than ten thousand people there the past season. Indeed, it has seemed that the people of our own country are just beginning to find out that there is such a place as the Yellowstone National Park, while it has attracted the attention of European scientists and travelers ever since it was first known. The distinguished travelers of our own country who have been there the past summer have told me that they felt compelled to visit the Park, so that they might be able to answer the thousands of inquiries that are made of them concerning this great Wonder-Land, wherever they go, in all parts of the earth. From this I think it safe to predict that as soon as the great railroads are completed to the borders of the Park, and the roads in the Park made comfortable by grading and bridging, it will speedily become the most popular summer resort in this or any land.

LINE OF TRAVEL LEADING TO THE PARK.

The tourist desiring to visit the Park, who may be, we will say, at Chicago, has his choice of either of the great Pacific railroads. The Union Pacific via Omaha to Ogden, thence by the Utah Northern to Beaver Cañon, where he takes stage or private conveyance up the valley of the Snake River to the Lower Fire-Hole Basin, a little over 100 miles from the railroad. Or he can take the northern route via Saint Paul and the North Pacific to Livingstone (Benson's Landing), from whence a branch road is to be built, I am informed, early next season, to the borders of the Park near my headquarters, 65 miles from Livingstone. In this connection I will also say, that active operations are already in progress to build and have ready for the accommodation of the public a number of elegant hotels at the points of greatest interest throughout the Park, so that tourists will not be compelled, as heretofore, to carry their own supplies, and camp on the ground.

I have the honor to be, very respectfully, your obedient servant,

P. H. CONGER.

Hon. H. M. TELLER,

Secretary of the Interior.

ANNUAL REPORT
OF THE
SUPERINTENDENT
OF THE
YELLOWSTONE NATIONAL PARK
TO THE
SECRETARY OF THE INTERIOR.

P. H. CONGER,
SUPERINTENDENT.

FOR THE YEAR 1883.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1883.

REPORT

OF

THE SUPERINTENDENT OF THE YELLOWSTONE NATIONAL PARK.

HEADQUARTERS YELLOWSTONE NATIONAL PARK,
Mammoth Hot Springs, September 10, 1883.

SIR: In compliance with the requirements of your office I have the honor to submit the following report pertaining to the Yellowstone National Park for the fiscal year ending June 30, 1883. A detailed statement of last summer's business, after the first of July and up to the close of business on the last of October, will be found in my annual report of last year, now in your office, and to which I respectfully refer you for particulars. All kinds of labor and improvements are necessarily suspended in the Park on or about the 1st of November on account of snow and the inclemency of the weather, at which time I settled with and dismissed all employés, except assistant and two men, whom I left in charge of the Government stock and property for the winter. Not deeming it necessary to remain here during the winter I returned to my home in Iowa, thence proceeded to Washington to counsel with you in regard to park management, and to prepare my annual report, which, owing to the press of business, I was unable to furnish at an earlier date. When my business was accomplished which called me to the capital, in compliance with your orders I returned to my post, where I arrived on the 1st of March, 1883, you deeming my presence in the Park necessary that early in the season by reason of reports reaching you of the slaughter of game within the Park. Upon investigating these rumors I ascertained that a few elk and deer had been killed by parties contracting to furnish meat for the hotel company. They were notified that hunting in the Park would not be allowed, and they immediately desisted. Hunting here has been practically suspended ever since, except what may be done by stealth. Indeed, I am glad I can assure you that the reports which reached you last winter relative to the slaughter of game in the Park were greatly exaggerated. On March 1 it was yet winter in this vicinity, and there was little we could do until the latter part of the month, when the weather became mild, and we were able to build a blacksmith shop 16 by 20, with attachment 10 by 16, used as cow house, a storehouse 16 by 37, a carpenter shop 16 by 20. The lumber was kindly furnished us by the hotel company, which had saw-mills running here. With refuse lumber and slabs (which cost us nothing but the hauling) we constructed a large corral, a wagon shed, and harness house; all of these buildings were absolutely requisite—indeed, they were indispensable for the proper care of our supplies and tools. I consider it fortunate for the interests of the Government here

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that the hotel company consented to let us have the lumber, as we have no mills anywhere near here, consequently lumber could not be delivered in the Park without costing three times as much as the hotel company charged us for the lumber we used. In justice to this company, it is my duty to inform you that they only charged \$20 per M at their mills. It cost the company that amount per M to get the logs to their mill and manufacture the same. The aforementioned buildings are covered with boards and battened. The roofs are not rain proof, and should be covered with shingles to be tight. This mountain lumber is full of knots, which crack open upon exposure to the sun; consequently, it is impossible to make compact roofs with any boards that can be obtained here. During the construction of these buildings I was also making the necessary preparations to commence the work on the roads. As soon as the snow cleared away and the roads became passable I went to Livingston, Bozeman, and Virginia City, Mont., and purchased one span of mules, harness, and wagon; also, one span of horses, harness, and wagon—the latter for the use of Superintendent—also purchased the necessary supplies and tools to carry on the season's campaign of road-making and bridge-building in the Park. We commenced active operations on the roads in the neighborhood of Mammoth Hot Springs the latter part of May. It was near the middle of June before we could get supplies and men into the Park from Virginia city to the Fire Hole Basin. My object was only to employ sufficient force to consume the unexpended balance of the appropriation applicable to the fiscal year ending June 30, 1883, at which time I understood a new law would take effect, and the expenditures for the construction of roads and bridges in the National Park would thereafter be under the supervision of the War Department. I kept two parties of men at work on the roads, each party about 12 strong, in different parts of the Park, repairing those places which required immediate attention.

At the end of the fiscal year I found, according to my accounts, that I had expended all of the appropriation except \$191.50, which amount still remains in my possession.

My accounts for the fourth quarter of the fiscal year ending June 30, 1883, await the examination and verification of the Treasury Department.

So urgent was the necessity for the improvement of the roads in the Park, and as tourists had already begun to arrive in large numbers, and as I daily expected the arrival of the engineer officer who was to relieve me of the charge of the construction of roads and bridges in the National Park, I still retained my men at work on the roads after the 1st of July. On the 20th of July, 1883, I addressed a letter to you, stating the embarrassment under which I was laboring by reason of the non-arrival of this officer whom I expected to relieve me; and not until the 27th of July did I receive your letter, under date of July 14, informing me of the assignment of an engineer officer to duty here, and advising me of the construction to be placed on the law passed last winter, making the appropriation for the protection, preservation, and improvement of the Yellowstone National Park.

I believe that I have given you a general idea of our operations for the fiscal year ending June 30, 1883, and I will now proceed to mention some matters that pertain more especially to the future management of the Park.

ASSISTANT SUPERINTENDENTS.

The law passed by the last Congress making the appropriation for the Park and creating the ten new officers, called "assistant superin-

tendents," seems to me not to have been well considered, as no provision was made for them except a meager salary, which is inadequate, if these men are required to build their own quarters, furnish their own horses, equipments, and sustenance. To be effective these officers necessarily ought to be stationed at different points throughout the Park, and to be well mounted, suitably uniformed and equipped. With the present force of ten men, I would recommend that they be stationed by twos at five of the most important points in the Park. This disposition of the force will require the erection of five comfortable cabins, as the law requires a permanent residence, and men cannot exist in this mountain country in the winter season without comfortable quarters. At this date, September 12, it will hardly be practicable to construct these buildings this season. Snow and severe weather are expected very soon. As to the operation of the law dividing the responsibility for the protection and improvement of the Park between two Departments of the Government, I am compelled to say that I think the measure unwise.

I need not enter into details in regard to this question, but I think there can be but little doubt that Congress at its next session will choose to have one responsible head for the transaction of business here as elsewhere. It must not be understood that I reflect upon the officer who has been assigned by the Secretary of War for duty here. Lieut. D. C. Kingman is all that I could desire as an officer and gentleman.

By the operation of this law the Superintendent of the Park is left without a dollar for any incidental expenses whatever for the care of these headquarters; no provision for the Government horses and mules, repairs of the buildings and fences, and many other things which I need not enumerate, but which will suggest themselves to the mind of any person familiar with the custody and care of an establishment of this kind. I cannot believe it was the intention of the makers of this law that the Superintendent should be left without the means to protect and preserve the property of the Government intrusted to his care and keeping.

HEADQUARTERS.

The headquarters building or Superintendent's residence is located, in my judgment, injudiciously. It is situated on the pinnacle of a very high and precipitous mound or hill, exposed to the fierce winds that prevail here, especially in the winter. Besides, it is nearly a half mile from water, necessitating the constant employment of a man and team to supply wood, water, and other necessities. My predecessor (Colonel Norris) built the house here a number of years ago. He gave as his reason for locating the headquarters on the hill, that he thought it the best defensive point against Indians. There may have been, and doubtless was at that time, a necessity for such precaution; but that day and necessity have passed. The Indians in this vicinity are no longer to be feared, and, allow me to remark, that I believe the whole Indian question solved and forever disposed of just so far as railroads penetrate our country. Hence other and more economic reasons should govern in selecting a site on which to erect suitable buildings for the use of the Government in this great National Park. The house now occupied is nothing but a log cabin at the best, sadly out of repair, roof leaky, and the force of the winds shakes the plaster out of the cracks between the logs constantly, rendering the house hardly habitable, especially during the cold season. Heretofore these rude cabins were all that were re-

quired, but all is now changed here. We have railroads, the telegraph, and great hotels, with all the crowd, business, and fashion that these wonderful civilizing agencies imply. I respectfully request that this subject be brought before Congress. In my next estimate, which I shall forward soon, I have named an amount which I deem necessary for this object.

HOTEL COMPANY.

Messrs. Rufus Hatch & Co. have erected at the Mammoth Hot Springs, in the vicinity of the headquarters, a large and elegant hotel for the accommodation of tourists. The hotel is very commodious and designed to be first class in every particular. The season for travel here was well advanced before the house was near enough completion for the accommodation of guests. It is not yet finished, and workmen mingle with visitors through its great halls; the sound of gong that calls one to dinner is deadened by the clatter of the carpenter's hammers upon the walls. There is much dissatisfaction and resentment manifest amongst the people of the Territories, especially amongst those living in the Yellowstone Valley, in the vicinity of the Park, against and with the claims that the "Yellowstone National Park Improvement Company" asserts, to wit, that this company holds the exclusive right and privilege to do all business of whatever kind or character (aside from that which is done by the Government) within the limits of the Park. I have had numerous inquiries to know if this is true, and I have invariably replied that if such was the case I had not been so informed by the Interior Department. The Northern Pacific Railroad Company have constructed a branch railroad from Livingston, Mont. (on their main line), up through the valley of the Yellowstone River to within 8 miles of the Mammoth Hot Springs, from which point Wakefield and Hoffman's excellent stages connect with every train to and from the hotel. This hotel company will doubtless be prepared by next season to furnish first-class accommodation to all who may come at most of the important points in the Park.

LAWS PERTAINING TO THE GOVERNMENT AND PROTECTION OF THE PEOPLE OF THE PARK.

The time has arrived when an imperative necessity demands the attention of Congress to this subject. The people here at this time have no security against any depredation or lawless act against either person or property. And no one understands better than does the vicious and criminal classes our defenseless condition.

The consequences are that this Park is overrun (especially in the summer) with large numbers of men of very doubtful character—a menace not only to the officers and employés of the Park, but also to the life and property of every visitor. It is not my province to recommend the form of government required here, but my duty to call your attention to this important subject, and I trust you will submit to Congress some plan of action to guide and protect us, best suited in your judgment to accomplish the desired end. It has not been the fault of the Secretary of the Interior that good and sufficient rules for the government of the Park have not been made. Nor is it the fault of the Superintendent that the same have not been duly published and promulgated, for all of this has been done. But the trouble is and has been that the Superintendent has not been provided with the necessary

legal machinery nor physical force to compel the obedience to the rules and regulations issued by the Secretary of the Interior for the government of the Park. Cheyenne, Wyo., the seat of government of this Territory, is nearly 1,000 miles from here, and, so far as I am advised, the nearest point to which we can appeal to the civil law for protection. Several men have been shot in the Park this season, and one instantly killed. I notified the Interior office of one shooting that occurred last March near the headquarters. I also gave notice of the commission of the crime to the governor of Wyoming, who replied that he had placed my communication in the hands of the United States district attorney, and requested me to furnish the names of the witnesses, which I promptly did. But in the mean time the culprit escaped, and, so far as I know, has not been apprehended or heard of since.

TOURISTS.

Visitors to the Park this season have been largely in excess of the number of last year, and a very wide distinction in the locality from whence they came. Heretofore the principal number of those visiting the Park came from the Territories and adjacent States, except those from foreign countries, many of whom were scientists, and who had been attracted here long before the savans of our own country had thought it worth their while to inspect the marvelous wonders to be found in the Yellowstone National Park and nowhere else on the globe. But that day of indifference has passed; the Eastern people have heard of the grandeur of the National Park, and the Eastern States have contributed their quota of their most learned and eminent citizens to swell the great multitude that have thronged these mountains the past summer, who have been invigorated by inhaling the pure air, healed by drinking the wonderful waters, and to be inspired to great thoughts and noble deeds by the beautiful and sublime scenery that here surrounds you on every hand. This season an unprecedented number of very distinguished personages have visited the Park—both of our own country and from foreign climes—the most eminent of whom was the President of the United States, accompanied by a member of his cabinet, Hon. Robert Lincoln, Secretary of War, and escorted by the Lieutenant-General of the Army, with his staff officers, and a company of cavalry. We had the distinguished honor and the pleasure, as the representative of the Government here, to welcome the President with his eminent friends and companions to this Park, and to assist them in pitching their camp within the inclosure, immediately in front of these headquarters.

Before the arrival of the Presidential party, came a party hardly less distinguished, viz: The General of the Army, with staff officers and escort of cavalry, accompanied by the Chief Justice of the United States and Associate Justice Gray, of the Supreme bench; also, Vermont's eminent and distinguished Senator, Mr. Edmunds. Close following this party came another of equal importance, led by three United States Senators, from three different and important States in the Union, to wit: Senator Dawes of Massachusetts, Senator Logan of Illinois, and Senator Cameron of Wisconsin. Next, the great States of Kentucky and Missouri were represented by their distinguished and chosen sons, Senator Beck of Kentucky, and Senator Vest of Missouri. Besides these eminent personages, who are now directly connected with the Government, many others visited this "wonderland," whose names are as familiar as household words with the people of our country, both for

their distinguished ability and no less distinguished public service, a few of whom I will name: Hon. Roscoe Conkling, New York; Hon. George S. Boutwell, Massachusetts; Hon. Edwards Pierrepont, New York; Hon. George C. Gorham, Washington, D. C.; Governor Crosby, of Montana; Hon. Morton E. Post, Wyoming.

In conclusion, Mr. Secretary, of this brief report I append a few of the names of the more prominent persons who have visited the Park this season, and who called at headquarters and subscribed their names on our register:

JUNE.

Dr. Max Siring, Germany; E. G. Taber, New Bedford, Mass.; Otto Dentsh, Dr. G. L. Gates, John Castle, and Henry Castle, Milwaukee, Wis.; Ralph Sailey, Dakota; James B. Williams, John Herrimen, and J. A. Barker, New York City; Waton Ferguson, Pittsburgh, Pa.; Charles Brayton, Cleveland, Ohio; J. H. Ames, Saint Paul, Minn.; J. E. Neal, San Francisco, Cal.; J. Hilton Scribner, New York; Hon. F. Jacobs, Delhi, N. Y.; W. F. Spalding, Binghamton, N. Y.; Frank Sibley, Norwich, N. Y.; Rev. S. E. Winger, Helena, Mont.; A. O. Linsley, A. P. Poney, F. Mix, and H. Hughitt, jr., Chicago, Ill.; Miss Nellie Blaire, Lancaster, Ohio; Miss A. Pease, and Walter Ayrault, Geneva, N. Y.

JULY.

General W. T. Sherman, United States Army; Chief Justice Waite, Associate Justice Gray, and United States Senator Edmunds, Vermont; General A. H. Terry, Colonel Hughes, Lieutenant Arthur, and Col. J. C. Tidball, United States Army; Major Gregg, of Fort Ellis, Mont. (commanding escort of 43 cavalry); Henry Anderson, Minnesota; George B. Bailey, San Francisco, Cal.; Louis Shaw, Philadelphia; T. Ward, Butte City, Mont.; George Sands and sons, Capron, Ill.; Col. P. W. Norris, ex-Superintendent National Park, Michigan; Hon. R. Elwood and wife, Sycamore, Ill.; J. L. Elwood and wife, De Kalb, Ill.; Robert McKnight, Miss Flora McKnight, and Robert McKnight, jr., Pittsburgh, Pa.; Hon. Alfred C. Coxe, Utica, N. Y.; Hon. Timothy Griffith, New York; T. McF. Patten, Salem, Oreg.

AUGUST.

A. F. Townsend, Chicago, Ill.; R. C. Moore and wife, Associated Press, Minnesota; A. W. Brayton, M. D., Indianapolis, Ind.

Mr. John Renshaw and party arrived August 6, commissioned by the Government to make a topographical survey of the Park, and on the 8th instant Mr. Arnold Hague arrived with his party, having like authority to make a geological examination of the same.

Miss Kate Dunn Dewey, Milwaukee, Wis.; Mrs. Charles W. Burne, Mrs. Alfred H. Anderson, and Charles W. Brown, La Crosse, Wis.; Paul Selby, Springfield, Ill.; Hon. Martin I. Townsend, Troy, N. Y., accompanied by three youths; E. L. Cole and wife, Grand Rapids, Mich.; George Armitage and wife, Monroe, Mich.; Rev. W. Atterberry, N. Y. City; W. W. Atterberry, Detroit, Mich.; Miss L. P. Chapin, Miss L. Griswold, Miss Florence E. Clough, and Col. J. B. Clough and wife, Minneapolis; M. D. Kneeland, Fredonia, N. Y.; Stella Kneeland, Syracuse, N. Y.; C. A. O. McClellan and James I. Best, Waterloo, Ind.; Hon. B. F. Gue, Des Moines, Iowa; T. M. Ferry, Benton Harbor, Mich.; G. W. Bassett and I. N. Moore, Fort Dodge, Iowa; H. B. Allen and wife, G. Conger and wife, and Emmons Johnson, Waterloo, Iowa.

Daniel C. Kingman, first lieutenant of Engineers, United States Army, accompanied by Charles H. Hendricks, of Omaha, Nebr., Henry Kehl and Robert Stone, topographical assistants, United States Army, arrived August 13, and assumed charge of the construction of the roads and bridges in the Park; Hon. J. B. Grinnell, Iowa; D. R. Jones, Des Moines, Iowa.; Hon. William H. Lyon, Indian commissioner, New York City; F. H. Dayton and wife and Mrs. D. W. Vanderhoof, Saint Paul, Minn.; United States Senator John A. Logan, Chicago, Ill.; United States Senator H. L. Dawes, Massachusetts; L. M. Desney, Shenandoah, Iowa; William H. Armstrong, Mrs. Armstrong, Miss Annette Armstrong, James Armstrong, Miss Earp and Thomas Hassard, Washington, D. C.; Charles H. F. Collis, Mrs. C. H. F. Collis, and Lloyd Collis, Philadelphia, Pa.; M. T. Lyon and William H. Lyon, jr., Brooklyn, L. I.; United States Senator James B. Beck and wife, Lexington, Ky.; Maj. G. Clay Goodloe and wife, Washington, D. C.; Col. W. Cassius Goodloe, Lexington, Ky.; James W. Coreoran, Pine Bluff, Ark.; W. L. Perkins, Saint Paul, Minn.; Asa Fisher and John Bowen, Bismarck, Dak.; E. L. Koon, Hillsdale, Mich.; Edwin Dun, London, Ohio; T. W. Plankinton, London, England; Prof. Samuel E. Tillman, West Point Military Academy; Lient. F. H. Barber, United States Army, New York Harbor; Lient. W. S. Schuyler, Fifth Cavalry, United States Army, accompanied by Frank Gruaeyo, post guide, Fort McKinney, Wyo., and an escort of 11 cavalry; J. W. Baxter, Chief Medical Purveyor United States Army, W. Scott Smith, P. Murphy, M. D., and William Lee, M. D., Washington, D. C.; Mrs. J. S. Harris, C. W. Cannon and wife, Helena, Mont.; Hon. Edwards Pierrepont, New York City; L. A. Luce, Bozeman, Mont.; George O. Eaton, Cooke City, Mont.; G. H. Carver, Livingston, Mont.; Charles P. Clark, Saint Paul, Minn.; Rufus Hatch, New York City; John Neate, London, England; Professor Passey, Paris, France; Johann H. Schmitz, George W. Mathers, Amsterdam; John C. Wyman, Rhode Island; Webb M. Samuels and H. L. Newman, Saint Louis; Thomas Mack, Boston, Mass.; George Fisk, Buffalo, N. Y.; and Kinney M. Shephard, Chicago, Ill.

SEPTEMBER.

T. A. Harvey, George B. Morley, W. A. Avery, R. B. McKnight, William B. Mershon, A. H. Mershon, Amasa Rust, Levi Tillotson, Wilber Hill, R. J. Berne, E. A. Sage, William Butman, D. L. C. Salér and son, N. W. Merrill, and Hugh Smith, East Saginaw, Mich.; Mrs. C. M. Finch and daughter, Mrs. G. W. Wakefield and daughter, Bozeman, Mont.; J. H. Jerkian, Chicago, Ill.; J. E. Curtis and daughter, Toledo, Ohio; Mrs. E. W. Herendeen, Virginia City, Mont.; Hon. John A. Kasson, Iowa; Dr. F. R. Dedolph and wife, Saint Paul, Minn., and many others.

Later, a large number of distinguished foreigners, guests of President Villard, of the Northern Pacific Railroad, arrived, prominent amongst whom were the English and German ministers; Hon. Carl Schurz; Sir James Hannen, president of the probate, divorce, and admiralty division of the high court of justice, England; General C. S. Hutchinson, R. E., inspector of railways and tramways, board of trade, London, England; Henry Edwards, M. P. for Weymouth, England; John Holmes, M. P. for Hackney, London, England; Mrs. John Holmes, Hackney, London, England; Charles M. Norwood, M. P. for Hull, England; James C. Hannen, London, England; Dr. Adam Eisenbohn,

Heidelberg, Germany; Mrs. Von Eisendecker and Madame Bonny,
Washington, D. C.

All of which is respectfully submitted.

I have the honor to be, very respectfully, your obedient servant,

P. H. CONGER,

Superintendent Yellowstone National Park.

Hon. H. M. TELLER,

Secretary of the Interior.

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REPORT

OF THE

SUPERINTENDENT OF THE YELLOWSTONE NATIONAL PARK

TO THE

SECRETARY OF THE INTERIOR.

1885.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1885.

REPORT

OF THE

SUPERINTENDENT OF THE YELLOWSTONE NATIONAL PARK.

YELLOWSTONE NATIONAL PARK,
OFFICE OF SUPERINTENDENT,
Mammoth Hot Springs, Wyo., October 5, 1885.

SIR: I have the honor to submit the following report, in compliance with your telegram of the 2d instant.

I arrived in the Park on the 28th day of June last. On the 1st day of July I assumed control of the Park as superintendent. I found the stock belonging to the Government in a worn-out condition, poor in flesh, stiff, and scarcely fit for service.

The discipline of the force was bad; no head to anything. I at once set about recruiting my stock and making such disposition of my assistants as would best serve to protect the game and the objects of interest in the Park, which had apparently been little thought of except for the purpose of spoliation or total destruction.

The game in the Park had been shot with impunity and marketed at the hotels without any interference on the part of the officers whose sworn duty it was to protect and prevent its destruction. I secured the services of a true and trusty mountaineer, and soon had the satisfaction of bringing to justice some of the worst "skin-hunters" that had infested the Park for years, and caused them to be punished to the full extent of the law. With this warning to the others, and a constant watch, both by day and night, I succeeded in a measure in breaking up the wholesale slaughter of the game that had been carried on in the Park for years, and at this time I am glad to be able to say that the Park is full of game of all kinds. There is somewhere in the neighborhood of two hundred bison in the Park, the elk in large numbers, and several bands of antelope have been seen within 3 miles of the Mammoth Hot Springs. With proper protection the game would soon become gentle, the Park would abound with it, and it could be seen by tourists in their travels through the Park, which would add greatly to their pleasure; to this end there should be no shooting or hunting of any kind allowed within the limits of the Park.

I found the residence of the superintendent situated on a high hill, far removed from wood and water, and not tenable on account of the leaky and worn-out condition of the roof. I caused it to be repaired and shingled in order to be protected from the heat and rain, and to be occupied as a summer residence. The furniture was old and not fit for use. I partially furnished two rooms, and with much patching made it passably comfortable for the summer, but it will be impos-

sible to occupy it during the winter. I shall build an addition to one of the assistant superintendent's houses, and move down on the flat, where I can be protected from the terrible gales of wind that blow here nearly the winter long.

A new building for the superintendent should be built at the earliest possible time, where wood and water are convenient and the residence accessible.

I found Lieut. Dan C. Kingman, of the Engineer Corps, U. S. Army, in charge of the construction of roads and bridges in the Park. This being his third season here, he was able to give me valuable information, and was of great assistance to me in many ways. The forces under him have constructed and completed 16 miles of splendid road between Mammoth Hot Springs and the Upper Geyser Basin. This road, with one or two exceptions, is what might be called a splendid drive. Besides building this road, he has built a number of bridges, and repaired the road through Gibbon Cañon, so that its passage is one of pleasure. These roads and bridges have cost in the neighborhood \$15,000. By this new road the Lake of the Woods country is avoided, and the Green Creek Mountain gone around, which will be glad tidings to the tourists who have had the sad experience of a trip from Mammoth Hot Springs to Norris Geyser Basin. This road shortens the distance by some 2½ miles, and is now one of the finest roads in the Park.

The road from the Fire Hole to the Upper Geyser Basin, a distance of about 9 miles, is simply a splendid drive. Too much cannot be said in its praise.

The work of repairing and opening new roads and trails will continue until about October 20, which I am informed is as long as one can work with any comfort. There are a number of roads that should be opened at the earliest possible moment, which would shorten the distance to be traveled in the Park by parties desiring to see all of the curiosities in the shortest possible space of time—all of which Lieutenant Kingman no doubt will mention more fully in his report.

Of Lieutenant Kingman's work in the Park too much cannot be said in his praise. My relations with him have been of the most pleasant character, and I would suggest that he be detailed and assigned permanently to duty in the Park, in order that he may have the time and opportunity of perfecting and completing the system of roads and bridges begun by him.

The hotel accommodations in the Park are not what they should be for the prices charged, and there should be some one authorized to see that there is something like the equivalent given their patrons. I would suggest that some suitable person be designated for this purpose; also to regulate the police affairs of these hotels, which have been bad this summer.

The force of assistant superintendents is not sufficient to protect the game and the many objects of interest in the Park; hence many acts of vandalism occur, such as filling up the geyser craters with logs and stones, chipping off the formations, writing of names, and breaking the beautiful hot-water crystallizations that are formed at the many hot springs that abound throughout the Park. I would most respectfully suggest that the force of assistants be increased from ten to fifteen, and that they be paid \$1,000 per year; that they be required to furnish their own horses and equipments, and allowed \$100 a year, in addition to their pay proper, for the latter item. I am convinced that a better service would be had, and that it would insure better care being taken of the stock.

One of the most difficult things that I have had to contend with was the prevention of fires in the Park, of which, I am happy to say, up to this time none have occurred worth mentioning, though some sixty-odd were put out by the assistants. A very stringent law should be enacted against the spread of fires, or leaving camp-fires without extinguishing them completely.

LAWS OF THE PARK.

I would most earnestly call your attention to the entire inadequacy of the laws to provide punishment for violations of the regulations for the protection of the Park. In fact, so far as the enforcement of the laws of the Park proper, there is no system available by which it can be done. The protection that I have been able to give the Park has been through the Territorial laws of Wyoming, which, in my opinion, are of very questionable validity, even within that portion of the Park lying wholly within Wyoming Territory, and certainly none in that portion lying in other Territories. I would suggest that a law be enacted by Congress establishing a court within and for the Yellowstone National Park, with exclusive jurisdiction of all misdemeanors, and with power to examine and hold to bail all cases of felonies, to be tried at the nearest court having criminal jurisdiction. That the assistant superintendents be authorized to serve any process of said court. That the judge thereof be a man learned in the law, of at least ten years' experience, and of good moral character. With a court of this character, and an effectual force of assistants to act as ministerial officers, there would be comparatively little trouble in protecting and keeping the Park in a state of preservation beautiful to look upon; but unless some stringent enactment is made, and that at the earliest possible time, it will be too late. Too much importance cannot be attached to the establishment of a court exclusively for the protection of the Yellowstone National Park.

The travel in the Park this summer has been much greater than ever before. Many distinguished persons, both from home and abroad, came to see the wonders of the nation's play-ground; and I am gratified to be able to say that none, so far as I have been able to learn, were disappointed.

The transportation in the Park was good. No serious accident of any kind occurred, to my knowledge.

I would most respectfully suggest that it is of the greatest importance that the lines of the Park be surveyed at the earliest opportunity, and so marked that there can be no mistaking them. This I deem next in importance to the organization of a proper court for the protection of the Park, which should be attended to at the earliest possible moment.

The estimate for the appropriation asked for the Park for the year ending June 30, 1887, in round numbers, amounts to \$150,000. Its purposes are set out in detail in my estimate for appropriations forwarded to the Department of the Interior on the 3d instant.

I am, sir, very respectfully, your obedient servant,

D. W. WEAR,

Superintendent Yellowstone National Park.

The Hon. the SECRETARY OF THE INTERIOR,

Washington, D. C.

(4552-500.)

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