

cates that it has been altered and has become partially crystalline—probably from the proximity of volcanic rocks. But though travelling was slow and fatiguing to the animals, we were delighted with the appearance of the country, which was green and refreshing after our tedious journey down the parched Valley of Snake River.

The mountains were covered with good bunch-grass (*festuca*); the water of the streams was cold and pure; their bottoms were handsomely wooded with various kinds of trees; and huge and lofty and picturesque precipices were displayed where the river cut through the mountains.

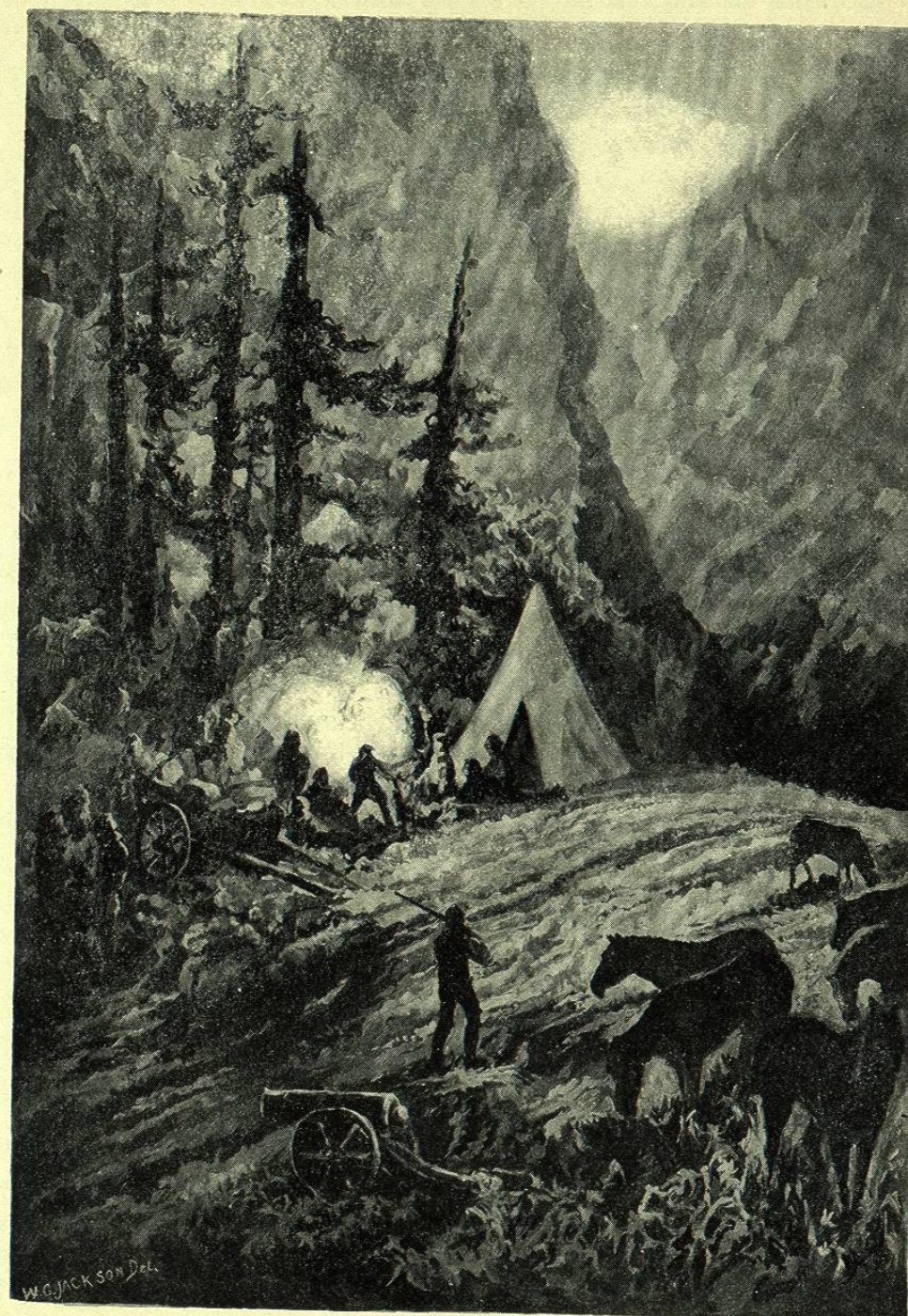
We found in the evening some good grass and rushes; and encamped among large timber, principally birch, which had been recently burnt and blackened, and almost destroyed by fire. The night was calm and tolerably clear, with the thermometer at sunset at 59°. Our journey to-day was about twenty miles.

October 14th.—The day was clear and calm, with a temperature at sunrise of 46°. After travelling about three miles up the valley, we found the river shut up by precipices in a kind of cañon, and the road makes a circuit over the mountains. In the afternoon we reached the river again, by another little ravine; and, after travelling along it for a few miles, left it enclosed among rude mountains; and, ascending a smaller branch, encamped on it about five o'clock, very much elevated above the valley.

The view was everywhere limited by mountains, on which were no longer seen the black and barren rocks, but a fertile soil, with excellent grass, and partly well covered with pine. I have never seen a wagon-road equally bad, in the same space, as this of yesterday and to-day. I noticed where one wagon had been overturned twice, in a very short distance; and it was surprising to me that those wagons which were in the rear, and could not have had much assistance, got through at all. Still, there is no mud; and the road has one advantage in being perfectly firm. The day had been warm and very pleasant, and the night was perfectly clear.

October 15th.—The thermometer at daylight was 42°, and at sunrise 40°; clouds, which were scattered over all the sky, disappeared with the rising sun. The trail did not much improve until we had crossed the dividing grounds between the *Brulé* (Burnt) and Powder Rivers.

The rock displayed on the mountains as we approached the summit was a compact trap, decomposing on the exposed surfaces, and apparently an altered argillaceous sandstone, containing small crystalline nodules of anolime, apparently filling cavities originally existing. From the summit here the whole horizon shows high mountains; no high plain or level is to be seen; and on the left, from south around by the west to north, the mountains are black with pines; while through the remaining space to the eastward they are bald, with the exception of some scattered pines.



CAMP, OCTOBER 14.—SNAKE RIVER.

We are now entering a region where all the elevated parts are covered with dense and heavy forests. From the dividing grounds we descended by a mountain road to Powder River, on an old bed of which we encamped. Descending from the summit, we enjoyed a picturesque view of high rocky mountains on the right, illuminated by the setting sun.

From the heights we had looked in vain for a well-known landmark on Powder River, which had been described to me by Mr. Payette as *l'arbre seul* (the lone tree); and, on arriving at the river, we found a fine tall pine stretched on the ground, which had been felled by some inconsiderate emigrant axe. It had been a beacon on the road for many years past.

Our Cayuses had become impatient to reach their homes, and travelled on ahead to-day; and this afternoon we were visited by several Indians who belonged to the tribes on the Columbia. They were on horseback, and were out on a hunting excursion, but had obtained no better game than a large gray hare, of which each had some six or seven hanging to his saddle.

We were also visited by an Indian who had his lodge and family in the mountain to the left. He was in want of ammunition, and brought with him a beaver-skin to exchange, which he valued at six charges of powder and ball. I learned from him that there are very few of these animals remaining in this part of the country.

The temperature at sunset was 61° , and the evening clear. I obtained, with other observations, an immersion and emersion of the third satellite. Elevation, three thousand one hundred feet.

October 16th.—For several weeks the weather in the daytime has been very beautiful, clear, and warm; but the nights, in comparison, are very cold. During the night there was ice a quarter of an inch thick in the lodge; and at daylight the thermometer was at 16° , and the same at sunrise—the weather being calm and clear. The annual vegetation now is nearly gone, almost all the plants being out of bloom.

Last night two of our horses had run off again, which delayed us until noon; and we made to-day but a short journey of thirteen miles, the road being very good, and encamped in a fine bottom of Powder River.

The thermometer at sunset was at 61° , with an easterly wind and partially clear sky; and the day has been quite pleasant and warm, though more cloudy than yesterday; and the sun was frequently faint, but it grew finer and clearer toward evening.

October 17th.—Thermometer at sunrise, 25° . The weather at daylight was fine, and the sky without a cloud; but these came up, or were formed with the sun, and at seven were thick over all the sky. Just now this appears to be the regular course—clear and brilliant during the night, and cloudy during the day.

There is snow yet visible in the neighboring mountains, which yesterday extended along our route to the left in a lofty and dark-blue range, having much the appearance of the Wind River Mountains. It is probable that they have received their name of the *Blue Mountains* from the dark-blue appearance given to them by the pines.

We travelled this morning across the affluents to Powder River, the road being good, firm, and level; and the country became constantly more pleasant and interesting. The soil appeared to be very deep, and is black and extremely good, as well among the hollows of the hills on the elevated plats as on the river bottoms; the vegetation being such as is usually found in good ground.

The following analytical result shows the precise qualities of this soil, and will justify to science the character of fertility which the eye attributes to it:

ANALYSIS OF POWDER RIVER SOIL.

Silica.....	72.30
Alumina.....	6.25
Carbonate of lime.....	6.86
Carbonate of magnesia.....	4.62
Oxide of iron.....	1.20
Organic matter.....	4.50
Water and loss.....	4.27
	100.00

From the waters of this stream the road ascended by a good and moderate ascent to a dividing ridge, but immediately entered upon ground covered with fragments of an altered siliceous slate, which are in many places large and render the road racking to a carriage.

In this rock the planes of deposition are distinctly preserved, and the metamorphism is evidently due to the proximity of volcanic rocks. On either side, the mountains here are densely covered with tall and handsome trees; and mingled with the green of a variety of pines is the yellow of the European larch (*Pinus larix*), which loses its leaves in the fall. From its present color we were enabled to see that it forms a large proportion of the forests on the mountains, and is here a magnificent tree, attaining sometimes the height of two hundred feet, which I believe is elsewhere unknown.

About two in the afternoon we reached a high point of the dividing ridge, from which we obtained a good view of the *Grand Rond*—a beautiful level basin, or mountain valley, covered with good grass on a rich soil, abundantly watered, and surrounded by high and well-timbered mountains; and its name descriptive of its form—the great circle. It is a place—one of the few we have seen in our journey so far—where a farmer

would delight to establish himself, if he were content to live in the seclusion which it imposes. It is about twenty miles in diameter, and may in time form a superb county. Probably with the view of avoiding a circuit, the wagons had directly descended into the *Rond* by the face of a hill so very rocky and continuously steep as to be apparently impracticable; and, following down on their trail, we encamped on one of the branches of the Grand Rond River, immediately at the foot of the hill. I had remarked, in descending, some very white spots glistening on the plain, and, going out in that direction after we had encamped, I found them to be the bed of a dry salt lake, or marsh, very firm and bare, which was covered thickly with a fine white powder containing a large quantity of carbonate of soda (thirty-three in one hundred parts).

The old grass had been lately burnt off from the surrounding hills, and, wherever the fire had passed, there was a recent growth of strong, green, and vigorous grass; and the soil of the level prairie, which sweeps directly up to the foot of the surrounding mountains, appears to be very rich, producing flax spontaneously and luxuriantly in various places.

ANALYSIS OF THE GRAND ROND SOIL.

Silica.....	70.81
Alumina.....	10.97
Lime and magnesia.....	1.38
Oxide of iron.....	2.21
Vegetable matter, partly decomposed.....	8.16
Water and loss.....	5.46
Phosphate of lime.....	1.01
	100.00

The elevation of this encampment is two thousand nine hundred and forty feet above the sea.

October 18th.—It began to rain an hour before sunrise, and continued until ten o'clock; the sky entirely overcast, and the temperature at sunrise 48°.

We resumed our journey somewhat later than usual, travelling in a nearly north direction across this beautiful valley; and about noon reached a place on one of the principal streams, where I had determined to leave the emigrant trail, in the expectation of finding a more direct and better road across the Blue Mountains. At this place the emigrants appeared to have held some consultation as to their further route, and finally turned directly off to the left; reaching the foot of the mountain in about three miles, and ascending it by a hill as steep and difficult as that by which we had yesterday descended to the Rond.

Quitting, therefore, this road, which, after a very rough crossing, issued

from the mountains by the heads of the *Umatilah* River, we continued our northern course across the valley, following an Indian trail which had been indicated to me by Mr. Payette, and encamped at the northern extremity of the Grand Rond, on a slough-like stream of very deep water, without any apparent current. There are some pines here on the low hills at the creek; and in the northwest corner of the Rond is a very heavy body of timber, which descends into the plain.

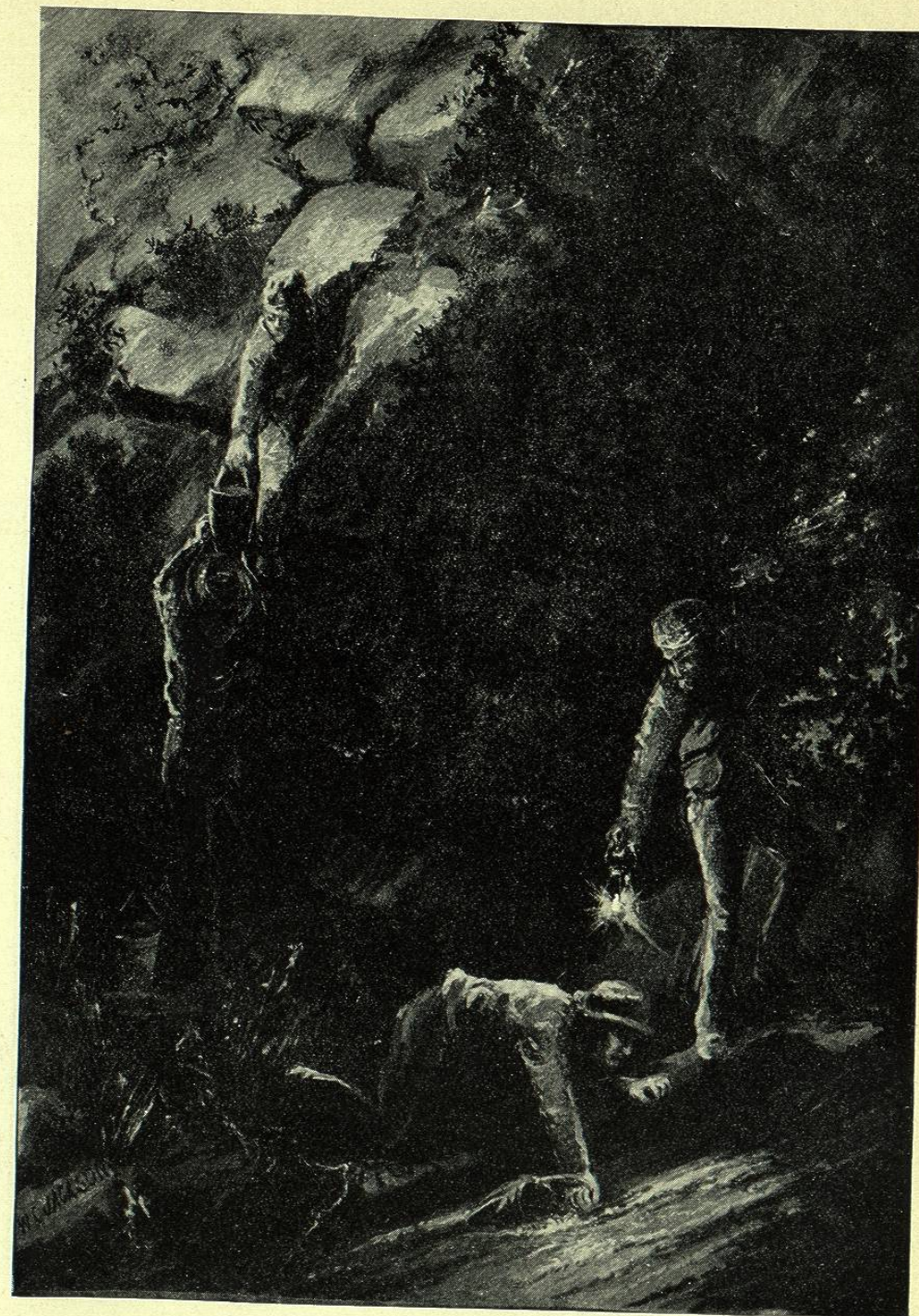
The clouds, which had rested very low along the mountain sides during the day, rose gradually up in the afternoon; and in the evening the sky was almost entirely clear, with a temperature at sunset of 47° . Some indifferent observations placed the camp in longitude $117^{\circ} 28' 26''$, latitude $45^{\circ} 26' 47''$; and the elevation was two thousand six hundred feet above the sea.

October 19th.—This morning the mountains were hidden by fog: there was a heavy dew during the night, in which the exposed thermometer at daylight stood at 32° , and at sunrise the temperature was 35° .

We passed out of the Grand Rond by a fine road along the creek, which, for a short distance, runs in a kind of rocky chasm. Crossing a low point, which was a little rocky, the trail conducted into the open valley of the stream—a handsome place for farms; the soil, even of the hills, being rich and black. Passing through a point of pines, which bore evidences of being much frequented by the Indians and in which the trees were sometimes apparently two hundred feet high and three to seven feet in diameter, we halted for a few minutes in the afternoon at the foot of the Blue Mountains, on a branch of the Grand Rond River, at an elevation of two thousand seven hundred feet.

Resuming our journey we commenced the ascent of the mountain through an open pine-forest of large and stately trees, among which the balsam-pine made its appearance; the road being good, with the exception of one steep ascent with a corresponding descent, which might both have been easily avoided by opening a way for a short distance through the timber.

It would have been well had we encamped on the stream where we had halted below, as the night overtook us on the mountain, and we were obliged to encamp without water and tie up the animals to the trees for the night. We had halted on a smooth, open place of a narrow ridge which descended very rapidly to a ravine, or piny hollow, at a considerable distance below; and it was quite a pretty spot, had there been water near. But the fires at night look very cheerless after a day's march when there is no preparation for supper going on; and, after sitting some time around the blazing logs, Mr. Preuss and Carson, with several others, volunteered to take the india-rubber buckets and go down into the ravine in



GETTING WATER, DEEP RAVINE OF SIERRA NEVADA.

search of water. It was a very difficult way, in the darkness, down the slippery side of the steep mountain, and harder still to climb about half a mile up again; but they found the water, and the cup of coffee, which it enabled us to make, and bread were only enjoyed with greater pleasure.

At sunset the temperature was 46° ; the evening remarkably clear; and I obtained an emersion of the first satellite, which does not give a good result, although the observation was a very good one. The chronometric longitude was $117^{\circ} 28' 34''$, latitude $45^{\circ} 38' 07''$, and we had ascended to an elevation of three thousand eight hundred and thirty feet. It appeared to have snowed yesterday on the mountains, their summits showing very white to-day.

October 20th.—There was a heavy white frost during the night, and at sunrise the temperature was 37° .

The animals had eaten nothing during the night; and we made an early start, continuing our route among the pines, which were more dense than yesterday, and still retained their magnificent size.

The larches cluster together in masses on the sides of the mountains, and their yellow foliage contrasts handsomely with the green of the balsam and other pines. After a few miles we ceased to see any pines, and the timber consisted of several varieties of spruce, larch, and balsam-pine, which have a regularly conical figure. These trees appeared from sixty to nearly two hundred feet in height; the usual circumference being ten to twelve feet, and in the pines sometimes twenty-one feet. In open places near the summit these trees became less high and more branching, the conical form having a greater base.

The instrument carriage occasioned much delay, it being frequently necessary to fell trees and remove the fallen timber. The trail we were following led up a long spur, with a very gradual and gentle rise.

At the end of three miles we halted at an open place near the summit, from which we enjoyed a fine view over the mountainous country where we had lately travelled, to take a barometrical observation at the height of four thousand seven hundred and sixty feet.

After travelling occasionally through open places in the forest we were obliged to cut a way through a dense body of timber, from which we emerged on an open mountain side, where we found a number of small springs, and encamped after a day's journey of ten miles. Our elevation here was five thousand feet.

October 21st.—There was a very heavy white frost during the night, and the thermometer at sunrise was 30° .

We continued to travel through the forest, in which the road was rendered difficult by fallen trunks, and obstructed by many small trees which it was necessary to cut down. But these are only accidental difficulties,