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NARRATIVE

OF

THE EXPLORING EXPEDITION

TO

OREGON AND NORTH CALIFORNIA,

IN THE YEARS 1843–44.

Washington City, March 1, 1845.

To Colonel J. J. ABERT,

Chief of the Corps of Topographical Engineers.

SIR,—In pursuance of your instructions to connect the reconnoissance of 1842, which I had the honour to conduct, with the surveys of Commander Wilkes on the coast of the Pacific Ocean, so as to give a connected survey of the interior of the American continent, I proceeded to the Great West early in the spring of 1843, and arrived, on the 17th of May, at the little town of Kansas, on the Missouri frontier, near the junction of the Kansas river with the Missouri river, where I was detained near two weeks in completing the necessary preparations for the extended explorations which my instructions contemplated.

My party consisted principally of Creole and Canadian French, and Americans, amounting in all to 39 men; among whom you will recognise several of those who were with me in my first expedition, and who have been favourably brought to your notice in a former report. Mr. Thomas Fitzpatrick, whom many years of hardship and exposure in the western territories had rendered familiar with a portion of the country it was designed to explore, had been selected as our guide; and Mr. Charles Preuss, who had been my assistant in the previous journey, was again associated with me in the same capacity on the present expedition. Agreeably to your directions, Mr. Theodore Talbot, of Washington city, had been attached to the party, with a view to advancement in his profession; and at St. Louis I had been joined by Mr. Frederick Dwight, a gentleman of Springfield, Massachusetts, who availed himself of our overland journey, to visit the Sandwich Islands and China, by way of Fort Vancouver.

The men engaged for the service were—

Alexis Ayot,	Clinton Deforest,	Raphael Proue,
François Badeau,	Baptiste Derosier,	Oscar Sarpy,
Oliver Beaulieu,	Basil Lajeunesse,	Baptiste Tabeau,
Baptiste Bernier,	François Lajeunesse,	Charles Taplin,
John A. Campbell,	Henry Lee,	Baptiste Tesson,
John G. Campbell,	Louis Ménard,	Auguste Vasquez,
Manuel Chapman,	Louis Montreuil,	Joseph Verrot,
Ransom Clark,	Samuel Neal,	Patrick White,
Philibert Courteau,	Alexis Pera,	Tiery Wright,
Michel Crélis,	François Pera,	Louis Zindel, and
William Creuss,	James Power,	Jacob Dodson,

a free young coloured man of Washington city, who volunteered to accompany the expedition, and performed his duty manfully throughout the voyage. Two Delaware Indians—a fine-looking old man and his son—were engaged to accompany the expedition as hunters, through the kindness of Major Cummins, the excellent Indian agent. L. Maxwell, who had accompanied the expedition as one of the hunters in 1842, being on his way to Taos, in New Mexico, also joined us at this place.

The party was armed generally with Hall's carbines, which, with a brass 12-lb. howitzer, had been furnished to me from the United States' arsenal at St. Louis, agreeably to the orders of Colonel S. W. Kearney, commanding the 3rd military division. Three men were especially detailed for the management of this piece, under the charge of Louis Zindel, a native of Germany, who had been 19 years a non-commissioned officer of artillery in the Prussian army, and regularly instructed in the duties of his profession. The camp equipage and provisions were transported in twelve carts, drawn each by two mules; and a light covered wagon, mounted on good springs, had been provided for the safer carriage of the instruments. These were—

One refracting telescope, by Frauenhofer.
One reflecting circle, by Gambey.
Two sextants, by Troughton.
One pocket chronometer, No. 837, by Goffe, Falmouth.
One pocket chronometer, No. 739, by Brockbank.
One syphon barometer, by Bunten, Paris.
One cistern barometer, by Frye and Shaw, New York.
Six thermometers, and a number of small compasses.

To make the exploration as useful as possible, I determined, in conformity to your general instructions, to vary the route to the Rocky Mountains from that followed in the year 1842. The route was then up the valley of the Great Platte river to the South Pass, in north latitude 42°; the route now determined on was up the valley of the Kansas river, and to the head of the Arkansas, and to some pass in the mountains, if any could be found, at the sources of that river.

By making this deviation from the former route, the problem of a new road to Oregon and California, in a climate more genial, might be solved; and a better knowledge obtained of an important river, and the country it drained, while the great object of the expedition would find its point of commencement at the termination of the former, which was at that great gate in the ridge of the Rocky Mountains called the South Pass, and on the lofty peak of the mountain which overlooks it, deemed the highest peak in the ridge, and from the opposite sides of which four great rivers take their rise, and flow to the Pacific or the Mississippi.

Various obstacles delayed our departure until the morning of the 29th, when we commenced our long voyage; and at the close of a day, rendered disagreeably cold by incessant rain, encamped about four miles beyond the frontier, on the verge of the great prairies.

Resuming our journey on the 31st, after the delay of a day to complete our equipment and furnish ourselves with some of the comforts of civilized life, we encamped in the evening at Elm Grove, in company with several emigrant wagons, constituting a party which was proceeding to Upper California, under the direction of Mr. J. B. Childs, of Missouri. The wagons were variously freighted with goods, furniture, and farming utensils, containing, among other things, an entire set of machinery for a mill, which Mr. Childs designed erecting on the waters of the Sacramento river, emptying into the bay of San Francisco.

We were joined here by Mr. William Gilpin, of Missouri, who, intending this year to visit the settlements in Oregon, had been invited to accompany us, and proved a useful and agreeable addition to the party. From this encampment our route, until the 3rd of June, was nearly the same as that described to you in 1842. Trains of wagons were almost constantly in sight, giving to the road a populous and animated appearance, although the greater portion of the emigrants were collected at the crossing, or already on their march beyond the Kansas river.

Leaving at the ford the usual emigrant road to the mountains, we continued our route along the southern side of the Kansas, where we found the country much more broken than on the northern side of the river, and where our progress was much delayed by the numerous small streams, which obliged us to make frequent bridges. On the morning of the 4th we crossed a handsome stream, called by the Indians Otter creek, about 130 feet wide, where a flat stratum of limestone, which forms the bed, made an excellent ford. We met here a small party of Kansas and Delaware Indians, the latter returning from a hunting and trapping expedition on the upper waters of the river; and on the heights above were five or six Kansas women, engaged in digging prairie potatoes (*psoralea esculenta*). On the afternoon of the 6th, while busily engaged in crossing a wooded stream, we were thrown into

a little confusion by the sudden arrival of Maxwell, who entered the camp at full speed at the head of a war party of Osage Indians, with gay red blankets, and heads shaved to the scalp lock. They had run him a distance of about nine miles, from a creek on which we had encamped the day previous, and to which he had returned in search of a runaway horse belonging to Mr. Dwight, which had taken the homeward road, carrying with him saddle, bridle, and holster pistols. The Osages were probably ignorant of our strength, and, when they charged into the camp, drove off a number of our best horses; but we were fortunately well mounted, and, after a hard chase of seven or eight miles, succeeded in recovering them all. This accident, which occasioned delay and trouble, and threatened danger and loss, and broke down some good horses at the start, and actually endangered the expedition, was a first fruit of having gentlemen in company — very estimable, to be sure, but who are not trained to the care and vigilance and self-dependence which such an expedition required, and who are not subject to the orders which enforce attention and exertion. We arrived on the 8th at the mouth of the Smoky-hill fork, which is the principal southern branch of the Kansas; forming here, by its junction with the Republican, or northern branch, the main Kansas river. Neither stream was fordable, and the necessity of making a raft, together with bad weather, detained us here until the morning of the 11th, when we resumed our journey along the Republican fork. By our observations, the junction of the streams is in latitude 39° 03′ 38″, longitude 96° 24′ 56″, and at an elevation of 926 feet above the gulf of Mexico. For several days we continued to travel along the Republican, through a country beautifully watered with numerous streams, handsomely timbered ; and rarely an incident occurred to vary the monotonous resemblance which one day on the prairies here bears to another, and which scarcely require a particular description. Now and then we caught a glimpse of a small herd of elk ; and occasionally a band of antelopes, whose curiosity sometimes brought them within rifle range, would circle round us, and then scour off into the prairies. As we advanced on our road these became more frequent ; but as we journeyed on the line usually followed by the trapping and hunting parties of the Kansas and Delaware Indians, game of every kind continued very shy and wild. The bottoms which form the immediate valley of the main river were generally about three miles wide, having a rich soil of black vegetable mould, and for a prairie country, well interspersed with wood. The country was everywhere covered with a considerable variety of grasses, occasionally poor and thin, but far more frequently luxuriant and rich. We had been gradually and regularly ascending in our progress westward, and on the evening of the 14th, when we encamped on a little creek in the valley of the Republican, 265 miles by our

travelling road from the mouth of the Kansas, we were at an elevation of 1,520 feet. That part of the river where we were now encamped is called by the Indians the *Big Timber*. Hitherto our route had been laborious and extremely slow, the unusually wet spring and constant rain having so saturated the whole country that it was necessary to bridge every watercourse, and, for days together, our usual march averaged only five or six miles. Finding that at such a rate of travel it would be impossible to comply with your instructions, I determined at this place to divide the party, and, leaving Mr. Fitzpatrick with 25 men in charge of the provisions and heavier baggage of the camp, to proceed myself in advance, with a light party of 15 men, taking with me the howitzer and the light wagon which carried the instruments.

Accordingly, on the morning of the 16th, the parties separated; and, bearing a little out from the river, with a view of heading some of the numerous affluents, after a few hours' travel over somewhat broken ground, we entered upon an extensive and high level prairie, on which we encamped towards evening at a little stream, where a single dry cotton-wood afforded the necessary fuel for preparing supper. Among a variety of grasses which to-day made their first appearance, I noticed bunch-grass, (*festuca,*) and buffalo-grass, (*sesleria dactyloides*). Amorpha canescens (*lead plant*) continued the characteristic plant of the country, and a narrow-leaved *lathyrus* occurred during the morning in beautiful patches. *Sida coccinea* occurred frequently, with a *psoralia* near *psoralia floribunda,* and a number of plants not hitherto met, just verging into bloom. The water on which we had encamped belonged to Solomon's fork of the Smoky-hill river, along whose tributaries we continued to travel for several days.

The country afforded us an excellent road, the route being generally over high and very level prairies; and we met with no other delay than being frequently obliged to bridge one of the numerous streams, which were well timbered with ash, elm, cotton-wood, and a very large oak—the latter being occasionally five and six feet in diameter, with a spreading summit. *Sida coccinea* is very frequent in vermilion-coloured patches on the high and low prairie; and I remarked that it has a very pleasant perfume.

The wild sensitive plant (*schrankia angustata*) occurs frequently, generally on the dry prairies, in valleys of streams, and frequently on the broken prairie bank. I remark that the leaflets close instantly to a very light touch. *Amorpha,* with the same *psoralia,* and a dwarf species of *lupinus,* are the characteristic plants.

On the 19th, in the afternoon, we crossed the Pawnee road to the Arkansas, and travelling a few miles onward, the monotony of the prairies was suddenly dispelled by the appearance of five or six buffalo bulls, forming a vanguard of immense herds, among which we were travelling a few days afterwards. Prairie dogs were seen for the first time during the day; and we had the good fortune to

obtain an antelope for supper. Our elevation had now increased to 1,900 feet. *Sida coccinea* was a characteristic on the creek bottoms, and buffalo grass is becoming abundant on the higher parts of the ridges.

June 21.—During the forenoon we travelled up a branch of the creek on which we had encamped, in a broken country, where, however, the dividing ridges always afforded a good road. Plants were few; and with the short sward of the buffalo grass, which now prevailed everywhere, giving to the prairies a smooth and mossy appearance, were mingled frequent patches of a beautiful red grass, (*aristida pallens,*) which had made its appearance only within the last few days.

We halted to noon at a solitary cotton-wood in a hollow, near which was killed the first buffalo, a large old bull.

Antelope appeared in bands during the day. Crossing here to the affluents of the Republican, we encamped on a fork, about 40 feet wide and 1 foot deep, flowing with a swift current over a sandy bed, and well wooded with ash-leaved maple (*negundo fraxinifolium*), elm, cotton-wood, and a few white oaks. We were visited in the evening by a very violent storm, accompanied by wind, lightning, and thunder; a cold rain falling in torrents. According to the barometer, our elevation was 2,130 feet above the gulf.

At noon, on the 23rd, we descended into the valley of a principal fork of the Republican, a beautiful stream with a dense border of wood, consisting principally of varieties of ash, 40 feet wide and 4 feet deep. It was musical with the notes of many birds, which, from the vast expanse of silent prairie around, seemed all to have collected here. We continued during the afternoon our route along the river, which was populous with prairie dogs, (the bottoms being entirely occupied with their villages,) and late in the evening encamped on its banks. The prevailing timber is a blue-foliaged ash (*fraxinus,* near *F. Americana,*) and ash-leaved maple. With these were *fraxinus Americana,* cotton-wood, and long-leaved willow. We gave to this stream the name of Prairie Dog river. Elevation 2,350 feet. Our road on the 25th lay over high smooth ridges, 3,100 feet above the sea; buffalo in great numbers, absolutely covering the face of the country. At evening we encamped within a few miles of the main Republican, on a little creek, where the air was fragrant with the perfume of *artemisia filifolia,* which we here saw for the first time, and which was now in bloom. Shortly after leaving our encampment on the 26th, we found suddenly that the nature of the country had entirely changed. Bare sand-hills everywhere surrounded us in the undulating ground along which we were moving; and the plants peculiar to a sandy soil made their appearance in abundance. A few miles further we entered the valley of a large stream, afterwards known to be the Republican fork of the Kansas, whose shallow waters, with a depth of only a few inches, were spread out over a bed of yellowish

white sand 600 yards wide. With the exception of one or two distant and detached groves, no timber of any kind was to be seen; and the features of the country assumed a desert character, with which the broad river, struggling for existence among quicksands along the treeless banks, was strikingly in keeping. On the opposite side, the broken ridges assumed almost a mountainous appearance; and fording the stream, we continued on our course among these ridges, and encamped late in the evening at a little pond of very bad water, from which we drove away a herd of buffalo that were standing in and about it. Our encampment this evening was 3,500 feet above the sea. We travelled now for several days through a broken and dry sandy region, about 4,000 feet above the sea, where there were no running streams; and some anxiety was constantly felt on account of the uncertainty of water, which was only to be found in small lakes that occurred occasionally among the hills. The discovery of these always brought pleasure to the camp, as around them were generally green flats, which afforded abundant pasturage for our animals; and here were usually collected herds of the buffalo, which now were scattered over all the country in countless numbers.

The soil of bare and hot sands supported a varied and exuberant growth of plants, which were much farther advanced than we had previously found them, and whose showy bloom somewhat relieved the appearance of general sterility. Crossing the summit of an elevated and continuous range of rolling hills, on the afternoon of the 30th of June, we found ourselves overlooking a broad and misty valley, where, about 10 miles distant, and 1,000 feet below us, the South fork of the Platte was rolling magnificently along, swollen with the waters of the melting snows. It was in strong and refreshing contrast with the parched country from which we had just issued; and when, at night, the broad expanse of water grew indistinct, it almost seemed that we had pitched our tents on the shore of the sea.

Travelling along up the valley of the river, here 4,000 feet above the sea, in the afternoon of July 1, we caught a far and uncertain view of a faint blue mass in the west, as the sun sank behind it; and from our camp in the morning, at the mouth of Bijou, Long's peak and the neighbouring mountains stood out into the sky, grand and luminously white, covered to their bases by glittering snow.

On the evening of the 3rd, as we were journeying along the partially overflowed bottoms of the Platte, where our passage stirred up swarms of mosquitoes, we came unexpectedly upon an Indian, who was perched upon a bluff, curiously watching the movements of our caravan. He belonged to a village of Oglallah Sioux, who had lost all their animals in the severity of the preceding winter, and were now on their way up the Bijou fork to beg horses from the Arapahoes, who were hunting buffalo at the head of that river. Several came into our camp at noon; and, as

they were hungry, as usual, they were provided with buffalo meat, of which the hunters had brought in an abundant supply.

About noon, on the 4th of July, we arrived at the fort, where Mr. St. Vrain received us with his customary kindness, and invited us to join him in a feast which had been prepared in honour of the day.

Our animals were very much worn out, and our stock of provisions entirely exhausted when we arrived at the fort; but I was disappointed in my hope of obtaining relief, as I found it in a very impoverished condition; and we were able to procure only a little unbolted Mexican flour, and some salt, with a few pounds of powder and lead.

As regarded provisions, it did not much matter in a country where rarely the day passed without seeing some kind of game, and where it was frequently abundant. It was a rare thing to lie down hungry, and we had already learned to think bread a luxury; but we could not proceed without animals, and our own were not capable of prosecuting the journey beyond the mountains without relief.

I had been informed that a large number of mules had recently arrived at Taos, from Upper California; and as our friend, Mr. Maxwell, was about to continue his journey to that place, where a portion of his family resided, I engaged him to purchase for me 10 or 12 mules, with the understanding that he should pack them with provisions and other necessaries, and meet me at the mouth of the *Fontaine-qui-bouit*, on the Arkansas river, to which point I would be led in the course of the survey.

Agreeably to his own request, and in the conviction that his habits of life and education had not qualified him to endure the hard life of a voyageur, I discharged here one of my party, Mr. Oscar Sarpy, having furnished him with arms and means of transportation to Fort Laramie, where he would be in the line of caravans returning to the States.

At daybreak, on the 6th of July, Maxwell was on his way to Taos; and a few hours after we also had recommenced our journey up the Platte, which was continuously timbered with cotton-wood and willow, on a generally sandy soil. Passing on the way the remains of two abandoned forts (one of which, however, was still in good condition), we reached, in 10 miles, Fort Lancaster, the trading establishment of Mr. Lupton. His post was beginning to assume the appearance of a comfortable farm: stock, hogs, and cattle, were ranging about on the prairie; there were different kinds of poultry; and there was the wreck of a promising garden, in which a considerable variety of vegetables had been in a flourishing condition, but it had been almost entirely ruined by the recent high waters. I remained to spend with him an agreeable hour, and set off in a cold storm of rain, which was accompanied with violent thunder and lightning. We encamped

immediately on the river, 16 miles from St. Vrain's. Several Arapahoes, on their way to the village which was encamped a few miles above us, passed by the camp in the course of the afternoon. Night set in stormy and cold, with heavy and continuous rain, which lasted until morning.

July 7.—We made this morning an early start, continuing to travel up the Platte; and in a few miles frequent bands of horses and mules, scattered for several miles round about, indicated our approach to the Arapaho village, which we found encamped in a beautiful bottom, and consisting of about 160 lodges. It appeared extremely populous, with a great number of children; a circumstance which indicated a regular supply of the means of subsistence. The chiefs, who were gathered together at the farther end of the village, received us (as probably strangers are always received to whom they desire to show respect or regard) by throwing their arms around our necks and embracing us.

It required some skill in horsemanship to keep the saddle during the performance of this ceremony, as our American horses exhibited for them the same fear they have for a bear or any other wild animal. Having very few goods with me, I was only able to make them a meagre present, accounting for the poverty of the gift by explaining that my goods had been left with the wagons in charge of Mr. Fitzpatrick, who was well known to them as the White Head, or the Broken Hand. I saw here, as I had remarked in an Arapaho village the preceding year, near the lodges of the chiefs, tall tripods of white poles supporting their spears and shields, which showed it to be a regular custom.

Though disappointed in obtaining the presents which had been evidently expected, they behaved very courteously, and, after a little conversation, I left them, and, continuing on up the river, halted at noon on the bluff, as the bottoms are almost inundated; continuing in the afternoon our route along the mountains, which were dark, misty, and shrouded—threatening a storm; the snow peaks sometimes glittering through the clouds beyond the first ridge.

We surprised a grizzly bear sauntering along the river, who raising himself upon his hind legs, took a deliberate survey of us; that did not appear very satisfactory to him, and he scrambled into the river and swam to the opposite side. We halted for the night a little above Cherry creek; the evening cloudy, with many mosquitoes. Some indifferent observations placed the camp in latitude 39° 43′ 53″, and chronometric longitude 105° 24′ 34″.

July 8.—We continued to-day to travel up the Platte; the morning pleasant, with a prospect of fairer weather. During the forenoon our way lay over a more broken country, with a gravelly and sandy surface; although the immediate bottom of the river was a good soil, of a dark sandy mould, resting upon a stratum of large pebbles, or rolled stones, as at Laramie fork. On our right,

and apparently very near, but probably eight or ten miles distant, and two or three thousand feet above us, ran the first range of the mountains, like a dark corniced line, in clear contrast with the great snowy chain which, immediately beyond, rose glittering 5,000 feet above them. We caught this morning a view of Pike's peak; but it appeared for a moment only, as clouds rose early over the mountains, and shrouded them in mist and rain all the day. In the first range were visible, as at the Red Buttes on the North fork, very lofty escarpments of red rock. While travelling through this region, I remarked that always in the morning the lofty peaks were visible and bright, but very soon small white clouds began to settle around them—brewing thicker and darker as the day advanced, until the afternoon, when the thunder began to roll; and invariably at evening we had more or less of a thunder storm. At 11 o'clock, and 21 miles from St. Vrain's fort, we reached a point in this southern fork of the Platte, where the stream is divided into three forks; two of these (one of them being much the largest) issuing directly from the mountains on the west, and forming, with the easternmost branch, a river of the plains. The elevation of this point is about 5,500 feet above the sea; this river falling 2,800 feet in a distance of 316 miles, to its junction with the North fork of the Platte. In this estimate, the elevation of the junction is assumed as given by our barometrical observations in 1842.

On the easternmost branch, up which we took our way, we first came among the pines growing on the top of a very high bank, and where we halted on it to noon; quaking asp (*populus tremuloides*) was mixed with the cotton-wood, and there were excellent grass and rushes for the animals.

During the morning there occurred many beautiful flowers, which we had not hitherto met. Among them, the common blue flowering flax made its first appearance; and a tall and handsome species of *gilia,* with slender scarlet flowers, which appeared yesterday for the first time, was very frequent to-day.

We had found very little game since leaving the fort, and provisions began to get unpleasantly scant, as we had had no meat for several days; but towards sundown, when we had already made up our minds to sleep another night without supper, Lajeunesse had the good fortune to kill a fine deer, which he found feeding in a hollow near by; and as the rain began to fall, threatening an unpleasant night, we hurried to secure a comfortable camp in the timber.

To-night the camp fires, girdled with *appolas* of fine venison, looked cheerful in spite of the stormy weather.

July 9.—On account of the low state of our provisions and the scarcity of game, I determined to vary our route, and proceed several camps to the eastward, in the hope of falling in with the buffalo. This route along the dividing grounds between the South

fork of the Platte and the Arkansas would also afford some additional geographical information. This morning, therefore, we turned to the eastward, along the upper waters of the stream on which we had encamped, entering a country of picturesque and varied scenery; broken into rocky hills of singular shapes; little valleys, with pure crystal water, here leaping swiftly along, and there losing itself in the sands; green spots of luxuriant grass, flowers of all colours, and timber of different kinds—everything to give it a varied beauty, except game. To one of these remarkably shaped hills, having on the summit a circular flat rock two or three hundred yards in circumference, some one gave the name of Poundcake, which it has been permitted to retain, as our hungry people seemed to think it a very agreeable comparison. In the afternoon a buffalo bull was killed, and we encamped on a small stream, near the road which runs from St. Vrain's fort to the Arkansas.

July 10.—Snow fell heavily on the mountains during the night, and Pike's peak this morning is luminous and grand, covered from the summit, as low down as we can see, with glittering white. Leaving the encampment at six o'clock, we continued our easterly course over a rolling country, near to the high ridges, which are generally rough and rocky, with a coarse conglomerate displayed in masses, and covered with pines. This rock is very friable, and it is undoubtedly from its decomposition that the prairies derive their sandy and gravelly formation. In six miles we crossed a head water of the Kioway river, on which we found a strong fort and *coral* that had been built in the spring, and halted to noon on the principal branch of the river. During the morning our route led over a dark vegetable mould, mixed with sand and gravel, the characteristic plant being *esparcette* (*onobrychis sativa*), a species of clover which is much used in certain parts of Germany for pasturage of stock—principally hogs. It is sown on rocky waste ground, which would otherwise be useless, and grows very luxuriantly, requiring only a renewal of the seed about once in 15 years. Its abundance here greatly adds to the pastural value of this region. A species of antennaria in flower was very common along the line of road, and the creeks were timbered with willow and pine. We encamped at Bijou's fork, the water of which, unlike the clear streams we had previously crossed, is of a whitish colour, and the soil of the bottom a very hard, tough clay. There was a prairie-dog village on the bottom, and, in the endeavour to unearth one of the little animals, we laboured ineffectually in the tough clay until dark. After descending, with a slight inclination, until it had gone the depth of two feet, the hole suddenly turned at a sharp angle in another direction for one more foot in depth, when it again turned, taking an ascending direction to the next nearest hole. I have no doubt that all their little habitations communicate with each other. The greater part of the people were

sick to-day, and I was inclined to attribute their indisposition to the meat of the bull which had been killed the previous day.

July 11.—There were no indications of buffalo having been recently in the neighbourhood; and, unwilling to travel farther eastward, I turned this morning to the southward, up the valley of Bijou. *Esparcette* occurred universally, and among the plants on the river I noticed, for the first time during this journey, a few small bushes of the *absinthe* of the voyageurs, which is commonly used for fire-wood (*artemisia tridentata*). Yesterday and to-day the road has been ornamented with the showy bloom of a beautiful *lupinus*, a characteristic in many parts of the mountain region, on which were generally great numbers of an insect with very bright colours (*litta vesicatoria*).

As we were riding quietly along, eagerly searching every hollow in search of game, we discovered, at a little distance in the prairie, a large grizzly bear, so busily engaged in digging roots that he did not perceive us until we were galloping down a little hill 50 yards from him, when he charged upon us with such sudden energy, that several of us came near losing our saddles. Being wounded ,he commenced retreating to a rocky piney ridge near by, from which we were not able to cut him off, and we entered the timber with him. The way was very much blocked up with fallen timber; and we kept up a running fight for some time, animated by the bear charging among the horses. He did not fall until after he had received six rifle balls. He was miserably poor, and added nothing to our stock of provisions.

We followed the stream to its head in a broken ridge, which, according to the barometer, was about 7,500 feet above the sea. This is a piney elevation, into which the prairies are gathered, and from which the waters flow, in almost every direction, to the Arkansas, Platte, and Kansas rivers; the latter stream having here its remotest sources. Although somewhat rocky and broken, and covered with pines, in comparison with the neighbouring mountains, it scarcely forms an interruption to the great prairie plains which sweep up to their bases.

We had an excellent view of Pike's peak from this camp, at the distance of 40 miles. This mountain barrier presents itself to travellers on the plains, which sweep almost directly to its bases —an immense and comparatively smooth and grassy prairie, in very strong contrast with the black masses of timber, and the glittering snow above them. With occasional exceptions, comparatively so very small as not to require mention, these prairies are everywhere covered with a close and vigorous growth of a great variety of grasses, among which the most abundant is the buffalo grass (*sesleria dactyloides*). Between the Platte and Arkansas rivers, that part of this region which forms the basin drained by the waters of the Kansas, with which our operations made us more particularly acquainted, is based upon a formation of calcareous

rocks. The soil of all this country is excellent, admirably adapted to agricultural purposes, and would support a large agricultural and pastoral population. A glance at the map, along our several lines of travel, will show you that this plain is watered by many streams. Throughout the western half of the plain, these are shallow, with sandy beds, becoming deeper as they reach the richer lands approaching the Missouri river; they generally have bottom lands, bordered by bluffs varying from 50 to 500 feet in height. In all this region the timber is entirely confined to the streams. In the eastern half, where the soil is a deep, rich, vegetable mould, retentive of rain and moisture, it is of vigorous growth, and of many different kinds; and throughout the western half it consists entirely of various species of cotton-wood, which deserves to be called the tree of the desert—growing in sandy soils, where no other tree will grow; pointing out the existence of water, and furnishing to the traveller fuel, and food for his animals. Add to this, that the western border of the plain is occupied by the Sioux, Arapaho, and Cheyenne nations, and the Pawnees and other half-civilized tribes in its eastern limits, for whom the intermediate country is a war-ground, you will have a tolerably correct idea of the appearance and condition of the country. Descending a somewhat precipitous and rocky hillside among the pines, which rarely appear elsewhere than on the ridge, we encamped at its foot, where there were several springs, which you will find laid down upon the map as one of the extreme sources of the Smoky Hill fork of the Kansas. From this place the view extended over the Arkansas valley, and the Spanish peaks in the south beyond. As the greater part of the men continued sick, I encamped here for the day, and ascertained conclusively, from experiments on myself, that their illness was caused by the meat of the buffalo bull.

On the summit of the ridge, near the camp, were several rock-built forts, which in front were very difficult of approach, and in the rear were protected by a precipice entirely beyond the reach of a rifle ball. The evening was tolerably clear, with a temperature at sunset of 63°. Elevation of the camp 7,300 feet.

Turning the next day to the south-west, we reached, in the course of the morning, the wagon road to the settlements on the Arkansas river, and encamped in the afternoon on the *Fontaine-qui-bouit* (or Boiling Spring) river, where it was 50 feet wide, with a swift current. I afterwards found that the spring and river owe their names to the bubbling of the effervescing gas in the former, and not to the temperature of the water, which is cold. During the morning a tall species of *gilia*, with a slender white flower, was characteristic; and, in the latter part of the day, another variety of *esparcette* (wild clover), having the flower white, was equally so. We had a fine sunset of golden brown; and, in the evening, a very bright moon, with the near mountains,

made a beautiful scene. Thermometer, at sunset, was 69°, and our elevation above the sea 5,800 feet.

July 13.—The morning was clear, with a north-westerly breeze, and the thermometer at sunrise at 46°. There were no clouds along the mountains, and the morning sun showed very clearly their rugged character.

We resumed our journey very early down the river, following an extremely good lodge trail, which issues by the head of this stream from the bayou Salade, a high mountain valley behind Pike's peak. The soil along the road was sandy and gravelly, and the river well timbered. We halted to noon under the shade of some fine large cotton-woods, our animals luxuriating on rushes (*equisetum hyemale*), which, along this river, were remarkably abundant. A variety of cactus made its appearance, and among several strange plants were numerous and beautiful clusters of a plant resembling *mirabilis jalapa*, with a handsome convolvulus I had not hitherto seen (*calystegia*). In the afternoon we passed near the encampment of a hunter named Maurice, who had been out into the plains in pursuit of buffalo calves, a number of which I saw among some domestic cattle near his lodge. Shortly afterwards, a party of mountaineers galloped up to us—fine-looking and hardy men, dressed in skins and mounted on good fat horses; among them were several Connecticut men, a portion of Wyeth's party, whom I had seen the year before, and others were men from the western states.

Continuing down the river, we encamped at noon on the 14th at its mouth, on the Arkansas river. A short distance above our encampment, on the left bank of the Arkansas, is a *pueblo* (as the Mexicans call their civilized Indian villages), where a number of mountaineers, who had married Spanish women in the valley of Taos, had collected together, and occupied themselves in farming, carrying on at the same time a desultory Indian trade. They were principally Americans, and treated us with all the rude hospitality their situation admitted; but as all commercial intercourse with New Mexico was now interrupted, in consequence of Mexican decrees to that effect, there was nothing to be had in the way of provisions. They had, however, a fine stock of cattle, and furnished us an abundance of excellent milk. I learned here that Maxwell, in company with two other men, had started for Taos on the morning of the 9th, but that he would probably fall into the hands of the Utah Indians, commonly called the *Spanish Yutes*. As Maxwell had no knowledge of their being in the vicinity when he crossed the Arkansas, his chance of escape was very doubtful; but I did not entertain much apprehension for his life, having great confidence in his prudence and courage. I was further informed that there had been a popular tumult among the *pueblos*, or civilized Indians, residing near Taos, against the "*foreigners*" of that place, in which they had plundered their

houses and ill-treated their families. Among those whose property had been destroyed, was Mr. Beaubien, father-in-law of Maxwell, from whom I had expected to obtain supplies, and who had been obliged to make his escape to Santa Fé.

By this position of affairs, our expectation of obtaining supplies from Taos was cut off. I had here the satisfaction to meet our good buffalo-hunter of 1842, Christopher Carson, whose services I considered myself fortunate to secure again; and as a reinforcement of mules was absolutely necessary, I despatched him immediately, with an account of our necessities, to Mr. Charles Bent, whose principal post is on the Arkansas river, about 75 miles below *Fontaine-qui-bouit*. He was directed to proceed from that post by the nearest route across the country, and meet me with what animals he should be able to obtain at St. Vrain's fort. I also admitted into the party Charles Towns, a native of St. Louis, a serviceable man, with many of the qualities of a good voyageur. According to our observations, the latitude of the mouth of the river is 38° 15′ 23″; its longitude 104° 58′ 30″; and its elevation above the sea 4,880 feet.

On the morning of the 16th, the time for Maxwell's arrival having expired, we resumed our journey, leaving for him a note, in which it was stated that I would wait for him at St. Vrain's fort until the morning of the 26th, in the event that he should succeed in his commission. Our direction was up the Boiling Spring river, it being my intention to visit the celebrated springs from which the river takes its name, and which are on its upper waters, at the foot of Pike's peak. Our animals fared well while we were on this stream, there being everywhere a great abundance of *prêle*. *Ipomea leptophylla*, in bloom, was a characteristic plant along the river, generally in large bunches, with two to five flowers on each. Beautiful clusters of the plant resembling *mirabilis jalapa* were numerous, and *glycyrrhiza lepidota* was a characteristic of the bottoms. Currants nearly ripe were abundant, and among the shrubs which covered the bottom was a very luxuriant growth of chenopodiaceous shrubs, four to six feet high.

On the afternoon of the 17th we entered among the broken ridges at the foot of the mountains, where the river made several forks. Leaving the camp to follow slowly, I rode ahead in the afternoon in search of the springs. In the mean time, the clouds, which had been gathering all the afternoon over the mountains, began to roll down their sides; and a storm so violent burst upon me, that it appeared I had entered the store-house of the thunder storms. I continued, however, to ride along up the river until about sunset, and was beginning to be doubtful of finding the springs before the next day, when I came suddenly upon a large smooth rock about 20 yards in diameter, where the water from several springs was bubbling and boiling up in the midst of a white incrustation, with which it had covered a portion of the rock.

As this did not correspond with a description given me by the hunters, I did not stop to taste the water, but, dismounting, walked a little way up the river, and passing through a narrow thicket of shrubbery bordering the stream, stepped directly upon a huge white rock, at the foot of which the river, already become a torrent, foamed along, broken by a small fall. A deer which had been drinking at the spring was startled by my approach, and springing across the river, bounded off up the mountain. In the upper part of the rock, which had apparently been formed by deposition, was a beautiful white basin, overhung by currant bushes, in which the cold clear water bubbled up, kept in constant motion by the escaping gas, and overflowing the rock, which it had almost entirely covered with a smooth crust of glistening white. I had all day refrained from drinking, reserving myself for the spring; and as I could not well be more wet than the rain had already made me, I lay down by the side of the basin, and drank heartily of the delightful water. The spring is situated immediately at the foot of lofty mountains, beautifully timbered, which sweep closely round, shutting up the little valley in a kind of cove. As it was beginning to grow dark, I rode quickly down the river, on which I found the camp a few miles below.

The morning of the 18th was beautiful and clear, and all the people being anxious to drink of these famous waters, we encamped immediately at the springs, and spent there a very pleasant day. On the opposite side of the river is another locality of springs, which are entirely of the same nature. The water has a very agreeable taste, which Mr. Preuss found very much to resemble that of the famous Seltzer springs in the grand duchy of Nassau, a country famous for wine and mineral waters; and it is almost entirely of the same character, though still more agreeable than that of the famous Bear springs, near Bear river of the Great Salt lake. The following is an analysis of an incrustation with which the water had covered a piece of wood lying on the rock:

Carbonate of lime	92·25
Carbonate of magnesia	1·21
Sulphate of lime Chloride of calcium Chloride of magnesia	·23
Silica	1·50
Vegetable matter	·20
Moisture and loss	4·61
	100·00

At 11 o'clock, when the temperature of the air was 73°, that of the water in this was 60°·5; and that of the upper spring, which issued from the flat rock, more exposed to the sun, was 69°. At sunset, when the temperature of the air was 66°, that of the lower springs was 58°, and that of the upper 61°.

July 19.—A beautiful and clear morning, with a slight breeze

from the north-west; the temperature of the air at sunrise being 57°·5. At this time the themperature of the lower spring was 57°·8, and that of the upper 54°·3.

The trees in the neighbourhood were birch, willow, pine, and an oak resembling *quercus alba*. In the shrubbery along the river are currant bushes (*ribes*), of which the fruit has a singular piney flavour; and on the mountain side, in a red gravelly soil, is a remarkably coniferous tree (perhaps an *abies*), having the leaves singularly long, broad, and scattered, with bushes of *spiræa ariæfolia*. By our observations, this place is 6,350 feet above the sea, in latitude 38° 52′ 10″, and longitude 105° 22′ 45″.

Resuming our journey on this morning, we descended the river, in order to reach the mouth of the eastern fork, which I proposed to ascend. The left bank of the river here is very much broken. There is a handsome little bottom on the right, and both banks are exceedingly picturesque—strata of red rock, in nearly perpendicular walls, crossing the valley from north to south. About three miles below the springs, on the right bank of the river, is a nearly perpendicular limestone rock, presenting a uniformly unbroken surface, 20 to 40 feet high, containing very great numbers of a large univalve shell, which appears to belong to the genus *inoceramus*.

In contact with this, to the westward, was another stratum of limestone, containing fossil shells of a different character; and still higher up on the stream were parallel strata, consisting of a compact somewhat crystalline limestone, and argillaceous bituminous limestone in thin layers. During the morning, we travelled up the eastern fork of the *Fontaine-qui-bouit* river, our road being roughened by frequent deep gullies timbered with pine, and halted to noon on a small branch of this stream, timbered principally with the narrow-leaved cotton-wood (*populus angustifolia*), called by the Canadians *liard amère*. On a hill near by were two remarkable columns of a grayish-white conglomerate rock, one of which was about 20 feet high, and two feet in diameter. They are surmounted by slabs of a dark ferruginous conglomerate, forming black caps, and adding very much to their columnar effect at a distance. This rock is very destructible by the action of the weather, and the hill, of which they formerly constituted a part, is entirely abraded.

A shaft of the gun-carriage was broken in the afternoon; and we made an early halt, the stream being from 12 to 20 feet wide, with clear water. As usual, the clouds had gathered to a storm over the mountains, and we had a showery evening. At sunset the thermometer stood at 62°, and our elevation above the sea was 6,530 feet.

July 20.—This morning (as we generally found the mornings under these mountains) was very clear and beautiful, and the air cool and pleasant, with the thermometer at 44°. We continued

our march up the stream, along a green sloping bottom, between pine hills on the one hand, and the main Black hills on the other, towards the ridge which separates the waters of the Platte from those of the Arkansas. As we approached the dividing ridge, the whole valley was radiant with flowers; blue, yellow, pink, white, scarlet, and purple, vied with each other in splendour. Espar-cette was one of the highly characteristic plants, and a bright-looking flower (*gaillardia aristata*) was very frequent; but the most abundant plant along our road to-day was *geranium macu-latum*, which is the characteristic plant on this portion of the dividing grounds. Crossing to the waters of the Platte, fields of blue flax added to the magnificence of this mountain garden: this was occasionally four feet in height, which was a luxuriance of growth that I rarely saw this almost universal plant attain through-out the journey. Continuing down a branch of the Platte, among high and very steep timbered hills, covered with fragments of rock, towards evening we issued from the piney region, and made a late encampment near the Poundcake rock, on that fork of the river which we had ascended on the 8th of July. Our animals enjoyed the abundant rushes this evening, as the flies were so bad among the pines that they had been much harassed. A deer was killed here this evening; and again the evening was overcast, and a col-lection of brilliant red clouds in the west was followed by the cus-tomary squall of rain.

Achillea millefolium (milfoil) was among the characteristic plants of the river bottoms to-day. This was one of the most common plants during the whole of our journey, occurring in almost every variety of situation. I noticed it on the lowlands of the rivers, near the coast of the Pacific, and near to the snow among the mountains of the *Sierra Nevada*.

During this excursion we had surveyed to its head one of the two principal branches of the Upper Arkansas, 75 miles in length, and entirely completed our survey of the south fork of the Platte, to the extreme sources of that portion of the river which belongs to the plains, and heads in the broken hills of the Arkansas dividing ridge, at the foot of the mountains. That portion of its waters which were collected among these mountains, it was hoped to explore on our homeward voyage.

Reaching St. Vrain's fort on the morning of the 23rd, we found Mr. Fitzpatrick and his party in good order and excellent health, and my true and reliable friend Kit Carson, who had brought with him 10 good mules, with the necessary pack-saddles. Mr. Fitzpatrick, who had often endured every extremity of want during the course of his mountain life, and knew well the value of provisions in this country, had watched over our stock with jealous vigilance, and there was an abundance of flour, rice, sugar, and coffee in the camp; and again we fared luxuriously. Meat was, however, very scarce; and two very small pigs, which we obtained

at the fort, did not go far among 40 men. Mr. Fitzpatrick had been here a week, during which time his men had been occupied in refitting the camp; and the repose had been very beneficial to his animals, which were now in tolerably good condition.

I had been able to obtain no certain information in regard to the character of the passes in this portion of the Rocky Mountain range, which had always been represented as impracticable for carriages, but the exploration of which was incidentally contemplated by my instructions, with the view of finding some convenient point of passage for the road of emigration, which would enable it to reach, on a more direct line, the usual ford of the Great Colorado—a place considered as determined by the nature of the country beyond that river. It is singular, that immediately at the foot of the mountains, I could find no one sufficiently acquainted with them to guide us to the plains at the western base; but the race of trappers, who formerly lived in their recesses, has almost entirely disappeared—dwindled to a few scattered individuals—some one or two of whom are regularly killed in the course of each year by the Indians. You will remember, that in the previous year I brought with me to their village near this post, and hospitably treated on the way, several Cheyenne Indians, whom I had met on the Lower Platte. Shortly after their arrival here, these were out with a party of Indians, (themselves the principal men,) which discovered a few trappers in the neighbouring mountains, whom they immediately murdered, although one of them had been nearly 30 years in the country, and was perfectly well known, as he had grown grey among them.

Through this portion of the mountains, also, are the customary roads of the war parties going out against the Utah and Shoshonee Indians; and occasionally parties from the Crow nation make their way down to the southward along this chain, in the expectation of surprising some straggling lodges of their enemies. Shortly before our arrival, one of their parties had attacked an Arapaho village in the vicinity, which they had found unexpectedly strong; and their assault was turned into a rapid flight and a hot pursuit, in which they had been compelled to abandon the animals they had rode, and escape on their war horses.

Into this uncertain and dangerous region, small parties of three or four trappers, who now could collect together, rarely ventured; and consequently it was seldom visited and little known. Having determined to try the passage by a pass through a spur of the mountains made by the *Câche-à-la-Poudre* river, which rises in the high bed of mountains around Long's peak, I thought it advisable to avoid any incumbrance which would occasion detention, and accordingly again separated the party into two divisions—one of which, under the command of Mr. Fitzpatrick, was directed to cross the plains to the mouth of Laramie river, and, continuing thence its route along the usual emigrant road, meet me at

Fort Hall, a post belonging to the Hudson Bay Company, and situated on Snake River, as it is commonly called in the Oregon Territory, although better known to us as Lewis's fork of the Columbia. The latter name is there restricted to one of the upper forks of the river.

Our Delaware Indians having determined to return to their homes, it became necessary to provide this party with a good hunter; and I accordingly engaged in that capacity Alexander Godey, a young man about 25 years of age, who had been in this country six or seven years, all of which time had been actively employed in hunting for the support of the posts, or in solitary trading expeditions among the Indians. In courage and professional skill he was a formidable rival to Carson, and constantly afterwards was among the best and most efficient of the party, and in difficult situations was of incalculable value. Hiram Powers, one of the men belonging to Mr. Fitzpatrick's party, was discharged at this place.

A French engagé, at Lupton's fort, had been shot in the back on the 4th of July, and died during our absence to the Arkansas. The wife of the murdered man, an Indian woman of the Snake nation, desirous, like Naomi of old, to return to her people, requested and obtained permission to travel with my party to the neighbourhood of Bear river, where she expected to meet with some of their villages. Happier than the Jewish widow, she carried with her two children, pretty little half-breeds, who added much to the liveliness of the camp. Her baggage was carried on five or six pack horses; and I gave her a small tent, for which I no longer had any use, as I had procured a lodge at the fort.

For my own party I selected the following men, a number of whom old associations rendered agreeable to me :—

Charles Preuss, Christopher Carson, Basil Lajeunesse, François Badeau, J. B. Bernier, Louis Menard, Raphael Proue, Jacob Dodson, Louis Zindél, Henry Lee, J. B. Derosier, François Lajeunesse, and Auguste Vasquez.

By observation, the latitude of the post is 40° 16′ 33″, and its longitude 105° 12′ 23″, depending, with all the other longitudes along this portion of the line, upon a subsequent occultation of September 13, 1843, to which they are referred by the chronometer. Its distance from Kansas landing, by the road we travelled, (which, it will be remembered, was very winding along the Lower Kansas river,) was 750 miles. The rate of the chronometer, determined by observations at this place for the interval of our absence, during this month, was 33′ 72″, which you will hereafter see did not sensibly change during the ensuing month, and remained nearly constant during the remainder of our journey across the continent. This was the rate used in referring to St. Vrain's fort, the longitude between that place and the mouth of the *Fontaine-qui-bouit.*

Our various barometrical observations, which are better worthy of confidence than the isolated determination of 1842, give, for the elevation of the fort above the sea, 4,930 feet. The barometer here used was also a better one, and less liable to derangement.

At the end of two days, which were allowed to my animals for necessary repose, all the arrangements had been completed, and on the afternoon of the 26th we resumed our respective routes. Some little trouble was experienced in crossing the Platte, the waters of which were still kept up by rains and melting snow; and having travelled only about four miles, we encamped in the evening on Thompson's Creek, where we were very much disturbed by mosquitoes.

The following days we continued our march westward over comparative plains, and, fording the Câche-à-la-Poudre on the morning of the 28th, entered the Black hills, and nooned on this stream in the mountains beyond them. Passing over a fine large bottom in the afternoon, we reached a place where the river was shut up in the hills; and, ascending a ravine, made a laborious and very difficult passage around by a gap, striking the river again about dusk. A little labour, however, would remove this difficulty, and render the road to this point a very excellent one. The evening closed in dark with rain, and the mountains looked gloomy.

July 29.—Leaving our encampment about 7 in the morning, we travelled until 3 in the afternoon along the river, which, for this distance of about six miles, runs directly through a spur of the main mountains.

We were compelled by the nature of the ground to cross the river eight or nine times, at difficult, deep, and rocky fords, the stream running with great force, swollen by the rains—a true mountain torrent, only 40 or 50 feet wide. It was a mountain valley of the narrowest kind, almost a chasm; and the scenery very wild and beautiful. Towering mountains rose round about; their sides sometimes dark with forests of pine, and sometimes with lofty precipices, washed by the river; while below, as if they indemnified themselves in luxuriance for the scanty space, the green river bottom was covered with a wilderness of flowers, their tall spikes sometimes rising above our heads as we rode among them. A profusion of blossoms on a white flowering vine, (*clematis lasianthi,*) which was abundant along the river, contrasted handsomely with the green foliage of the trees. The mountain appeared to be composed of a greenish-grey and red granite, which in some places appeared to be in a state of decomposition, making a red soil.

The stream was wooded with cotton-wood, box-elder, and cherry, with currant and serviceberry bushes. After a somewhat laborious day, during which it had rained incessantly, we encamped near the end of the pass at the mouth of a small creek, in sight of the great Laramie plains. It continued to rain heavily, and at

evening the mountains were hid in mists; but there was no lack of wood, and the large fires we made to dry our clothes were very comfortable; and at night the hunters came in with a fine deer. Rough and difficult as we found the pass to-day, an excellent road may be made with a little labour. Elevation of the camp 5,540 feet, and distance from St. Vrain's fort 56 miles.

July 30.—The day was bright again; the thermometer at sunrise 52°; and leaving our encampment at 8 o'clock, in about half a mile we crossed the *Cáche-a-la-Poudre* river for the last time; and, entering a smoother country, we travelled along a kind of *vallon*, bounded on the right by red buttes and precipices, while to the left a high rolling country extended to a range of the Black hills, beyond which arose the great mountains around Long's peak.

By the great quantity of snow visible among them, it had probably snowed heavily there the previous day, while it rained on us in the valley.

We halted at noon on a small branch; and in the afternoon travelled over a high country, gradually ascending towards a range of *buttes*, or high hills covered with pines, which forms the dividing ridge between the waters we had left and those of Laramie river.

Late in the evening we encamped at a spring of cold water, near the summit of the ridge, having increased our elevation to 7,520 feet. During the day we had travelled 24 miles. By some indifferent observations, our latitude is 41° 02′ 19″. A species of *hedeome* was characteristic along the whole day's route.

Emerging from the mountains, we entered a region of bright, fair weather. In my experience in this country, I was forcibly impressed with the different character of the climate on opposite sides of the Rocky Mountain range. The vast prairie plain on the east is like the ocean; the rain and clouds from the constantly evaporating snow of the mountains rushing down into the heated air of the plains, on which you will have occasion to remark the frequent storms of rain we encountered during our journey.

July 31.—The morning was clear; temperature 48°. A fine rolling road, among piney and grassy hills, brought us this morning into a large trail where an Indian village had recently passed. The weather was pleasant and cool; we were disturbed by neither mosquitoes nor flies; and the country was certainly extremely beautiful. The slopes and broad ravines were absolutely covered with fields of flowers of the most exquisitely beautiful colours. Among those which had not hitherto made their appearance, and which here were characteristic, was a new *delphinium*, of a green and lustrous metallic blue colour, mingled with compact fields of several bright-coloured varieties of *astragalus*, which were crowded together in splendid profusion. This trail conducted us through a remarkable defile, to a little timbered creek, up which we

wound our way, passing by a singular and massive wall of dark-red granite. The formation of the country is a red feldspathic granite, overlying a decomposing mass of the same rock, forming the soil of all this region, which everywhere is red and gravelly, and appears to be of a great floral fertility.

As we emerged on a small tributary of the Laramie river, coming in sight of its principal stream, the flora became perfectly magnificent; and we congratulated ourselves, as we rode along our pleasant road, that we had substituted this for the uninteresting country between Laramie hills and the Sweet Water valley. We had no meat for supper last night or breakfast this morning, and were glad to see Carson come in at noon with a good antelope.

A meridian observation of the sun placed us in latitude 41° 04′ 06″. In the evening we encamped on the Laramie river, which is here very thinly timbered with scattered groups of cotton-wood at considerable intervals. From our camp, we are able to distinguish the gorges, in which are the sources of Câche-à-la-Poudre and Laramie rivers; and the Medicine Bow mountain, towards the point of which we are directing our course this afternoon, has been in sight the greater part of the day. By observation the latitude was 41° 15′ 02″, and longitude 106° 16′ 54″. The same beautiful flora continued till about four in the afternoon, when it suddenly disappeared, with the red soil, which became sandy and of a whitish-gray colour. The evening was tolerably clear; temperature at sunset 64°. The day's journey was 30 miles.

August 1.—The morning was calm and clear, with sunrise temperature at 42°. We travelled to-day over a plain, or open rolling country, at the foot of the Medicine Bow mountain; the soil in the morning being sandy, with fragments of rock abundant; and in the afternoon, when we approached closer to the mountain, so stony that we made but little way. The beautiful plants of yesterday reappeared occasionally; flax in bloom occurred during the morning; and esparcette, in luxuriant abundance, was a characteristic of the stony ground in the afternoon. The camp was roused into a little excitement by a chase after a buffalo bull, and an encounter with a war-party of Sioux and Cheyenne Indians, about 30 strong. Hares and antelope were seen during the day, and one of the latter was killed. The Laramie peak was in sight this afternoon. The evening was clear, with scattered clouds: temperature 62°. The day's journey was 26 miles.

August 2.—Temperature at sunrise 52°, and scenery and weather made our road to-day delightful. The neighbouring mountain is thickly studded with pines, intermingled with the brighter foliage of aspens, and occasional spots like lawns between the patches of snow among the pines, and here and there on the heights. Our route below lay over a comparative plain, covered with the same brilliant vegetation, and the day was clear and pleasantly cool.

During the morning, we crossed many streams, clear and rocky, and broad grassy valleys, of a strong black soil, washed down from the mountains, and producing excellent pasturage. These were timbered with the red willow and long-leaved cotton-wood, mingled with aspen, as we approached the mountain more nearly towards noon. *Esparcette* was a characteristic, and flax occurred frequently in bloom. We halted at noon on the most western fork of Laramie river—a handsome stream about 60 feet wide and 2 feet deep, with clear water and a swift current, over a bed composed entirely of boulders or roll stones. There was a large open bottom here, on which were many lodge poles lying about; and in the edge of the surrounding timber were three strong forts, that appeared to have been recently occupied. At this place I became first acquainted with the *yampah, (anethum graveolens,)* which I found our Snake women engaged in digging in the low timbered bottom of the creek. Among the Indians along the Rocky Mountains, and more particularly among the Shoshonee or Snake Indians, in whose territory it is very abundant, this is considered the best among the roots used for food. To us it was an interesting plant—a little link between the savage and civilized life. Here, among the Indians, its root is a common article of food, which they take pleasure in offering to strangers; while with us, in a considerable portion of America and Europe, the seeds are used to flavour soup. It grows more abundantly, and in greater luxuriance, on one of the neighbouring tributaries of the Colorado than in any other part of this region; and on that stream, to which the Snakes are accustomed to resort every year to procure a supply of their favourite plant, they have bestowed the name of *Yampah* river. Among the trappers it is generally known as Little Snake river; but in this and other instances, where it illustrated the history of the people inhabiting the country, I have preferred to retain on the map the aboriginal name. By a meridional observation, the latitude is 41° 45′ 59″.

In the afternoon we took our way directly across the spurs from the point of the mountain, where we had several ridges to cross; and, although the road was not rendered bad by the nature of the ground, it was made extremely rough by the stiff tough bushes of *artemisia tridentata,** in this country commonly called sage.

This shrub now began to make its appearance in compact fields; and we were about to quit for a long time this country of excellent pasturage and brilliant flowers. Ten or twelve buffalo bulls were seen during the afternoon; and we were surprised by the appearance of a large red ox. We gathered around him as if he been an old acquaintance, with all our domestic feelings as much

* The greater portion of our subsequent journey was through a region where this shrub constituted the tree of the country; and, as it will often be mentioned in occasional descriptions, the word *artemisia* only will be used, without the specific name.

awakened as if we had come in sight of an old farm-house. He had probably made his escape from some party of emigrants on Green river; and, with a vivid remembrance of some old green field, he was pursuing the straightest course for the frontier that the country admitted. We carried him along with us as a prize; and, when it was found in the morning that he had wandered off, I would not let him be pursued, for I would rather have gone through a starving time of three entire days, than let him be killed, after he had successfully run the gauntlet so far among the Indians. I have been told by Mr. Bent's people of an ox born and raised at St. Vrain's fort, which made his escape from them at Elm Grove, near the frontier, having come in that year with the wagons. They were on their way out, and saw occasionally places where he had eaten and lain down to rest; but did not see him for about 700 miles, when they overtook him on the road, travelling along to the fort, having unaccountably escaped Indians and every other mischance.

We encamped at evening on the principal fork of Medicine Bow river, near to an isolated mountain called the Medicine *Butte*, which appeared to be about 1,800 feet above the plain, from which it rises abruptly, and was still white, nearly to its base, with a great quantity of snow. The streams were timbered with the long-leaved cotton-wood and red willow; and during the afternoon a species of onion was very abundant. I obtained here an immersion of the first satellite of Jupiter, which, corresponding very nearly with the chronometer, placed us in longitude 106° 47′ 25″. The latitude, by observation, was 41° 37′ 16″; elevation above the sea, 7,800 feet, and distance from St. Vrain's fort, 147 miles.

August 3.—There was a white frost last night; the morning is clear and cool. We were early on the road, having breakfasted before sunrise, and in a few miles' travel entered the pass of the Medicine *Butte*, through which led a broad trail, which had been recently travelled by a very large party. Immediately in the pass, the road was broken by ravines, and we were obliged to clear a way through groves of aspens, which generally made their appearance when we reached elevated regions. According to the barometer, this was 8,300 feet; and while we were detained in opening a road, I obtained a meridional observation of the sun, which gave 41° 35′ 48″ for the latitude of the pass. The Medicine *Butte* is isolated by a small tributary of the North fork of the Platte, but the mountains approach each other very nearly; the stream running at their feet. On the south they are smooth, with occasional streaks of pine; but the butte itself is ragged, with escarpments of red feldspathic granite, and dark with pines; the snow reaching from the summit to within a few hundred feet of the trail. The granite here was more compact and durable than that in the formation which we had passed through a few days

before to the eastward of Laramie. Continuing our way over a plain on the west side of the pass, where the road was terribly rough with artemisia, we made our evening encampment on the creek, where it took a northern direction, unfavourable to the course we were pursuing. Bands of buffalo were discovered as we came down upon the plain; and Carson brought into the camp a cow which had the fat on the fleece two inches thick. Even in this country of rich pasturage and abundant game, it is rare that the hunter chances upon a finer animal. Our voyage had already been long, but this was the first good buffalo meat we had obtained. We travelled to-day 26 miles.

August 4.—The morning was clear and calm: and, leaving the creek, we travelled towards the North fork of the Platte, over a plain which was rendered rough and broken by ravines. With the exception of some thin grasses, the sandy soil here was occupied almost exclusively by artemisia, with its usual turpentine odour. We had expected to meet with some difficulty in crossing the river, but happened to strike it where there was a very excellent ford, and halted to noon on the left bank, 200 miles from St. Vrain's fort. The hunters brought in pack animals loaded with fine meat. According to our imperfect knowledge of the country, there should have been a small affluent to this stream a few miles higher up; and in the afternoon we continued our way among the river hills, in the expectation of encamping upon it in the evening. The ground proved to be so exceedingly difficult, broken up into hills, terminating in escarpments and broad ravines, 500 or 600 feet deep, with sides so precipitous that we could scarcely find a place to descend, that, towards sunset, I turned directly in towards the river, and, after nightfall, entered a sort of ravine. We were obliged to feel our way, and clear a road in the darkness; the surface being much broken, and the progress of the carriages being greatly obstructed by the artemisia, which had a luxuriant growth of four to six feet in height. We had scrambled along this gully for several hours, during which we had knocked off the carriage lamps, broken a thermometer and several small articles, when, fearing to lose something of more importance, I halted for the night at 10 o'clock. Our animals were turned down towards the river, that they might pick up what little grass they could find; and after a little search, some water was found in a small ravine, and improved by digging. We lighted up the ravine with fires of artemisia, and about midnight sat down to a supper which we were hungry enough to find delightful—although the buffalo meat was crusted with sand, and the coffee was bitter with the wormwood taste of the artemisia leaves.

A successful day's hunt had kept our hunters occupied until late, and they slept out, but rejoined us at daybreak, when, finding ourselves only about a mile from the river, we followed the ravine down, and camped in a cotton-wood grove on a beautiful grassy

bottom, where our animals indemnified themselves for the scanty fare of the past night. It was quite a pretty and pleasant place; a narrow strip of prairie about 500 yards long terminated at the ravine where we entered by high precipitous hills closing in upon the river, and at the upper end by a ridge of low rolling hills.

In the precipitous bluffs were displayed a succession of strata containing fossil vegetable remains, and several beds of coal. In some of the beds the coal did not appear to be perfectly mineralized; and in some of the seams, it was compact and remarkably lustrous. In these latter places there were also thin layers of a very fine white salt, in powder. As we had a large supply of meat in the camp, which it was necessary to dry, and the surrounding country appeared to be well stocked with buffalo, which it was probable, after a day or two, we would not see again until our return to the Mississippi waters, I determined to make here a provision of dried meat, which would be necessary for our subsistence in the region we were about entering, which was said to be nearly destitute of game. Scaffolds were accordingly soon erected, fires made, and the meat cut into thin slices to be dried; and all were busily occupied, when the camp was thrown into a sudden tumult, by a charge from about 70 mounted Indians, over the low hills at the upper end of the little bottom. Fortunately the guard, who was between them and our animals, had caught a glimpse of an Indian's head, as he raised himself in his stirrups to look over the hill, a moment before he made the charge; and succeeded in turning the band into the camp, as the Indians charged into the bottom with the usual yell. Before they reached us, the grove on the verge of the little bottom was occupied by our people, and the Indians brought to a sudden halt, which they made in time to save themselves from a howitzer shot, which would undoubtedly have been very effective in such a compact body; and further proceedings were interrupted by their signs for peace. They proved to be a war party of Arapaho and Cheyenne Indians, and informed us that they had charged upon the camp under the belief that we were hostile Indians, and had discovered their mistake only at the moment of the attack—an excuse which policy required us to receive as true, though under the full conviction that the display of our little howitzer, and our favourable position in the grove, certainly saved our horses, and probably ourselves, from their marauding intentions. They had been on a war party, and had been defeated, and were consequently in the state of mind which aggravates their innate thirst for plunder and blood. Their excuse, however, was taken in good part, and the usual evidences of friendship interchanged. The pipe went round, provisions were spread, and the tobacco and goods furnished the customary presents, which they look for even from traders, and much more from government authorities.

They were returning from an expedition against the Shoshonee Indians, one of whose villages they had surprised, at Bridger's

fort, on Ham's fork of Green river, (in the absence of the men, who were engaged in an antelope surround,) and succeeded in carrying off their horses and taking several scalps. News of the attack reached the Snakes immediately, who pursued and overtook them, and recovered their horses; and, in the running fight which ensued, the Arapahoes had lost several men killed, and a number wounded, who were coming on more slowly with a party in the rear. Nearly all the horses they had brought off were the property of the whites at the fort. After remaining until nearly sunset, they took their departure; and the excitement which their arrival had afforded subsided into our usual quiet, a little enlivened by the vigilance rendered necessary by the neighbourhood of our uncertain visiters. At noon the thermometer was at 75°, at sunset 70°, and the evening clear. Elevation above the sea 6,820 feet; latitude 41° 36′ 00″; longitude 107° 22′ 27″.

August 6.—At sunrise the thermometer was 46°, the morning being clear and calm. We travelled to-day over an extremely rugged country, barren and uninteresting—nothing to be seen but artemisia bushes; and, in the evening found a grassy spot among the hills, kept green by several springs, where we encamped late. Within a few hundred yards was a very pretty little stream of clear cool water, whose green banks looked refreshing among the dry rocky hills. The hunters brought in a fat mountain sheep (*ovis montana*).

Our road the next day was through a continued and dense field of *artemisia*, which now entirely covered the country in such a luxuriant growth that it was difficult and laborious for a man on foot to force his way through, and nearly impracticable for our light carriages. The region through which we were travelling was a high plateau, constituting the dividing ridge between the waters of the Atlantic and Pacific oceans, and extending to a considerable distance southward, from the neighbourhood of the Table rock, at the southern side of the South Pass. Though broken up into rugged and rocky hills of a dry and barren nature, it has nothing of a mountainous character; the small streams which occasionally occur belonging neither to the Platte nor the Colorado, but losing themselves either in the sand or in small lakes. From an eminence, in the afternoon, a mountainous range became visible in the north, in which were recognized some rocky peaks belonging to the range of the Sweet Water valley; and, determining to abandon any further attempt to struggle through this almost impracticable country, we turned our course directly north, towards a pass in the valley of the Sweet Water river. A shaft of the gun-carriage was broken during the afternoon, causing a considerable delay; and it was late in an unpleasant evening before we succeeded in finding a very poor encampment, where there was a little water in a deep trench of a creek, and some scanty grass among the shrubs. All the game here consisted in a

few straggling buffalo bulls, and during the day there had been but very little grass, except in some green spots where it had collected around springs or shallow lakes. Within 50 miles of the Sweet Water, the country changed into a vast saline plain, in many places extremely level, occasionally resembling the flat sandy beds of shallow lakes. Here the vegetation consisted of a shrubby growth, among which were several varieties of *chenopodiaceous* plants; but the characteristic shrub was *Fremontia vermicularis*, with smaller saline shrubs growing with singular luxuriance, and in many places holding exclusive possession of the ground.

On the evening of the 8th, we encamped on one of these fresh-water lakes, which the traveller considers himself fortunate to find; and the next day, in latitude by observation 42° 20′ 06″, halted to noon immediately at the foot of the southern side of the range which walls in the Sweet Water valley, on the head of a small tributary to that river.

Continuing in the afternoon our course down the stream, which here cuts directly through the ridge, forming a very practicable pass, we entered the valley; and, after a march of about nine miles, encamped on our familiar river, endeared to us by the acquaintance of the previous expedition; the night having already closed in with a cold rain-storm. Our camp was about 20 miles above the Devil's gate, which we had been able to see in coming down the plain; and in the course of the night, the clouds broke away around Jupiter for a short time, during which we obtained an immersion of the first satellite, the result of which agreed very nearly with the chronometer, giving for the mean longitude 107° 50′ 07″; elevation above the sea 6,040 feet; and distance from St. Vrain's fort, by the road we had just travelled, 315 miles.

Here passes the road to Oregon; and the broad smooth high-way, where the numerous heavy waggons of the emigrants had entirely beaten and crushed the artemisia, was a happy exchange to our poor animals for the sharp rocks and tough shrubs among which they had been toiling so long; and we moved up the valley rapidly and pleasantly. With very little deviation from our route of the preceding year, we continued up the valley; and on the evening of the 12th encamped on the Sweet Water, at a point where the road turns off to cross to the plains of Green river. The increased coolness of the weather indicated that we had attained a great elevation, which the barometer here placed at 7,220 feet; and during the night water froze in the lodge.

The morning of the 13th was clear and cold, there being a white frost; and the thermometer, a little before sunrise, standing at 26·5°. Leaving this encampment, (our last on the waters which flow towards the rising sun,) we took our way along the upland, towards the dividing ridge which separates the Atlantic from the Pacific waters, and crossed it by a road some miles further south than the one we had followed on our return in 1842.

We crossed very near the table mountain, at the southern extremity of the South Pass, which is near 20 miles in width, and already traversed by several different roads. Selecting as well as I could, in the scarcely distinguishable ascent, what might be considered the dividing ridge in this remarkable depression in the mountain, I took a barometrical observation, which gave 7,490 feet for the elevation above the Gulf of Mexico. You will remember that, in my report of 1842, I estimated the elevation of this pass at about 7,000 feet; a correct observation with a good barometer enables me now to give it with more precision. Its importance, as the great gate through which commerce and travelling may hereafter pass between the valley of the Mississippi and the north Pacific, justifies a precise notice of its locality and distance from leading points, in addition to this statement of its elevation. As stated in the report of 1842, its latitude at the point where we crossed is 42° 24′ 32″; its longitude 109° 26′ 00″; its distance from the mouth of the Kansas, by the common travelling route, 962 miles; from the mouth of the Great Platte, along the valley of that river, according to our survey of 1842, 882 miles; and its distance from St. Louis about 400 miles more by the Kansas, and about 700 by the Great Platte route; these additions being steam-boat conveyance in both instances. From this pass to the mouth of the Oregon is about 1,400 miles by the common travelling route; so that, under a general point of view, it may be assumed to be about half way between the Mississippi and the Pacific Ocean, on the common travelling route. Following a hollow of slight and easy descent, in which was very soon formed a little tributary to the Gulf of California, (for the waters which flow west from the South Pass go to this gulf,) we made our usual halt four miles from the pass, in latitude by observation 42° 19′ 53″. Entering here the valley of Green river—the great Colorado of the West—and inclining very much to the southward along the streams which form the Sandy river, the road led for several days over dry and level uninteresting plains, to which a low, scrubby growth of artemisia gave a uniform dull grayish colour; and on the evening of the 15th we encamped in the Mexican territory, on the left bank of Green river, 69 miles from the South Pass, in longitude 110° 05′ 05″, and latitude 41° 53′ 54″, distant 1,031 miles from the mouth of the Kansas. This is the emigrant road to Oregon, which bears much to the southward, to avoid the mountains about the western heads of Green river—the *Rio Verde* of the Spaniards.

August 16.—Crossing the river, here about 400 feet wide, by a very good ford, we continued to descend for seven or eight miles on a pleasant road along the right bank of the stream, of which the islands and shores are handsomely timbered with cotton-wood. The refreshing appearance of the broad river, with its timbered shores and green wooded islands, in contrast to its dry sandy

plains, probably obtained for it the name of Green river, which was bestowed on it by the Spaniards who first came into this country to trade some 25 years ago. It was then familiarly known as the Seeds-ke-dée-agie, or Prairie Hen (*tetrao urophasianus*) river; a name which it received from the Crows, to whom its upper waters belong, and on which this bird is still very abundant. By the Shoshonee and Utah Indians, to whom belongs, for a considerable distance below, the country where we were now travelling, it was called the Bitter Root river, from the great abundance in its valley of a plant which affords them one of their favourite roots. Lower down, from Brown's hole to the southward, the river runs through lofty chasms, walled in by precipices of *red* rock; and even among the wilder tribes who inhabit that portion of its course, I have heard it called by Indian refugees from the Californian settlement the Rio *Colorado*. We halted to noon at the upper end of a large bottom, near some old houses, which had been a trading post, in latitude 41° 46′ 54″. At this place the elevation of the river above the sea is 6,230 feet. That of Lewis's fork of the Columbia at Fort Hall is, according to our subsequent observations, 4,500 feet. The descent of each stream is rapid, but that of the Colorado is but little known, and that little derived from vague report. Three hundred miles of its lower part, as it approaches the Gulf of California, is reported to be smooth and tranquil; but its upper part is manifestly broken into many falls and rapids. From many descriptions of trappers, it is probable that in its foaming course among its lofty precipices it presents many scenes of wild grandeur; and though offering many temptations, and often discussed, no trappers have been found bold enough to undertake a voyage which has so certain a prospect of a fatal termination. The Indians have strange stories of beautiful valleys abounding with beaver, shut up among inaccessible walls of rock in the lower course of the river; and to which the neighbouring Indians, in their occasional wars with the Spaniards and among themselves, drive their herds of cattle and flocks of sheep, leaving them to pasture in perfect security.

The road here leaves the river, which bends considerably to the east; and in the afternoon we resumed our westerly course, passing over a somewhat high and broken country; and about sunset, after a day's travel of 26 miles, reached Black's fork of the Green river —a shallow stream, with a somewhat sluggish current, about 120 feet wide, timbered principally with willow, and here and there an occasional large tree. At three in the morning I obtained an observation of an emersion of the first satellite of Jupiter, with other observations. The heavy waggons have so completely pulverized the soil, that clouds of fine light dust are raised by the slightest wind, making the road sometimes very disagreeable.

August 17.—Leaving our encampment at six in the morning, we travelled along the bottom, which is about two miles wide,

bordered by low hills, in which the strata contained handsome and very distinct vegetable fossils. In a gully a short distance farther up the river, and underlying these, was exposed a stratum of an impure or argillaceous limestone. Crossing on the way Black's fork, where it is one foot deep and forty wide, with clear water and a pebbly bed, in nine miles we reached Ham's fork, a tributary to the former stream, having now about sixty feet breadth, and a few inches depth of water. It is wooded with thickets of red willow, and in the bottom is a tolerably strong growth of grass. The road here makes a traverse of 12 miles across a bend of the river. Passing in the way some remarkable hills, 200 or 300 feet high, with frequent and nearly vertical escarpments of a green stone, consisting of an argillaceous carbonate of lime, alternating with strata of an iron-brown limestone, and worked into picturesque forms by wind and rain, at two in the afternoon we reached the river again, having made to-day 21 miles. Since crossing the great dividing ridge of the Rocky Mountains, plants have been very few in variety, the country being covered principally with artemisia.

August 18.—We passed on the road, this morning, the grave of one of the emigrants, being the second we had seen since falling into their trail; and halted to noon on the river, a short distance above.

The Shoshonee woman took leave of us here, expecting to find some of her relations at Bridger's fort, which is only a mile or two distant, on a fork of this stream. In the evening we encamped on a salt creek, about 15 feet wide, having to-day travelled 32 miles. I obtained an emersion of the first satellite under favourable circumstances, the night being still and clear.

One of our mules died here, and in this portion of our journey we lost six or seven of our animals. The grass which the country had lately afforded was very poor and insufficient; and animals which have been accustomed to grain become soon weak and unable to labour, when reduced to no other nourishment than grass. The American horses (as those are usually called which are brought to this country from the States) are not of any serviceable value until after they have remained a winter in the country, and become accustomed to live entirely on grass.

August 19.—Desirous to avoid every delay not absolutely necessary, I sent on Carson in advance to Fort Hall this morning, to make arrangements for a small supply of provisions. A few miles from our encampment the road entered a high ridge, which the trappers called the "Little Mountain," connecting the Utah with the Wind river chain; and in one of the hills near which we passed I remarked strata of a conglomerate formation, fragments of which were scattered over the surface. We crossed a ridge of this conglomerate, the road passing near a grove of low cedar, and descended upon one of the heads of Ham's fork, called Muddy,

where we made our mid-day halt. In the river hills at this place, I discovered strata of fossiliferous rock, having an *oolitic structure,* which, in connection with the neighbouring strata, authorize us to believe that here, on the west side of the Rocky Mountains, we find repeated the modern formations of Great Britain and Europe, which have hitherto been wanting to complete the system of North American geology.

In the afternoon we continued our road, and, searching among the hills a few miles up the stream, and on the same bank, I discovered, among alternating beds of coal and clay, a stratum of white indurated clay, containing very clear and beautiful impressions of vegetable remains. This was the most interesting fossil locality I had met in the country, and I deeply regretted that time did not permit me to remain a day or two in the vicinity; but I could not anticipate the delays to which I might be exposed in the course of our journey—or, rather, I knew that they were many and inevitable; and after remaining here only about an hour, I hurried off, loaded with as many specimens as I could conveniently carry.

Coal made its appearance occasionally in the hills during the afternoon, and was displayed in rabbit burrows in a kind of gap, through which we passed over some high hills, and we descended to make our encampment on the same stream, where we found but very poor grass. In the evening, a fine cow, with her calf, which had strayed off from some emigrant party, were found several miles from the road, and brought into camp; and as she gave an abundance of milk, we enjoyed to-night an excellent cup of coffee. We travelled to-day 28 miles, and, as has been usual since crossing the Green river, the road has been very dusty, and the weather smoky and oppressively hot. Artemisia was characteristic among the few plants.

August 20.—We continued to travel up the creek by a very gradual ascent and a very excellent grassy road, passing on the way several small forks of the stream. The hills here are higher, presenting escarpments of parti-coloured and apparently clay rocks, purple, dark red, and yellow, containing strata of sandstone and limestone with shells, with a bed of cemented pebbles, the whole overlaid by beds of limestone. The alternation of red and yellow gives a bright appearance to the hills, one of which was called by our people the Rainbow hill; and the character of the country became more agreeable, and travelling far more pleasant, as now we found timber and very good grass. Gradually ascending, we reached the lower level of a bed of white limestone, lying upon a white clay, on the upper line of which the whole road is abundantly supplied with beautiful cool springs, gushing out a foot in breadth and several inches deep, directly from the hill side. At noon we halted at the last main fork of the creek, at an elevation of 7,200 feet, and in latitude, by observation, 41° 39′ 45″; and in

the afternoon continued on the same excellent road, up the left or northern fork of the stream, towards its head, in a pass which the barometer placed at 8,230 feet above the sea. This is a connecting ridge between the Utah or Bear river mountains and the Wind river chain of the Rocky Mountains, separating the waters of the gulf of California on the east, and those on the west belonging more directly to the Pacific, from a vast interior basin whose rivers are collected into numerous lakes having no outlet to the ocean. From the summit of this pass, the highest which the road crosses between the Mississippi and the Western ocean, our view was over a very mountainous region, whose rugged appearance was greatly increased by the smoky weather, through which the broken ridges were dark and dimly seen. The ascent to the summit of the gap was occasionally steeper than the national road in the Alleghanies; and the descent, by way of a spur on the western side, is rather precipitous, but the pass may still be called a good one. Some thickets of willow in the hollows below deceived us into the expectation of finding a camp at our usual hour at the foot of the mountain; but we found them without water, and continued down a ravine, and encamped about dark at a place where the springs again began to make their appearance, but where our animals fared badly; the stock of the emigrants having razed the grass as completely as if we were again in the midst of the buffalo.

August 21.—An hour's travel this morning brought us into the fertile and picturesque valley of Bear river, the principal tributary to the Great Salt lake. The stream is here 200 feet wide, fringed with willows and occasional groups of hawthorns. We were now entering a region which for us possessed a strange and extraordinary interest. We were upon the waters of the famous lake which forms a salient point among the remarkable geographical features of the country, and around which the vague and superstitious accounts of the trappers had thrown a delightful obscurity, which we anticipated pleasure in dispelling, but which, in the mean time, left a crowded field for the exercise of our imagination.

In our occasional conversations with the few old hunters who had visited the region, it had been a subject of frequent speculation; and the wonders which they related were not the less agreeable because they were highly exaggerated and impossible.

Hitherto this lake had been seen only by trappers who were wandering through the country in search of new beaver streams, caring very little for geography; its islands had never been visited; and none were to be found who had entirely made the circuit of its shores; and no instrumental observations or geographical survey, of any description, had ever been made anywhere in the neighbouring region. It was generally supposed that it had no visible outlet; but among the trappers, including those in my own camp, were many who believed that somewhere on its surface

was a terrible whirlpool, through which its waters found their way to the ocean by some subterranean communication. All these things had made a frequent subject of discussion in our desultory conversations around the fires at night; and my own mind had become tolerably well filled with their indefinite pictures, and insensibly coloured with their romantic descriptions, which, in the pleasure of excitement, I was well disposed to believe, and half expected to realize.

Where we descended into this beautiful valley, it is three to four miles in breadth, perfectly level, and bounded by mountainous ridges, one above another, rising suddenly from the plain.

We continued our road down the river, and at night encamped with a family of emigrants—two men, women, and several children—who appeared to be bringing up the rear of the great caravan. I was struck with the fine appearance of their cattle, some six or eight yoke of oxen, which really looked as well as if they had been all the summer at work on some good farm. It was strange to see one small family travelling along through such a country, so remote from civilization. Some nine years since, such a security might have been a fatal one; but since their disastrous defeats in the country a little north, the Blackfeet have ceased to visit these waters. Indians, however, are very uncertain in their localities; and the friendly feelings, also, of those now inhabiting it may be changed.

According to barometrical observation at noon, the elevation of the valley was 6,400 feet above the sea, and our encampment at night in latitude 42° 03′ 47″, and longitude 111° 10′ 53″, by observation—the day's journey having been 26 miles. This encampment was therefore within the territorial limit of the United States; our travelling, from the time we entered the valley of the Green river, on the 15th of August, having been to the south of the 42nd degree of north latitude, and consequently on Mexican territory; and this is the route all the emigrants now travel to Oregon.

The temperature at sunset was 65 ; and at evening there was a distant thunder storm, with a light breeze from the north.

Antelope and elk were seen during the day on the opposite prairie; and there were ducks and geese in the river.

The next morning, in about three miles from our encampment, we reached Smith's fork, a stream of clear water, about 50 feet in breadth. It is timbered with cotton-wood, willow, and aspen, and makes a beautiful debouchement through a pass about 600 yards wide, between remarkable mountain hills, rising abruptly on either side, and forming gigantic columns to the gate by which it enters Bear river valley. The bottoms, which below Smith's fork had been two miles wide, narrowed, as we advanced, to a gap 500 yards wide; and during the greater part of the day we had a winding route, the river making very sharp and sudden bends, the

mountains steep and rocky, and the valley occasionally so narrow as only to leave space for a passage through.

We made our halt at noon in a fertile bottom, where the common blue flax was growing abundantly, a few miles below the mouth of Thomas's fork, one of the larger tributaries of the river.

Crossing, in the afternoon, the point of a narrow spur, we descended into a beautiful bottom, formed by a lateral valley, which presented a picture of home beauty that went directly to our hearts. The edge of the wood for several miles along the river was dotted with the white covers of emigrant waggons, collected in groups at different camps, where the smokes were rising lazily from the fires, around which the women were occupied in preparing the evening meal, and the children playing in the grass; and herds of cattle, grazing about in the bottom, had an air of quiet security and civilized comfort that made a rare sight for the traveller in such a remote wilderness.

In common with all the emigration, they had been reposing for several days in this delightful valley, in order to recruit their animals on its luxuriant pasturage, after their long journey, and prepare them for the hard travel along the comparatively sterile banks of the Upper Columbia. At the lower end of this extensive bottom the river passes through an open canon, where there were high vertical rocks to the water's edge, and the road here turns up a broad valley to the right. It was already near sunset, but, hoping to reach the river again before night, we continued our march along the valley, finding the road tolerably good, until we arrived at a point where it crosses the ridge by an ascent of a mile in length, which was so very steep and difficult for the gun and carriage, that we did not reach the summit until dark.

It was absolutely necessary to descend into the valley for water and grass; and we were obliged to grope our way in the darkness down a very steep, bad mountain, reaching the river at about 10 o'clock. It was late before our animals were gathered into camp, several of those which were very weak being necessarily left to pass the night on the ridge; and we sat down again to a midnight supper. The road, in the morning, presented an animated appearance. We found that we had encamped near a large party of emigrants, and a few miles below another party was already in motion. Here the valley had resumed its usual breadth, and the river swept off along the mountains on the western side, the road continuing directly on.

In about an hour's travel we met several Shoshonee Indians, who informed us that they belonged to a large village which had just come into the valley from the mountain to the westward, where they had been hunting antelope and gathering service-berries. Glad at the opportunity of seeing one of their villages, and in the hope of purchasing from them a few horses, I turned imme-

diately off into the plain towards their encampment, which was situated on a small stream near the river.

We had approached within something more than a mile of the village, when suddenly a single horseman emerged from it at full speed, followed by another, and another, in rapid succession; and then party after party poured into the plain, until, when the foremost rider reached us, all the whole intervening plain was occupied by a mass of horsemen, which came charging down upon us with guns and naked swords, lances, and bows and arrows,—Indians entirely naked, and warriors fully dressed for war, with the long red streamers of their war bonnets reaching nearly to the ground, all mingled together in the bravery of savage warfare. They had been thrown into a sudden tumult by the appearance of our flag, which, among these people, is regarded as an emblem of hostility, it being usually borne by the Sioux, and the neighbouring mountain Indians, when they come here to war: and we had, accordingly, been mistaken for a body of their enemies. A few words from the chief quieted the excitement, and the whole band, increasing every moment in number, escorted us to their encampment, where the chief pointed out a place for us to encamp, near his own lodge, and made known our purpose in visiting the village. In a very short time we purchased eight horses, for which we gave in exchange blankets, red and blue cloth, beads, knives, and tobacco, and the usual other articles of Indian traffic. We obtained from them also a considerable quantity of berries of different kinds, among which service-berries were the most abundant; and several kinds of roots and seeds, which we could eat with pleasure, as any kind of vegetable food was gratifying to us. I ate here, for the first time, the *kooyah*, or *tobacco-root* (*valeriana edulis*), the principal edible root among the Indians who inhabit the upper waters of the streams on the western side of the mountains. It has a very strong and remarkably peculiar taste and odour, which I can compare to no other vegetable that I am acquainted with, and which to some persons is extremely offensive. It was characterized by Mr. Preuss as the most horrid food he had ever put in his mouth; and when, in the evening, one of the chiefs sent his wife to me with a portion which she had prepared as a delicacy to regale us, the odour immediately drove him out of the lodge; and frequently afterwards he used to beg that when those who liked it had taken what they desired, it might be sent away. To others, however, the taste is rather an agreeable one; and I was afterwards always glad when it formed an addition to our scanty meals. It is full of nutriment, and in its unprepared state is said by the Indians to have very strong poisonous qualities, of which it is deprived by a peculiar process, being baked in the ground for about two days.

The morning of the 24th was disagreeably cool, with an easterly wind, and very smoky weather. We made a late start from the

village, and, regaining the road, (on which, during all the day, were scattered the emigrant wagons,) we continued on down the valley of the river, bordered by high and mountainous hills, on which fires are seen at the summit. The soil appears generally good, although, with the grasses, many of the plants are dried up, probably on account of the great heat and want of rain. The common blue flax of cultivation, now almost entirely in seed—only a scattered flower here and there remaining—is the most characteristic plant of the Bear river valley. When we encamped at night on the right bank of the river, it was growing as in a sown field. We had travelled during the day 22 miles, encamping in latitude (by observation) 42° 36′ 56″, chronometric longitude 111° 42′ 05″.

In our neighbourhood the mountains appeared extremely rugged, giving still greater value to this beautiful natural pass.

August 25.—This was a cloudless but smoky autumn morning, with a cold wind from the S.E., and a temperature of 45° at sunrise. In a few miles I noticed, where a little stream crossed the road, fragments of *scoriated basalt* scattered about—the first volcanic rock we had seen, and which now became a characteristic rock along our future road. In about six miles' travel from our encampment, we reached one of the points in our journey to which we had always looked forward with great interest—the famous *Beer springs*. The place in which they are situated is a basin of mineral waters enclosed by the mountains, which sweep around a circular bend of Bear river, here at its most northern point, and which, from a northern, in the course of a few miles acquires a southern direction towards the GREAT SALT LAKE. A pretty little stream of clear water enters the upper part of the basin from an open valley in the mountains, and, passing through the bottom, discharges into Bear river. Crossing this stream, we descended a mile below, and made our encampment in a grove of cedar immediately at the Beer springs, which, on account of the effervescing gas and acid taste, have received their name from the voyageurs and trappers of the country, who, in the midst of their rude and hard lives, are fond of finding some fancied resemblance to the luxuries they rarely have the fortune to enjoy.

Although somewhat disappointed in the expectations which various descriptions had led me to form of unusual beauty of situation and scenery, I found it altogether a place of very great interest; and a traveller for the first time in a volcanic region remains in a constant excitement, and at every step is arrested by something remarkable and new. There is a confusion of interesting objects gathered together in a small space. Around the place of encampment the Beer springs were numerous, but, as far as we could ascertain, were entirely confined to that locality in the bottom. In the bed of the river in front, for a space of several hundred yards, they were very abundant, the effervescing gas

rising up and agitating the water in countless bubbling columns. In the vicinity round about were numerous springs of an entirely different and equally marked mineral character. In a rather picturesque spot, about 1,300 yards below our encampment, and immediately on the river bank, is the most remarkable spring of the place. In an opening on the rock, a white column of scattered water is thrown up, in form like a *jet-d'eau*, to a variable height of about three feet, and though it is maintained in a constant supply, its greatest height is attained only at regular intervals, according to the action of the force below. It is accompanied by a subterranean noise, which, together with the motion of the water, makes very much the impression of a steam-boat in motion; and, without knowing that it had been already previously so called, we gave to it the name of the *Steam-boat spring*. The rock through which it is forced is slightly raised in a convex manner, and gathered at the opening into an urn-mouthed form, and is evidently formed by continued deposition from the water, and coloured bright red by oxide of iron. An analysis of this deposited rock, which I subjoin, will give you some idea of the properties of the water, which, with the exception of the Beer springs, is the mineral water of the place.* It is a hot spring, and the water has a pungent and disagreeable metallic taste, leaving a burning effect on the tongue. Within perhaps two yards of the *jet-d'eau* is a small hole of about an inch in diameter, through which, at regular intervals, escapes a blast of hot air with a light wreath of smoke, accompanied by a regular noise. This hole had been noticed by Dr. Wislizenus, a gentleman who several years since passed by this place, and who remarked, with very nice observation, that smelling the gas which issued from the orifice produced a sensation of giddiness and nausea. Mr. Preuss and myself repeated the observation, and were so well satisfied with its correctness, that we did not find it pleasant to continue the experiment, as the sensation of giddiness which it produced was certainly strong and decided. A huge emigrant wagon, with a large and diversified family, had overtaken us, and halted to noon at our encampment; and, while we were sitting at the spring, a band of boys and girls, with two or three young men, came up, one of whom I asked to stoop down and smell the gas, desirous to satisfy myself further of its effects; but his natural caution had been awakened by the singular and suspicious features of the place, and he declined my proposal de-

* ANALYSIS.

Carbonate of lime	92·55
Carbonate of magnesia	0·42
Oxide of iron	1·05
Silica, Alumina, Water and loss	5·98
	100·00

cidedly, and with a few indistinct remarks about the devil, whom he seemed to consider the *genius loci*. The ceaseless motion and the play of the fountain, the red rock, and the green trees near, make this a picturesque spot.

A short distance above the spring, and near the foot of the same spur, is a very remarkable yellow-coloured rock, soft and friable, consisting principally of carbonate of lime and oxide of iron, of regular structure, which is probably a fossil coral. The rocky bank along the shore between the Steam-boat spring and our encampment, along which is dispersed the water from the hills, is composed entirely of strata of a calcareous *tufa*, with the remains of moss and reed-like grasses, which are probably the formation of springs. The *Beer or Soda springs*, which have given name to this locality, are agreeable, but less highly flavoured than the *Boiling springs* at the foot of Pike's peak, which are of the same character. They are very numerous, and half hidden by tufts of grass, which we amused ourselves in removing and searching about for more highly impregnated springs. They are some of them deep, and of various sizes—sometimes several yards in diameter, and kept in constant motion by columns of escaping gas. By analysis, one quart of the water contains as follows:—

	Grains.
Sulphate of magnesia	12·10
Sulphate of lime	2·12
Carbonate of lime	3·86
Carbonate of magnesia	3·22
Chloride of calcium	1·33
Chloride of magnesium	1·12
Chloride of sodium	2·24
Vegetable extractive matter, &c.	0·85
	26·84

The carbonic acid, originally contained in the water, had mainly escaped before it was subjected to analysis; and it was not, therefore, taken into consideration.

In the afternoon I wandered about among the cedars, which occupy the greater part of the bottom towards the mountains. The soil here has a dry and calcined appearance; in some places, the open grounds are covered with saline efflorescences, and there are a number of regularly-shaped and very remarkable hills, which are formed of a succession of convex strata that have been deposited by the waters of extinct springs, the orifices of which are found on their summits, some of them having the form of funnel-shaped cones. Others of these remarkably-shaped hills are of a red-coloured earth, entirely bare, and composed principally of carbonate of lime, with oxide of iron, formed in the same manner. Walking near one of them, on the summit of which the springs were dry, my attention was attracted by an underground noise, around which I circled repeatedly, until I found the spot from beneath which it came; and, removing the red earth, discovered a

hidden spring, which was boiling up from below, with the same disagreeable metallic taste asthe Steam-boat spring. Continuing up the bottom, and crossing the little stream which has been already mentioned, I visited several remarkable red and white hills, which had attracted my attention from the road in the morning. These are immediately upon the stream, and, like those already mentioned, are formed by the deposition of successive strata from the springs. On their summits, the orifices through which the waters had been discharged were so large, that they resembled miniature craters, being some of them several feet in diameter, circular, and regularly formed as if by art. At a former time, when these dried-up fountains were all in motion, they must have made a beautiful display on a grand scale; and nearly all this basin appears to me to have been formed under their action, and should be called the *Place of fountains.* At the foot of one of these hills, or rather on its side near the base, are several of these small limestone columns, about one foot in diameter at the base, and tapering upwards to a height of three or four feet; and on the summit the water is boiling up and bubbling over, constantly adding to the height of the little obelisks. In some, the water only boils up, no longer overflowing, and has here the same taste as at the Steam-boat spring. The observer will remark a gradual subsidence in the water, which formerly supplied the fountains; as on all the summits of the hills the springs are now dry, and are found only low down upon their sides, or on the surrounding plain.

A little higher up the creek, its banks are formed by strata of a very heavy and hard scoriaceous basalt, having a bright metallic lustre when broken. The mountains overlooking the plain are of an entirely different geological character. Continuing on, I walked to the summit of one of them, where the principal rock was a granular quartz. Descending the mountains, and returning towards the camp along the base of the ridge which skirts the plain, I found at the foot of a mountain spur, and issuing from a compact rock of a dark-blue colour, a great number of springs having the same pungent and disagreeably metallic taste already mentioned, the water of which was collected into a very remarkable basin, whose singularity, perhaps, made it appear to me very beautiful. It is large—perhaps 50 yards in circumference; and in it the water is contained at an elevation of several feet above the surrounding ground, by a wall of calcareous *tufa,* composed principally of the remains of mosses, three or four, and sometimes 10 feet high. The water within is very clear and pure, and three or four feet deep, where it could be conveniently measured near the wall; and at a considerably lower level, is another pond or basin of very clear water, and apparently of considerable depth, from the bottom of which the gas was escaping in bubbling columns at many places. This water was collected into a small stream, which, in a few hun-

dred yards, sank underground, re-appearing among the rocks between the two great springs near the river, which it entered by a little fall.

Late in the afternoon I set out on my return to the camp, and, crossing in the way a large field of a salt that was several inches deep, found on my arrival that our emigrant friends, who had been encamped in company with us, had resumed their journey, and the road had again assumed its solitary character. The temperature of the largest of the *Beer* springs at our encampment was 65° at sunset, that of the air being 62°·5. Our barometric observation gave 5,840 feet for the elevation above the gulf, being about 500 feet lower than the Boiling springs, which are of a similar nature, at the foot of Pike's peak. The astronomical observations gave for our latitude 42° 39′ 57″, and 111° 46′ 00″ for the longitude. The night was very still and cloudless, and I sat up for an observation of the first satellite of Jupiter, the emersion of which took place about midnight; but fell asleep at the telescope, awaking just a few minutes after the appearance of the star.

The morning of the 26th was calm, and the sky without clouds, but smoky; and the temperature at sunrise 28°·5. At the same time, the temperature of the large Beer spring, where we were encamped, was 56°; that of the Steam-boat spring 87°, and that of the steam hole, near it, 81°·5. In the course of the morning, the last wagons of the emigration passed by, and we were again left in our place, in the rear.

Remaining in camp until nearly 11 o'clock, we travelled a short distance down the river, and halted to noon on the bank, at a point where the road quits the valley of Bear river, and, crossing a ridge which divides the Great Basin from the Pacific waters, reaches Fort Hall, by way of the Portneuf river, in a distance of probably 50 miles, or two-and-a-half days' journey probably for wagons. An examination of the great lake, which is the outlet of this river, and the principal feature of geographical interest in the basin, was one of the main objects contemplated in the general plan of our survey, and I accordingly determined at this place to leave the road, and, after having completed a reconnoissance of the lake, regain it subsequently at Fort Hall. But our little stock of provisions had again become extremely low; we had only dried meat sufficient for one meal, and our supply of flour and other comforts was entirely exhausted. I therefore immediately despatched one of the party, Henry Lee, with a note to Carson, at Fort Hall, directing him to load a pack horse with whatever could be obtained there in the way of provisions, and endeavour to overtake me on the river. In the mean time, we had picked up along the road two tolerably well-grown calves, which would have become food for wolves, and which had probably been left by some of the earlier emigrants, none of those we had met having made any claim to them; and on these I mainly relied for support during our circuit to the lake.

In sweeping around the point of the mountain which runs down into the bend, the river here passes between perpendicular walls of basalt, which always fix the attention, from the regular form in which it occurs, and its perfect distinctness from the surrounding rocks among which it has been placed. The mountain, which is rugged and steep, and, by our measurement, 1,400 feet above the river directly opposite the place of our halt, is called the *Sheep rock*—probably because a flock of the common mountain sheep (*ovis montana*) had been seen on the craggy point.

As we were about resuming our march in the afternoon, I was attracted by the singular appearance of an isolated hill with a concave summit, in the plain, about two miles from the river, and turned off towards it, while the camp proceeded on its way to the southward in search of the lake. I found the thin and stony soil of the plain entirely underlaid by the basalt which forms the river walls; and when I reached the neighbourhood of the hill, the surface of the plain was rent into frequent fissures and chasms of the same scoriated volcanic rock, from 40 to 60 feet deep, but which there was not sufficient light to penetrate entirely, and which I had not time to descend. Arrived at the summit of the hill, I found that it terminated in a very perfect crater, of an oval or nearly circular form, 360 paces in circumference, and 60 feet at the greatest depth. The walls, which were perfectly vertical, and disposed like masonry in a very regular manner, were composed of a brown-coloured scoriaceous lava, evidently the production of a modern volcano, and having all the appearance of the lighter scoriaceous lavas of Mount Ætna, Vesuvius, and other volcanoes. The faces of the walls were reddened and glazed by the fire, in which they had been melted, and which had left them contorted and twisted by its violent action.

Our route during the afternoon was a little rough, being (in the direction we had taken) over a volcanic plain, where our progress was sometimes obstructed by fissures and black beds composed of fragments of the rock. On both sides the mountains appeared very broken, but tolerably well timbered.

August 26.—Crossing a point of ridge which makes in to the river, we fell upon it again before sunset, and encamped on the right bank, opposite to the encampment of three lodges of Snake Indians. They visited us during the evening, and we obtained from them a small quantity of roots of different kinds, in exchange for goods. Among them was a sweet root of very pleasant flavour, having somewhat the taste of preserved quince. My endeavours to become acquainted with the plants which furnish to the Indians a portion of their support were only gradually successful, and after long and persevering attention; and even after obtaining, I did not succeed in preserving them until they could be satisfactorily determined. In this portion of the journey I found this particular root cut up into such small pieces that it was only to be identified by its

taste, when the bulb was met with in perfect form among the Indians lower down on the Columbia, among whom it is the highly celebrated kamás. It was long afterwards, on our return through Upper California, that I found the plant itself in bloom, which I supposed to furnish the kamás root (*camassia esculenta*). The root diet had a rather mournful effect at the commencement, and one of the calves was killed this evening for food. The animals fared well on rushes.

August 27.—The morning was cloudy, with appearance of rain, and the thermometer at sunrise at 29°. Making an unusually early start, we crossed the river at a good ford; and, following for about three hours a trail which led along the bottom, we entered a labyrinth of hills below the main ridge, and halted to noon in the ravine of a pretty little stream, timbered with cotton-wood of a large size, ash-leaved maple, with cherry and other shrubby trees. The hazy weather, which had prevented any very extended views since entering the Green river valley, began now to disappear. There was a slight rain in the earlier part of the day, and at noon, when the thermometer had risen to 79·5°, we had a bright sun, with blue sky and scattered *cumuli*. According to the barometer, our halt here among the hills was at an elevation of 5,320 feet. Crossing a dividing ridge in the afternoon, we followed down another little Bear river tributary, to the point where it emerged on an open green flat among the hills, timbered with groves, and bordered with cane thickets, but without water. A pretty little rivulet, coming out of the hill side, and overhung by tall flowering plants of a species I had not hitherto seen, furnished us with a good camping place. The evening was cloudy, the temperature at sunset 69°, and the elevation 5,140 feet. Among the plants occurring along the line of road during the day, *épinettes des prairies* (grindelia squarrosa) was in considerable abundance, and is among the very few plants remaining in bloom, the whole country having now an autumnal appearance in the crisped and yellow plants and dried-up grasses. Many cranes were seen during the day, with a few antelope, very shy and wild.

August 28.—During the night we had a thunder-storm, with moderate rain, which has made the air this morning very clear, the thermometer being at 55°. Leaving our encampment at the *Cane spring*, and quitting the trail on which we had been travelling, and which would probably have afforded us a good road to the lake, we crossed some very deep ravines, and, in about an hour's travelling, again reached the river. We were now in a valley five or six miles wide, between mountain ranges, which, about 30 miles below, appeared to close up and terminate the valley, leaving for the river only a very narrow pass, or cañon, behind which we imagined that we should find the broad waters of the lake. We made the usual halt at the mouth of a small clear stream, having a slightly mineral taste (perhaps of salt), 4,760 feet above the gulf. In the after-

noon we climbed a very steep sandy hill, and, after a slow and winding day's march of 27 miles, encamped at a slough on the river. There were great quantities of geese and ducks, of which only a few were shot, the Indians having probably made them very wild. The men employed themselves in fishing, but caught nothing. A skunk (*mephitis Americana*), which was killed in the afternoon, made a supper for one of the messes. The river is bordered occasionally with fields of cane, which we regarded as an indication of our approach to a lake country. We had frequent showers of rain during the night, with thunder.

August 29.—The thermometer at sunrise was 54°, with air from N.W., and dark rainy clouds moving on the horizon; rain-squalls and bright sunshine by intervals. I rode ahead with Basil to explore the country, and, continuing about three miles along the river, turned directly off on a trail running towards three marked gaps in the bordering range, where the mountains appeared cut through to their bases, towards which the river plain rose gradually. Putting our horses into a gallop on some fresh tracks which showed very plainly in the wet path, we came suddenly upon a small party of Shoshonee Indians, who had fallen into the trail from the north. We could only communicate by signs; but they made us understand that the road through the chain was a very excellent one, leading into a broad valley which ran to the southward. We halted to noon at what may be called the gate of the pass; on either side of which were huge mountains of rock, between which stole a little pure water stream, with a margin just sufficiently large for our passage. From the river the plain had gradually risen to an altitude of 5,500 feet, and, by meridian observation, the latitude of the entrance was 42°.

In the interval of our usual halt several of us wandered along up the stream to examine the pass more at leisure. Within the gate the rocks receded a little back, leaving a very narrow, but most beautiful valley, through which the little stream wound its way, hidden by different kinds of trees and shrubs—aspen, maple, willow, cherry, and elder; a fine verdure of smooth short grass spread over the remaining space to the bare sides of the rocky walls. These were of a blue limestone, which constitutes the mountain here; and opening directly on the grassy bottom were several curious caves, which appeared to be inhabited by root diggers. On one side was gathered a heap of leaves for a bed, and they were dry, open, and pleasant. On the roofs of the caves I remarked bituminous exudations from the rock.

The trail was an excellent one for pack horses; but, as it sometimes crossed a shelving point, to avoid the shrubbery we were obliged in several places to open a road for the carriage through the wood. A squaw on horseback, accompanied by five or six dogs, entered the pass in the afternoon, but was too much terrified at finding herself in such unexpected company to make any pause

for conversation, and hurried off at a good pace, being, of course, no further disturbed than by an accelerating shout. She was well and showily dressed, and was probably going to a village encampment somewhere near, and evidently did not belong to the tribe of *Root Diggers*. We had now entered a country inhabited by these people; and, as in the course of our voyage we shall frequently meet with them in various stages of existence, it will be well to inform you that, scattered over the great region west of the Rocky Mountains, and south of the great Snake river, are numerous Indians whose subsistence is almost wholly derived from roots and seeds, and such small animals as chance and great good fortune sometimes bring within their reach. They are miserably poor, armed only with bows and arrows, or clubs; and, as the country they inhabit is almost destitute of game, they have no means of obtaining better arms. In the northern part of the region just mentioned, they live generally in solitary families; and further to the south they are gathered together in villages. Those who live together in villages, strengthened by association, are in exclusive possession of the more genial and richer parts of the country, while the others are driven to the ruder mountains, and to the more inhospitable parts of the country. But by simply observing, in accompanying us along our road, you will become better acqainted with these people than we could make you in any other than a very long description, and you will find them worthy of your interest.

Roots, seeds, and grass, every vegetable that affords any nourishment, and every living animal, thing, insect, or worm, they eat. Nearly approaching to the lower animal creation, their sole employment is to obtain food; and they are constantly occupied in a struggle to support existence.

The most remarkable feature of this pass is the *Standing rock*, which has fallen from the cliffs above, and standing perpendicularly near the middle of the valley, presents itself like a watch-tower in the pass. The annexed view will give you a tolerably correct idea of the character of the scenery in this country, where generally the mountains rise abruptly up from comparatively unbroken plains and level valleys; but it will entirely fail in representing the picturesque beauty of this delightful place, where a green valley, full of foliage, and a hundred yards wide, contrasts with naked crags that spire up into a blue line of pinnacles 3,000 feet ove, sometimes crested with cedar and pine, and sometimes ragged and bare.

The detention that we met with in opening the road, and, perhaps, a willingness to linger on the way, made the afternoon's travel short; and about two miles from the entrance we passed through another gate, and encamped on the stream at the junction of a little fork from the southward, around which the mountains stooped more gently down, forming a small open cove.

As it was still early in the afternoon, Basil and myself in one direction, and Mr. Preuss in another, set out to explore the country and ascended different neighbouring peaks, in the hope of seeing some indicationof the lake; but though our elevation afforded magnificent views, the eye ranging over a long extent of Bear river, with the broad and fertile *Cache valley*, in the direction of our search was only to be seen a bed of apparently-impracticable mountains. Among these, the trail we had been following turned sharply to the northward, and it began to be doubtful if it would not lead us away from the object of our destination; but I, nevertheless, determined to keep it, in the belief that it would eventually bring us right. A squall of rain drove us out of the mountain, and it was late when we reached the camp. The evening closed in with frequent showers of rain, with some lightning and thunder.

August 30.—We had constant thunder-storms during the night, but in the morning the clouds were sinking to the horizon, and the air was clear and cold, with the thermometer at sunrise at 39°. Elevation by barometer 5,580 feet. We were in motion early, continuing up the little stream without encountering any ascent where a horse could not easily gallop, and, crossing a slight dividing ground at the summit, descended upon a small stream, along which we continued on the same excellent road. In riding through the pass, numerous cranes were seen; and prairie hens, or grouse (*bonasia umbellus*), which lately had been rare, were very abundant.

This little affluent brought us to a larger stream, down which we travelled through a more open bottom, on a level road, where heavily laden wagons could pass without obstacle. The hills on the right grew lower, and, on entering a more open country, we discovered a Shoshonee village; and being desirous to obtain information, and purchase from them some roots and berries, we halted on the river, which was lightly wooded with cherry, willow, maple, service-berry, and aspen. A meridian observation of the sun, which I obtained here, gave 42° 14′ 22″ for our latitude, and the barometer indicated a height of 5,170 feet. A number of Indians came immediately over to visit us, and several men were sent to the village with goods, tobacco, knives, cloth, vermilion, and the usual trinkets, to exchange for provisions. But they had no game of any kind; and it was difficult to obtain any roots from them, as they were miserably poor, and had but little to spare from their winter stock of provisions. Several of the Indians drew aside their blankets, showing me their lean and bony figures; and I could not any longer tempt them with a display of our merchandise to part with their wretched subsistence, when they gave as a reason that it would expose them to temporary starvation. A great portion of the region inhabited by this nation formerly abounded in game; the buffalo ranging about in herds, as we had

found them on the eastern waters, and the plains dotted with scattered bands of antelope; but so rapidly have they disappeared within a few years, that now, as we journeyed along, an occasional buffalo skull and a few wild antelope were all that remained of the abundance which had covered the country with animal life.

The extraordinary rapidity with which the buffalo is disappearing from our territories will not appear surprising when we remember the great scale on which their destruction is yearly carried on. With inconsiderable exceptions, the business of the American trading posts is carried on in their skins; every year the Indian villages make new lodges, for which the skin of the buffalo furnishes the material; and in that portion of the country where they are still found, the Indians derive their entire support from them, and slaughter them with a thoughtless and abominable extravagance. Like the Indians themselves, they have been a characteristic of the Great West; and as, like them, they are visibly diminishing, it will be interesting to throw a glance backward through the last twenty years, and give some account of their former distribution through the country, and the limit of their western range.

The information is derived principally from Mr. Fitzpatrick, supported by my own personal knowledge and acquaintance with the country. Our knowledge does not go further back than the spring of 1824, at which time the buffalo were spread in immense numbers over the Green river and Bear river valleys, and through all the country lying between the Colorado, or Green river of the gulf of California, and Lewis's fork of the Columbia river; the meridian of Fort Hall then forming the western limit of their range. The buffalo then remained for many years in that country, and frequently moved down the valley of the Columbia, on both sides of the river, as far as the *Fishing Falls*. Below this point they never descended in any numbers. About the year 1834 or 1835 they began to diminish very rapidly, and continued to decrease until 1838 to 1840, when, with the country we have just described, they entirely abandoned all the waters of the Pacific north of Lewis's fork of the Columbia. At that time, the Flathead Indians were in the habit of finding their buffalo on the heads of Salmon river, and other streams of the Columbia; but now they never meet with them farther west than the three forks of the Missouri or the plains of the Yellowstone river.

In the course of our journey it will be remarked that the buffalo have not so entirely abandoned the waters of the Pacific, in the Rocky Mountain region south of the Sweet Water, as in the country north of the Great Pass. This partial distribution can only be accounted for in the great pastoral beauty of that country, which bears marks of having long been one of their favourite haunts, and by the fact that the white hunters have more frequented the northern than the southern region—it being north of the South

Pass that the hunters, trappers, and traders, have had their rendezvous for many years past; and from that section also the greater portion of the beaver and rich furs were taken, although always the most dangerous as well as the most profitable hunting ground.

In that region lying between the Green or Colorado river and the head waters of the Rio del Norte, over the *Yampah, Kooyah, White* and *Grand* rivers—all of which are the waters of the Colorado—the buffalo never extended so far to the westward as they did on the waters of the Columbia; and only in one or two instances have they been known to descend as far west as the mouth of White river. In travelling through the country west of the Rocky Mountains, observation readily led me to the impression that the buffalo had, for the first time, crossed that range to the waters of the Pacific only a few years prior to the period we are considering; and in this opinion I am sustained by Mr. Fitzpatrick, and the older trappers in that country. In the region west of the Rocky Mountains, we never meet with any of the ancient vestiges which, throughout all the country lying upon their eastern waters, are found in the *great highways,* continuous for hundreds of miles, always several inches and sometimes several feet in depth, which the buffalo have made in crossing from one river to another, or in traversing the mountain ranges. The Snake Indians, more particularly those low down on Lewis's fork, have always been very grateful to the American trappers, for the great kindness (as they frequently expressed it) which they did to them, in driving the buffalo so low down the Columbia river.

The extraordinary abundance of the buffalo on the east side of the Rocky Mountains, and their extraordinary diminution, will be made clearly evident from the following statement:—At any time between the years 1824 and 1836, a traveller might start from any given point south or north in the Rocky Mountain range, journeying by the most direct route to the Missouri river, and, during the whole distance, his road would be always among large bands of buffalo, which would never be out of his view until he arrived almost within sight of the abodes of civilization.

At this time, the buffalo occupy but a very limited space, principally along the eastern base of the Rocky Mountains, sometimes extending at the southern extremity to a considerable distance into the plains between the Platte and Arkansas rivers, and along the eastern frontier of New Mexico as far south as Texas.

The following statement, which I owe to the kindness of Mr. Sanford, a partner in the American Fur Company, will further illustrate this subject, by extensive knowledge acquired during several years of travel through the region inhabited by the buffalo:—

"The total amount of robes annually traded by ourselves and

others will not be found to differ much from the following statement:—

	Robes.
American Fur Company	70,000
Hudson's Bay Company	10,000
All other companies, probably	10,000
Making a total of	90,000

as an average annual return for the last eight or ten years.

"In the north-west, the Hudson's Bay Company purchase from the Indians but a very small number—their only market being Canada, to which the cost of transportation nearly equals the produce of the furs; and it is only within a very recent period that they have received buffalo robes in trade; and out of the great number of buffalo annually killed throughout the extensive regions inhabited by the Camanches and other kindred tribes, no robes whatever are furnished for trade. During only four months of the year (from November until March) the skins are good for dressing; those obtained in the remaining eight months being valueless to the traders; and the hides of bulls are never taken off, or dressed as robes, at any season. Probably not more than one-third of the skins are taken from the animals killed, even when they are in good season, the labour of preparing and dressing the robes being very great; and it is seldom that a lodge trades more than twenty skins in a year. It is during the summer months, and in the early part of autumn, that the greatest number of buffalo are killed, and yet at this time a skin is never taken for the purposes of trade."

From these data, which are certainly limited, and decidedly within bounds, the reader is left to draw his own inference of the immense number annually killed.

In 1842, I found the Sioux Indians of the Upper Platte *demontes*, as their French traders expressed it, with the failure of the buffalo; and in the following year, large villages from the Upper Missouri came over to the mountains at the heads of the Platte, in search of them. The rapidly progressive failure of their principal and almost their only means of subsistence has created great alarm among them; and at this time there are only two modes presented to them, by which they see a good prospect for escaping starvation: one of these is to rob the settlements along the frontier of the States; and the other is to form a league between the various tribes of the Sioux nation, the Cheyennes, and Arapahoes, and make war against the Crow nation, in order to take from them their country, which is now the best buffalo country in the west. This plan they now have in consideration; and it would probably be a war of extermination, as the Crows have long been advised of this state of affairs, and say that they are perfectly prepared. These are the best warriors in the Rocky Mountains, and are now allied with the

Snake Indians; and it is probable that their combination would extend itself to the Utahs, who have long been engaged in war against the Sioux. It is in this section of country that my observation formerly led me to recommend the establishment of a military post.

The farther course of our narrative will give fuller and more detailed information of the present disposition of the buffalo in the country we visited.

Among the roots we obtained here, I could distinguish only five or six different kinds; and the supply of the Indians whom we met consisted principally of yampah, (*anethum graveolens,*) tobacco root, (*valeriana,*) and a large root of a species of thistle, (*circium Virginianum,*) which now is occasionally abundant, and is a very agreeably flavoured vegetable.

We had been detained so long at the village, that in the afternoon we made only five miles, and encamped on the same river after a day's journey of 19 miles. The Indians informed us that we should reach the big salt water after having slept twice and travelling in a south direction. The stream had here entered a nearly level plain or valley, of good soil, eight or ten miles broad, to which no termination was to be seen, and lying between ranges of mountains which, on the right, were grassy and smooth, unbroken by rock, and lower than on the left, where they were rocky and bald, increasing in height to the southward. On the creek were fringes of young willows, older trees being rarely found on the plains, where the Indians burn the surface to produce better grass. Several magpies (*pica Hudsonica*) were seen on the creek this afternoon; and a rattlesnake was killed here, the first which had been seen since leaving the eastern plains. Our camp tonight had such a hungry appearance, that I suffered the little cow to be killed, and divided the roots and berries among the people. A number of Indians from the village encamped near.

The weather the next morning was clear, the thermometer at sunrise at 44° 5′, and, continuing down the valley, in about five miles we followed the little creek of our encampment to its junction with a larger stream, called *Roseaux*, or Reed river. Immediately opposite, on the right, the range was gathered into its highest peak, sloping gradually low, and running off to a point apparently some 40 or 50 miles below. Between this (now become the valley stream) and the foot of the mountains, we journeyed along a handsome sloping level, which frequent springs from the hills made occasionally miry, and halted to noon at a swampy spring, where there were good grass and abundant rushes. Here the river was 40 feet wide, with a considerable current; and the valley a mile and a half in breadth; the soil being generally good, of a dark colour, and apparently well adapted to cultivation. The day had become bright and pleasant, with the thermometer at 71°. By observation, our latitude

was 41° 59′ 31″, and the elevation above the sea 4,670 feet. On our left, this afternoon, the range at long intervals formed itself into peaks, appearing to terminate, about 40 miles below, in a rocky cape; beyond which, several others were faintly visible; and we were disappointed when at a very little rise we did not see the lake. Towards evening, our way was somewhat obstructed by fields of *artemisia*, which began to make their appearance here, and we encamped on the Roseaux, the water of which had acquired a decidedly salt taste, nearly opposite to a canon gap in the mountains, through which the Bear river enters this valley. As we encamped, the night set in dark and cold, with heavy rain; and the artemisia, which was here our only wood, was so wet that it would not burn. A poor, nearly starved dog, with a wound in his side from a ball, came to the camp, and remained with us until the winter, when he met a very unexpected fate.

September 1.—The morning was squally and cold; the sky scattered over with clouds; and the night had been so uncomfortable, that we were not on the road until eight o'clock. Travelling between Roseaux and Bear rivers, we continued to descend the valley, which gradually expanded, as we advanced, into a level plain of good soil, about 25 miles in breadth, between mountains 3,000 and 4,000 feet high, rising suddenly to the clouds, which all day rested upon the peaks. These gleamed out in the occasional sunlight, mantled with the snow which had fallen upon them, while it rained on us in the valley below, of which the elevation here was about 4,500 feet above the sea. The country before us plainly indicated that we were approaching the lake, though, as the ground where we were travelling afforded no elevated point, nothing of it as yet could be seen; and at a great distance ahead were several isolated mountains, resembling islands, which they were afterwards found to be. On this upper plain the grass was everywhere dead; and among the shrubs with which it was almost exclusively occupied, (artemisia being the most abundant,) frequently occurred handsome clusters of several species of *dieteria* in bloom. *Purshia tridentata* was among the frequent shrubs. Descending to the bottoms of Bear river, we found good grass for the animals, and encamped about 300 yards above the mouth of Roseaux, which here makes its junction, without communicating any of its salty taste to the main stream, of which the water remains perfectly pure. On the river are only willow thickets, (*salix longifolia*,) and in the bottoms the abundant plants are canes, solidago, and helianthi, and along the banks of Roseaux are fields of *malva rotundifolia*. At sunset the thermometer was at 54° 5′, and the evening clear and calm; but I deferred making any use of it until one o'clock in the morning, when I endeavoured to obtain an emersion of the first satellite; but it was lost in a bank of clouds, which also rendered our usual observations indifferent.

Among the useful things which formed a portion of our equipage, was an India-rubber boat, 18 feet long, made somewhat in the form of a bark canoe of the northern lakes. The sides were formed by two air-tight cylinders, 18 inches in diameter, connected with others forming the bow and stern. To lessen the danger from accidents to the boat, these were divided into four different compartments, and the interior space was sufficiently large to contain five or six persons and a considerable weight of baggage. The Roseaux being too deep to be forded, our boat was filled with air, and in about one hour all the equipage of the camp, carriage and gun included, ferried across. Thinking that perhaps in the course of the day we might reach the outlet at the lake, I got into the boat with Basil Lajeunesse, and paddled down Bear river, intending at night to rejoin the party, which in the mean time proceeded on its way. The river was from 60 to 100 yards broad, and the water so deep, that even on the comparatively shallow points we could not reach the bottom with 15 feet. On either side were alternately low bottoms and willow points, with an occasional high prairie; and for five or six hours we followed slowly the winding course of the river, which crept along with a sluggish current among frequent *détours* several miles around, sometimes running for a considerable distance directly up the valley. As we were stealing quietly down the stream, trying in vain to get a shot at a strange large bird that was numerous among the willows, but very shy, we came unexpectedly upon several families of *Root Diggers*, who were encamped among the rushes on the shore, and appeared very busy about several weirs or nets which had been rudely made of canes and rushes for the purpose of catching fish. They were very much startled at our appearance, but we soon established an acquaintance; and finding that they had some roots, I promised to send some men with goods to trade with them. They had the usual very large heads, remarkable among the Digger tribe, with matted hair, and were almost entirely naked; looking very poor and miserable, as if their lives had been spent in the rushes where they were, beyond which they seemed to have very little knowledge of anything. From the few words we could comprehend, their language was that of the Snake Indians.

Our boat moved so heavily, that we had made very little progress; and, finding that it would be impossible to overtake the camp, as soon as we were sufficiently far below the Indians, we put to the shore near a high prairie bank, hauled up the boat, and *cached* our effects in the willows. Ascending the bank, we found that our desultory labour had brought us only a few miles in a direct line; and, going out into the prairie, after a search we found the trail of the camp, which was now nowhere in sight, but had followed the general course of the river in a large circular sweep which it makes at this place.

The sun was about three hours high when we found the trail;

and as our people had passed early in the day, we had the prospect of a vigorous walk before us. Immediately where we landed, the high arable plain on which we had been travelling for several days past terminated in extensive low flats, very generally occupied by salt marshes, or beds of shallow lakes, whence the water had in most places evaporated, leaving their hard surface encrusted with a shining white residuum, and absolutely covered with very small *univalve* shells. As we advanced, the whole country around us assumed this appearance; and there was no other vegetation than the shrubby chenopodiaceous and other apparently saline plants, which were confined to the rising grounds. Here and there on the river bank, which was raised like a levee above the flats through which it ran, was a narrow border of grass and short black-burnt willows; the stream being very deep and sluggish, and sometimes 600 to 800 feet wide. After a rapid walk of about 15 miles, we caught sight of the camp fires among clumps of willows just as the sun had sunk behind the mountains on the west side of the valley, filling the clear sky with a golden yellow. These last rays, to us so precious, could not have revealed a more welcome sight. To the traveller and the hunter, a camp fire in the lonely wilderness is always cheering; and to ourselves, in our present situation, after a hard march in a region of novelty, approaching the *debouches* of a river, in a lake of almost fabulous reputation, it was doubly so. A plentiful supply of aquatic birds, and the interest of the scene, soon dissipated fatigue; and I obtained during the night emersions of the second, third, and fourth satellites of Jupiter, with observations for time and latitude.

September 3.—The morning was clear, with a light air from the north, and the thermometer at sunrise at 45°·5. At three in the morning, Basil was sent back with several men and horses for the boat, which, in a direct course across the flats, was not 10 miles distant; and in the mean time there was a pretty spot of grass here for the animals. The ground was so low that we could not get high enough to see across the river, on account of the willows; but we were evidently in the vicinity of the lake, and the waterfowl made this morning a noise like thunder. A pelican (*pelecanus onocrotalus*) was killed as he passed by, and many geese and ducks flew over the camp. On the dry salt marsh here is scarce any other plant than *salicornia herbacea*.

In the afternoon the men returned with the boat, bringing with them a small quantity of roots, and some meat, which the Indians had told them was bear-meat.

Descending the river for about three miles in the afternoon, we found a bar to any further travelling in that direction—the stream being spread out in several branches, and covering the low grounds with water, where the miry nature of the bottom did not permit any further advance. We were evidently on the border of the lake,

although the rushes and canes which covered the marshes prevented any view; and we accordingly encamped at the little *delta* which forms the mouth of Bear river—a long arm of the lake stretching up to the north between us and the opposite mountains. The river was bordered with a fringe of willows and canes, among which were interspersed a few plants; and scattered about on the marsh was a species of *uniola*, closely allied to *U. spicata* of our sea-coast. The whole morass was animated with multitudes of water-fowl, which appeared to be very wild—rising for the space of a mile round about at the sound of a gun, with a noise like distant thunder. Several of the people waded out into the marshes, and we had to-night a delicious supper of ducks, geese, and plover.

Although the moon was bright, the night was otherwise favourable; and I obtained this evening an emersion of the first satellite, with the usual observations. A mean result, depending on various observations made during our stay in the neighbourhood, places the mouth of the river in longitude 112° 19′ 30″ west from Greenwich; latitude 41 30′ 22″; and, according to the barometer, in elevation 4,200 feet above the Gulf of Mexico. The night was clear, with considerable dew, which I had remarked every night since the first of September. The next morning, while we were preparing to start, Carson rode into the camp with flour and a few other articles of light provision, sufficient for two or three days—a scanty but very acceptable supply. Mr. Fitzpatrick had not yet arrived, and provisions were very scarce and difficult to be had at Fort Hall, which had been entirely exhausted by the necessities of the emigrants. He brought me also a letter from Mr. Dwight, who, in company with several emigrants, had reached that place in advance of Mr. Fitzpatrick, and was about continuing his journey to Vancouver.

Returning about five miles up the river, we were occupied until nearly sunset in crossing to the left bank—the stream, which in the last five or six miles of its course is very much narrower than above, being very deep immediately at the banks; and we had great difficulty in getting our animals over. The people with the baggage were easily crossed in the boat, and we encamped on the left bank where we crossed the river. At sunset the thermometer was at 75°, and there was some rain during the night, with a thunder-storm at a distance.

September 5.—Before us was evidently the bed of the lake, being a great salt marsh, perfectly level and bare, whitened in places by saline efflorescences, with here and there a pool of water, and having the appearance of a very level sea-shore at low tide. Immediately along the river was a very narrow strip of vegetation, consisting of willows, helianthi, roses, flowering vines, and grass; bordered on the verge of the great marsh by a fringe of singular plants, which appear to be a shrubby salicornia, or a genus allied to it.

About 12 miles to the southward was one of those isolated mountains, now appearing to be a kind of peninsula; and towards this we accordingly directed our course, as it probably afforded a good view of the lake; but the deepening mud as we advanced forced us to return toward the river, and gain the higher ground at the foot of the eastern mountains. Here we halted for a few minutes at noon, on a beautiful little stream of pure and remarkably clear water, with a bed of rock *in situ*, on which was an abundant water-plant with a white blossom. There was good grass in the bottoms; and, amidst a rather luxuriant growth, its banks were bordered with a large showy plant (*eupatorium purpureum*), which I here saw for the first time. We named the stream *Clear Creek*.

We continued our way along the mountain, having found here a broad plainly beaten trail, over what was apparently the shore of the lake in the spring; the ground being high and firm, and the soil excellent and covered with vegetation, among which a leguminous plant (*glycyrrhiza lepidota*) was a characteristic plant. The ridge here rises abruptly to the height of about 4,000 feet; its face being very prominently marked with a massive stratum of rose-coloured granular quartz, which is evidently an altered sedimentary rock; the lines of deposition being very distinct. It is rocky and steep; divided into several mountains; and the rain in the valley appears to be always snow on their summits at this season. Near a remarkably rocky point of the mountain, at a large spring of pure water, were several hackberry-trees (*celtis*), probably a new species, the berries still green; and a short distance farther, thickets of sumach (*rhus*).

On the plain here I noticed blackbirds and grouse. In about seven miles from Clear Creek the trail brought us to a place at the foot of the mountain where there issued with considerably force 10 or 12 hot springs, highly impregnated with salt. In one of these the thermometer stood at 136°, and in another at 132°·5; and the water, which spread in pools over the low ground, was coloured red.*

At this place the trail we had been following turned to the left, apparently with the view of entering a gorge in the mountain, from which issued the principal fork of a large and comparatively well-timbered stream, called Weber's fork. We accordingly

* An analysis of the red earthy matter deposited in the bed of the stream from the springs, gives the following result:—

Peroxide of iron	33·50
Carbonate of magnesia	2·40
Carbonate of lime	50·43
Sulphate of lime	2·00
Chloride of sodium	3·45
Silica and alumina	3·00
Water and loss	5·22
	100·00

turned off towards the lake, and encamped on this river, which was 100 to 150 feet wide, with high banks, and very clear pure water, without the slightest indication of salt.

September 6.—Leaving the encampment early, we again directed our course for the peninsular *butte* across a low shrubby plain, crossing in the way a slough-like creek with miry banks, and wooded with thickets of thorn (*cratægus*), which were loaded with berries. This time we reached the *butte* without any difficulty, and, ascending to the summit, immediately at our feet beheld the object of our anxious search—the waters of the Inland Sea, stretching in still and solitary grandeur far beyond the limit of our vision. It was one of the great points of the exploration; and as we looked eagerly over the lake in the first emotions of excited pleasure, I am doubtful if the followers of Balboa felt more enthusiasm when, from the heights of the Andes, they saw for the first time the great Western ocean. It was certainly a magnificent object, and a noble *terminus* to this part of our expedition; and to travellers so long shut up among mountain ranges, a sudden view over the expanse of silent waters had in it something sublime. Several large islands raised their high rocky heads out of the waves; but whether or not they were timbered was still left to our imagination, as the distance was too great to determine if the dark hues upon them were woodland or naked rock. During the day the clouds had been gathering black over the mountains to the westward, and, while we were looking, a storm burst down with sudden fury upon the lake, and entirely hid the islands from our view. So far as we could see, along the shores there was not a solitary tree, and but little appearance of grass; and on Weber's fork, a few miles below our last encampment, the timber was gathered into groves, and then disappeared entirely. As this appeared to be the nearest point to the lake where a suitable camp could be found, we directed our course to one of the groves, where we found a handsome encampment, with good grass and an abundance of rushes (*equisetum hyemale*). At sunset, the thermometer was at 55°; the evening clear and calm, with some cumuli.

September 7.—The morning was calm and clear, with a temperature at sunrise of 39°·5. The day was spent in active preparation for our intended voyage on the lake. On the edge of the stream a favourable spot was selected in a grove, and, felling the timber, we made a strong *coral*, or horse pen, for the animals, and a little fort for the people who were to remain. We were now probably in the country of the Utah Indians, though none reside upon the lake. The India-rubber boat was repaired with prepared cloth and gum, and filled with air, in readiness for the next day.

The provisions which Carson had brought with him being now exhausted, and our stock reduced to a small quantity of roots, I determined to retain with me only a sufficient number of men for

the execution of our design; and accordingly seven were sent back to Fort Hall, under the guidance of François Lajeunesse, who, having been for many years a trapper in the country, was considered an experienced mountaineer. Though they were provided with good horses, and the road was a remarkably plain one of only four days' journey for a horseman, they became bewildered (as we afterwards learned), and, losing their way, wandered about the country in parties of one or two, reaching the fort about a week afterwards. Some straggled in of themselves, and the others were brought in by Indians who had picked them up on Snake river, about 60 miles below the fort, travelling along the emigrant road in full march for the Lower Columbia. The leader of this adventurous party was François.

Hourly barometrical observations were made during the day, and, after the departure of the party for Fort Hall, we occupied ourselves in continuing our little preparations, and in becoming acquainted with the country in the vicinity. The bottoms along the river were timbered with several kinds of willow, hawthorn, and fine cotton-wood trees (*populus Canadensis*), with remarkably large leaves, and 60 feet in height by measurement.

We formed now but a small family. With Mr. Preuss and myself, Carson, Bernier, and Basil Lajeunesse, had been selected for the boat expedition—the first ever attempted on this interior sea; and Badeau, with Derosier, and Jacob (the coloured man), were to be left in charge of the camp. We were favoured with most delightful weather. To-night there was a brilliant sunset of golden orange and green, which left the western sky clear and beautifully pure; but clouds in the east made me lose an occultation. The summer frogs were singing around us, and the evening was very pleasant, with a temperature of 60°—a night of a more southern autumn. For our supper we had *yampah*, the most agreeably flavoured of the roots, seasoned by a small fat duck, which had come in the way of Jacob's rifle. Around our fire to-night were many speculations on what to-morrow would bring forth; and in our busy conjectures we fancied that we should find every one of the large islands a tangled wilderness of trees and shrubbery, teeming with game of every description that the neighbouring region afforded, and which the foot of a white man or Indian had never violated. Frequently, during the day, clouds had rested on the summits of their lofty mountains, and we believed that we should find clear streams and springs of fresh water; and we indulged in anticipations of the luxurious repasts with which we were to indemnify ourselves for past privations. Neither, in our discussions, were the whirlpool and other mysterious dangers forgotten, which Indian and hunters' stories attributed to this unexplored lake. The men had discovered that, instead of being strongly sewed (like that of the preceding year, which had so triumphantly rode the cañons of the Upper Great Platte), our pre-

sent boat was only pasted together in a very insecure manner, the maker having been allowed so little time in the construction, that he was obliged to crowd the labour of two months into several days. The insecurity of the boat was sensibly felt by us; and, mingled with the enthusiasm and excitement that we all felt at the prospect of an undertaking which had never before been accomplished, was a certain impression of danger, sufficient to give a serious character to our conversation. The momentary view which had been had of the lake the day before, its great extent and rugged islands, dimly seen amidst the dark waters in the obscurity of the sudden storm, were well calculated to heighten the idea of undefined danger with which the lake was generally associated.

September 8.—A calm, clear day, with a sunrise temperature of 41°. In view of our present enterprise, a part of the equipment of the boat had been made to consist in three air-tight bags, about three feet long, and capable each of containing five gallons. These had been filled with water the night before, and were now placed in the boat, with our blankets and instruments, consisting of a sextant, telescope, spy-glass, thermometer, and barometer.

We left the camp at sunrise, and had a very pleasant voyage down the river, in which there was generally eight or ten feet of water, deepening as we neared the mouth in the latter part of the day. In the course of the morning we discovered that two of the cylinders leaked so much as to require one man constantly at the bellows, to keep them sufficiently full of air to support the boat. Although we had made a very early start, we loitered so much on the way—stopping every now and then, and floating silently along to get a shot at a goose or a duck—that it was late in the day when we reached the outlet. The river here divided into several branches, filled with fluvials, and so very shallow that it was with difficulty we could get the boat along, being obliged to get out and wade. We encamped on a low point among rushes and young willows, where there was a quantity of drift wood, which served for our fires. The evening was mild and clear; we made a pleasant bed of the young willows; and geese and ducks enough had been killed for an abundant supper at night, and for breakfast the next morning. The stillness of the night was enlivened by millions of water-fowl. Latitude (by observation) 41° 11′ 26″; and longitude 112° 11′ 30″.

September 9.—The day was clear and calm; the thermometer at sunrise at 49°. As is usual with the trappers on the eve of any enterprise, our people had made dreams, and theirs happened to be a bad one—one which always preceded evil—and consequently they looked very gloomy this morning; but we hurried through our breakfast, in order to make an early start, and have all the day before us for our adventure. The channel in a short distance became so shallow that our navigation was at an end, being merely a

sheet of soft mud, with a few inches of water, and sometimes none at all, forming the low-water shore of the lake. All this place was absolutely covered with flocks of screaming plover. We took off our clothes, and, getting overboard, commenced dragging the boat—making, by this operation, a very curious trail, and a very disagreeable smell in stirring up the mud, as we sank above the knee at every step. The water here was still fresh, with only an insipid and disagreeable taste, probably derived from the bed of fœtid mud. After proceeding in this way about a mile, we came to a small black ridge on the bottom, beyond which the water became suddenly salt, beginning gradually to deepen, and the bottom was sandy and firm. It was a remarkable division, separating the fresh waters of the rivers from the briny water of the lake, which was entirely *saturated* with common salt. Pushing our little vessel across the narrow boundary, we sprang on board, and at length were afloat on the waters of the unknown sea.

We did not steer for the mountainous islands, but directed our course towards a lower one, which it had been decided we should first visit, the summit of which was formed like the crater at the upper end of Bear river valley. So long as we could touch the bottom with our paddles, we were very gay; but gradually, as the water deepened we became more still in our frail bateau of gum cloth distended with air, and with pasted seams. Although the day was very calm, there was a considerable swell on the lake; and there were white patches of foam on the surface, which were slowly moving to the southward, indicating the set of a current in that direction, and recalling the recollection of the whirlpool stories. The water continued to deepen as we advanced; the lake becoming almost transparently clear, of an extremely beautiful bright green colour; and the spray, which was thrown into the boat and over our clothes, was directly converted into a crust of common salt, which covered also our hands and arms. "Captain," said Carson, who for some time had been looking suspiciously at some whitening appearances outside the nearest islands, "what are those yonder?—won't you just take a look with the glass?" We ceased paddling for a moment, and found them to be the caps of the waves that were beginning to break under the force of a strong breeze that was coming up the lake.

The form of the boat seemed to be an admirable one, and it rode on the waves like a water-bird; but, at the same time, it was extremely slow in its progress. When we were a little more than half way across the reach, two of the divisions between the cylinders gave way, and it required the constant use of the bellows to keep in a sufficient quantity of air. For a long time we scarcely seemed to approach our island, but gradually we worked across the rougher sea of the open channel into the smoother water under the lee of the island; and began to discover that what we took for a long row of pelicans, ranged on the beach, were only low cliffs

whitened with salt by the spray of the waves; and about noon we reached the shore, the transparency of the water enabling us to see the bottom at a considerable depth.

It was a handsome broad beach where we landed, behind which the hill, into which the island was gathered, rose somewhat abruptly, and a point of rock at one end enclosed it in a sheltering way, and as there was an abundance of drift wood along the shore, it offered us a pleasant encampment. We did not suffer our fragile boat to touch the sharp rocks; but, getting overboard, discharged the baggage, and, lifting it gently out of the water, carried it to the upper part of the beach, which was composed of very small fragments of rock.

Among the successive banks of the beach, formed by the action of the waves, our attention, as we approached the island, had been attracted by one 10 to 20 feet in breadth, of a dark-brown colour. Being more closely examined, this was found to be composed, to the depth of seven or eight and twelve inches, entirely of the *larvæ* of insects, or, in common language, of the skins of worms, about the size of a grain of oats, which had been washed up by the waters of the lake.

Alluding to this subject some months afterwards, when travelling through a more southern portion of this region, in company with Mr. Joseph Walker, an old hunter, I was informed by him, that, wandering with a party of men in a mountain country east of the great Californian range, he surprised a party of several Indian families encamped near a small salt lake, who abandoned their lodges at his approach, leaving everything behind them. Being in a starving condition, they were delighted to find in the abandoned lodges a number of skin bags containing a quantity of what appeared to be fish, dried and pounded. On this they made a hearty supper: and were gathering around an abundant breakfast the next morning, when Mr. Walker discovered that it was with these, or a similar worm, that the bags had been filled. The stomachs of the stout trappers were not proof against their prejudices, and the repulsive food was suddenly rejected. Mr. Walker had further opportunities of seeing these worms used as an article of food; and I am inclined to think they are the same as those we saw, and appear to be a product of the salt lakes. It may be well to recall to your mind that Mr. Walker was associated with Captain Bonneville in his expedition to the Rocky Mountains; and has since that time remained in the country, generally residing in some one of the Snake villages, when not engaged in one of his numerous trapping expeditions, in which he is celebrated as one of the best and bravest leaders who have ever been in the country.

The cliffs and masses of rock along the shore were whitened by an incrustation of salt where the waves dashed up against them; and the evaporating water, which had been left in holes and hollows on the surface of the rocks, was covered with a crust of salt

about one-eighth of an inch in thickness. It appeared strange that, in the midst of this grand reservoir, one of our greatest wants lately had been salt. Exposed to be more perfectly dried in the sun, this became very white and fine, having the usual flavour of very excellent common salt, without any foreign taste; but only a little was collected for present use, as there was in it a number of small black insects.

Carrying with us the barometer and other instruments, in the afternoon we ascended to the highest point of the island—a bare rocky peak 800 feet above the lake. Standing on the summit, we enjoyed an extended view of the lake, enclosed in a basin of rugged mountains, which sometimes left marshy flats and extensive bottoms between them and the shore, and in other places came directly down into the water with bold and precipitous bluffs. Following with our glasses the irregular shores, we searched for some indications of a communication with other bodies of water, or the entrance of other rivers; but the distance was so great that we could make out nothing with certainty. To the southward, several peninsular mountains, 3,000 or 4,000 feet high, entered the lake, appearing, so far as the distance and our position enabled us to determine, to be connected by flats and low ridges with the mountains in the rear. These are probably the islands usually indicated on maps of this region as entirely detached from the shore. The season of our operations was when the waters were at their lowest stage. At the season of high waters in the spring, it is probable that the marshes and low grounds are overflowed, and the surface of the lake considerably greater. In several places the view was of unlimited extent—here and there a rocky islet appearing above the water at a great distance; and beyond, everything was vague and undefined. As we looked over the vast expanse of water spread out beneath us, and strained our eyes along the silent shores over which hung so much doubt and uncertainty, and which were so full of interest to us, I could hardly repress the almost irresistible desire to continue our exploration; but the lengthening snow on the mountains was a plain indication of the advancing season, and our frail linen boat appeared so insecure that I was unwilling to trust our lives to the uncertainties of the lake. I therefore unwillingly resolved to terminate our survey here, and remain satisfied for the present with what we had been able to add to the unknown geography of the region. We felt pleasure also in remembering that we were the first who, in the traditionary annals of the country, had visited the islands, and broken, with the cheerful sound of human voices, the long solitude of the place. From the point where we were standing, the ground fell off on every side to the water, giving us a perfect view of the island, which is 12 or 13 miles in circumference, being simply a rocky hill, on which there is neither water nor trees of any kind; although the *Fremontia vermicularis*, which was in great abundance, might

easily be mistaken for timber at a distance. The plant seemed here to delight in a congenial air, growing in extraordinary luxuriance seven to eight feet high, and was very abundant on the upper parts of the island, where it was almost the only plant. This is eminently a saline shrub; its leaves have a very salt taste; and it luxuriates in saline soils, where it is usually a characteristic. It is widely diffused over all this country. A chenopodiaceous shrub, which is a new species of OBIONE (O. rigida, *Torr. & Frem.*), was equally characteristic of the lower parts of the island. These two are the striking plants on the island, and belong to a class of plants which form a prominent feature in the vegetation of this country. On the lower parts of the island, also, a prickly pear of very large size was frequent. On the shore, near the water, was a woolly species of *phaca;* and a new species of umbelliferous plant (*leptotæmia*) was scattered about in very considerable abundance. These constituted all the vegetation that now appeared upon the island.

I accidentally left on the summit the brass cover to the object end of my spy-glass; and as it will probably remain there undisturbed by Indians, it will furnish matter of speculation to some future traveller. In our excursions about the island, we did not meet with any kind of animal; a magpie, and another larger bird, probably attracted by the smoke of our fire, paid us a visit from the shore, and were the only living things seen during our stay. The rock constituting the cliffs along the shore where we were encamped, is a talcous rock, or steatite, with brown spar.

At sunset the temperature was 70°. We had arrived just in time to obtain a meridian altitude of the sun, and other observations were obtained this evening, which place our camp in latitude 41° 10′ 42″, and longitude 112° 21′ 05″ from Greenwich. From a discussion of the barometrical observations made during our stay on the shores of the lake, we have adopted 4,200 feet for its elevation above the Gulf of Mexico. In the first disappointment we felt from the dissipation of our dream of the fertile islands, I called this *Disappointment island.*

Out of the drift wood, we made ourselves pleasant little lodges, open ~~to the~~ water, and, after having kindled large fires to excite the wonder of any straggling savage on the lake shores, lay down, for the first time in a long journey, in perfect security; no one thinking about his arms. The evening was extremely bright and pleasant; but the wind rose during the night, and the waves began to break heavily on the shore, making our island tremble. I had not expected in our inland journey to hear the roar of an ocean surf; and the strangeness of our situation, and the excitement we felt in the associated interests of the place, made this one of the most interesting nights I remember during our long expedition.

In the morning the surf was breaking heavily on the shore, and we were up early. The lake was dark and agitated, and we hur-

ried through our scanty breakfast, and embarked—having first filled one of the buckets with water from the lake, of which it was intended to make salt. The sun had risen by the time we were ready to start; and it was blowing a strong gale of wind, almost directly off the shore, and raising a considerable sea, in which our boat strained very much. It roughened as we got away from the island, and it required all the efforts of the men to make any head against the wind and sea, the gale rising with the sun; and there was danger of being blown into one of the open reaches beyond the island. At the distance of half a mile from the beach, the depth of water was 16 feet, with a clay bottom; but, as the working of the boat was very severe labour, and during the operation of sounding it was necessary to cease paddling, during which the boat lost considerable way, I was unwilling to discourage the men, and reluctantly gave up my intention of ascertaining the depth, and the character of the bed. There was a general shout in the boat when we found ourselves in one fathom, and we soon after landed on a low point of mud, immediately under the *butte* of the peninsula, where we unloaded the boat, and carried the baggage about a quarter of mile to firmer ground. We arrived just in time for meridian observation, and carried the barometer to the summit of the butte, which is 500 feet above the lake. Mr. Preuss set off on foot for the camp, which was about nine miles distant; Basil accompanying him to bring back horses for the boat and baggage.

The rude-looking shelter we raised on the shore, our scattered baggage and boat lying on the beach, made quite a picture; and we called this the *fisherman's camp*. *Lynosiris graveolens*, and another new species of OBIONE (O. confertifolia, *Torr & Frem.*), were growing on the low grounds, with interspersed spots of an unwholesome salt grass, on a saline clay soil, with a few other plants.

The horses arrived late in the afternoon, by which time the gale had increased to such a height that a man could scarcely stand before it; and we were obliged to pack our baggage hastily, as the rising water of the lake had already reached the point where we were halted. Looking back as we rode off, we found the place of recent encampment entirely covered. The low plain through which we rode to the camp was covered with a compact growth of shrubs of extraordinary size and luxuriance. The soil was sandy and saline; flat places, resembling the beds of ponds, that were bare of vegetation, and covered with a powdery white salt, being interspersed among the shrubs. Artemisia tridentata was very abundant, but the plants were principally saline; a large and vigorous chenopodiaceous shrub, five to eight feet high, being characteristic, with Fremontia vermicularis, and a shrubby plant which seems to be a new *salicornia*. We reached the camp in time to escape a thunder-storm which blackened the sky, and were

received with a discharge of the howitzer by the people, who, having been unable to see anything of us on the lake, had begun to feel some uneasiness.

September 11.—To-day we remained at this camp, in order to obtain some further observations, and to boil down the water which had been brought from the lake, for a supply of salt. Roughly evaporated over the fire, the five gallons of water yielded fourteen pints of very fine-grained and very white salt, of which the whole lake may be regarded as a saturated solution. A portion of the salt thus obtained has been subjected to analysis, giving, in 100 parts, the following proportions:—

Analysis of the Salt.

Chloride of sodium (common salt)	97·80
Chloride of calcium	0·61
Chloride of magnesium	0·24
Sulphate of soda	0·23
Sulphate of lime	1·12
	100·00

Glancing your eye along the map, you will see a small stream entering the *Utah lake*, south of the Spanish fork, and the first waters of that lake which our road of 1844 crosses in coming up from the southward. When I was on this stream with Mr. Walker in that year, he informed me that on the upper part of the river are immense beds of rock salt of very great thickness, which he had frequently visited. Farther to the southward, the rivers which are affluent to the Colorado, such as the Rio Virgen, and Gila river, near their mouths, are impregnated with salt by the cliffs of rock salt between which they pass. These mines occur in the same ridge in which, about 120 miles to the northward, and subsequently in their more immediate neighbourhood, we discovered the fossils belonging to the oolitic period, and they are probably connected with that formation, and are the deposits from which the Great Lake obtains its salt. Had we remained longer, we should have found them in its bed, and in the mountains around its shores.

By observation, the latitude of this camp is 41° 15′ 50″, and longitude 112° 06′ 43″.

The observations made during our stay give for the rate of the chronometer 31″·27, corresponding almost exactly with the rate obtained at St. Vrain's fort. Barometrical observations were made hourly during the day. This morning we breakfasted on yampah, and had only kamás for supper; but a cup of good coffee still distinguished us from our *Digger* acquaintances.

September 12.—The morning was clear and calm, with a temperature at sunrise of 32°. We resumed our journey late in the day, returning by nearly the same route by which we had travelled in coming to the lake; and, avoiding the passage of Hawthorn

creek, struck the hills a little below the hot salt springs. The flat plain we had here passed over consisted alternately of tolerably good sandy soil and of saline plants. We encamped early on Clear creek, at the foot of the high ridge; one of the peaks of which we ascertained by measurement to be 4,210 feet above the lake, or about 8,400 feet above the sea. Behind these front peaks the ridge rises towards the Bear river mountains, which are probably as high as the Wind river chain. This creek is here unusually well timbered with a variety of trees. Among them were birch *(betula)*, the narrow-leaved poplar *(populus angustifolia)*, several kinds of willow *(salix)*, hawthorn *(cratægus)*, alder *(alnus viridis)*, and *cerasus*, with an oak allied to *quercus alba*, but very distinct from that or any other species in the United States.

We had to-night a supper of sea-gulls, which Carson killed near the lake. Although cool, the thermometer standing at 47°, mosquitoes were sufficiently numerous to be troublesome this evening.

September 13.—Continuing up the river valley we crossed several small streams; the mountains on the right appearing to consist of the blue limestone, which we had observed in the same ridge to the northward, alternating here with a granular quartz already mentioned. One of these streams, which forms a smaller lake near the river, was broken up into several channels; and the irrigated bottom of fertile soil was covered with innumerable flowers, among which were purple fields of *eupatorium purpureum*, with helianthi, a handsome solidago *(S. Canadensis)*, and a variety of other plants in bloom. Continuing along the foot of the hills, in the afternoon we found five or six hot springs gushing out together, beneath a conglomerate, consisting principally of fragments of a greyish-blue limestone, efflorescing a salt upon the surface. The temperature of these springs was 134°, and the rocks in the bed were coloured with a red deposit, and there was common salt crystallized on the margin. There was also a white incrustation upon leaves and roots, consisting principally of carbonate of lime. There were rushes seen along the road this afternoon, and the soil under the hills was very black, and apparently very good; but at this time the grass is entirely dried up. We encamped on Bear river, immediately below a cut-off, the cañon by which the river enters this valley bearing north by compass. The night was mild, with a very clear sky; and I obtained a very excellent observation of an occultation of Tau.[1] Arietis, with other observations. Both immersion and emersion of the star were observed; but, as our observations have shown, the phase at the bright limb generally gives incorrect longitudes, and we have adopted the result obtained from the emersion at the dark limb, without allowing any weight to the immersion. According to these observations, the longitude is 112° 05′ 12″, and the latitude 41° 42′ 43″. All the longitudes on the line of

our outward journey, between St. Vrain's fort and the Dalles of the Columbia, which were not directly determined by satellites, have been chronometrically referred to this place.

The people to-day were rather low-spirited, hunger making them very quiet and peaceable; and there was rarely an oath to be heard in the camp—not even a solitary *enfant de garce.* It was time for the men with an expected supply of provisions from Fitzpatrick to be in the neighbourhood; and the gun was fired at evening to give them notice of our locality, but met with no response.

September 14.—About four miles from this encampment, the trail led us down to the river, where we unexpectedly found an excellent ford—the stream being widened by an island, and not yet disengaged from the hills at the foot of the range. We encamped on a little creek where we had made a noon halt in descending the river. The night was very clear and pleasant, the sunset temperature being 67°.

The people this evening looked so forlorn, that I gave them permission to kill a fat young horse which I had purchased with goods from the Snake Indians, and they were very soon restored to gaiety and good humour. Mr. Preuss and myself could not yet overcome some remains of civilized prejudices, and preferred to starve a little longer; feeling as much saddened as if a crime had been committed.

The next day we continued up the valley, the soil being sometimes very black and good, occasionally gravelly, and occasionally a kind of naked salt plains. We found on the way this morning a small encampment of two families of Snake Indians, from whom we purchased a small quantity of *kooyah.* They had piles of seeds, of three different kinds, spread out upon pieces of buffalo robe; and the squaws had just gathered about a bushel of the roots of a thistle (*circium Virginianium*). They were about the ordinary size of carrots, and, as I have previously mentioned, are sweet and well flavoured, requiring only a long preparation. They had a band of twelve or fifteen horses, and appeared to be growing in the sunshine with about as little labour as the plants they were eating.

Shortly afterwards we met an Indian on horseback who had killed an antelope, which we purchased from him for a little powder and some balls. We crossed the Roseaux, and encamped on the left bank; halting early for the pleasure of enjoying a wholesome and abundant supper, and were pleasantly engaged in protracting our unusual comfort, when Tabeau galloped into the camp with news that Mr. Fitzpatrick was encamped close by us, with a good supply of provisions—flour, rice, and dried meat, and even a little butter. Excitement to-night made us all wakeful; and after a breakfast before sunrise the next morning, we were again on the road, and, continuing up the valley, crossed some high points of hills, and halted to noon on the same stream, near several lodges of Snake Indians, from whom we purchased about a bushel of

service-berries, partially dried. By the gift of a knife, I prevailed upon a little boy to show me the *kooyah* plant, which proved to be *valeriana edulis*. The root, which constitutes the *kooyah*, is large, of a very bright yellow colour, with the characteristic odour, but not so fully developed as in the prepared substance. It loves the rich moist soil of river bottoms, which was the locality in which I always afterwards found it. It was now entirely out of bloom; according to my observation, flowering in the months of May and June. In the afternoon we entered a long ravine leading to a pass in the dividing ridge between the waters of Bear river and the Snake river, or Lewis's fork of the Columbia; our way being very much impeded, and almost entirely blocked up, by compact fields of luxuriant artemisia. Taking leave at this point of the waters of Bear river, and of the geographical basin which encloses the system of rivers and creeks which belong to the Great Salt Lake, and which so richly deserves a future detailed and ample exploration, I can say of it, in general terms, that the bottoms of this river (Bear), and of some of the creeks which I saw, form a natural resting and recruiting station for travellers, now, and in all time to come. The bottoms are extensive; water excellent; timber sufficient; the soil good, and well adapted to the grains and grasses suited to such an elevated region. A military post, and a civilized settlement, would be of great value here; and cattle and horses would do well where grass and salt so much abound. The lake will furnish exhaustless supplies of salt. All the mountain sides here are covered with a valuable nutritious grass, called bunch grass, from the form in which it grows, which has a second growth in the fall. The beasts of the Indians were fat upon it; our own found it a good subsistence; and its quantity will sustain any amount of cattle, and make this truly a bucolic region.

We met here an Indian family on horseback, which had been out to gather service-berries, and were returning loaded. This tree was scattered about on the hills, and the upper part of the pass was timbered with aspen (*populus trem.*); the common blue flowering flax occurring among the plants. The approach to the pass was very steep; and the summit about 6,300 feet above the sea—probably only an uncertain approximation, as at the time of observation it was blowing a violent gale of wind from the north-west, with *cumuli* scattered in masses over the sky, the day otherwise bright and clear. We descended by a steep slope into a broad open valley—good soil—from four to five miles wide; coming down immediately upon one of the head-waters of the Pannack river, which here loses itself in swampy ground. The appearance of the country here is not very interesting. On either side is a regular range of mountains of the usual character, with a little timber, tolerably rocky on the right, and higher and more smooth on the left, with still higher peaks looking out above the range. The valley afforded a good level road, but it was late

when it brought us to water, and we encamped at dark. The north-west wind had blown up very cold weather, and the artemisia, which was our fire-wood to-night, did not happen to be very abundant. This plant loves a dry, sandy soil, and cannot grow in the good bottoms where it is rich and moist, but on every little eminence, where water does not rest long, it maintains absolute possession. Elevation above the sea about 5,100 feet.

At night scattered fires glimmered along the mountains, pointing out camps of the Indians; and we contrasted the comparative security in which we travelled through this country, with the guarded vigilance we were compelled to exert among the Sioux and other Indians on the eastern side of the Rocky Mountains.

At sunset the thermometer was at 50°, and at midnight at 30°.

September 17.—The morning sky was calm and clear, the temperature at daylight being 25°, and at sunrise 20°. There is throughout this mountain country a remarkable difference between the morning and mid-day temperatures, which at this season was very generally 40° or 50°, and occasionally greater; and frequently, after a very frosty morning, the heat in a few hours would render the thinnest clothing agreeable. About noon we reached the main fork. The Pannack river was before us; the valley being here a mile and a half wide, fertile, and bordered by smooth hills, not over 500 feet high, partly covered with cedar; a high ridge, in which there is a prominent peak, rising behind those on the left. We continued to descend this stream, and found on it at night a warm and comfortable camp. Flax occurred so frequently during the day as to be almost a characteristic, and the soil appeared excellent. The opposite hills on the right are broken here into a great variety of shapes. The evening was gusty, with a temperature at sunset of 59°. I obtained, about midnight, an observation of an emersion of the first satellite; the night being calm and very clear, the stars remarkably bright, and the thermometer at 30°. Longitude from mean of satellite and chronometer, 112° 29′ 52″; and latitude, by observation, 42° 44′ 40″.

September 18.—The day clear and calm, with a temperature of 25° at sunrise. After travelling seven or eight miles, we emerged on the plains of the Columbia, in sight of the famous "*Three Buttes,*" a well known landmark in the country, distant about 45 miles. The French word *butte,* which so often occurs in this narrative, is retained from the familiar language of the country, and identifies the objects to which it refers. It is naturalized in the region of the Rocky Mountains; and, even if desirable to render it in English, I know of no word which would be its precise equivalent. It is applied to the detached hills and ridges which rise abruptly, and reach too high to be called hills or ridges, and not high enough to be called mountains. *Knob,* as applied in the Western States, is their most descriptive term in English. *Cerro* is the Spanish term; but no translation, or paraphrasis, would

preserve the identity of these picturesque landmarks, familiar to the traveller, and often seen at a great distance. Covered as far as could be seen with artemisia, the dark and ugly appearance of this plain obtained for it the name of the *Sage Desert;* and we were agreeably surprised, on reaching the Portneuf river, to see a beautiful green valley with scattered timber spread out beneath us on which, about four miles distant, were glistening the white walls of the fort. The Portneuf runs along the upland plain nearly to its mouth, and an abrupt descent of perhaps 200 feet brought us down immediately upon the stream, which at the ford is 100 yards wide, and three feet deep, with clear water, a swift current, and gravelly bed; but a little higher up the breadth was only about 35 yards, with apparently deep water.

In the bottom I remarked a very great number of springs and sloughs, with remarkably clear water and gravel beds. At sunset we encamped with Mr. Talbot and our friends, who came on to Fort Hall, when we went to the lake, and whom we had the satisfaction to find all well, neither party having met with any mischance in the interval of our separation. They, too, had had their share of fatigue and scanty provisions, as there had been very little game left on the trail of the populous emigration; and Mr. Fitzpatrick had rigidly husbanded our stock of flour and light provisions, in view of the approaching winter and the long journey before us.

September 19.—This morning the sky was very dark and gloomy, and at daylight it began snowing thickly, and continued all day, with cold and disagreeable weather. At sunrise the temperature was 43°. I rode up to the fort, and purchased from Mr. Grant (the officer in charge of the post) several very indifferent horses, and five oxen in very fine order, which were received at the camp with great satisfaction; and one being killed at evening, the usual gaiety and good humour were at once restored. Night came in stormy.

September 20.—We had a night of snow and rain, and the thermometer at sunrise was at 34°; the morning was dark, with a steady rain, and there was still an inch of snow on the ground, with an abundance on the neighbouring hills and mountains. The sudden change in the weather was hard for our animals, who trembled and shivered in the cold—sometimes taking refuge in the timber, and now and then coming out and raking the snow off the ground for a little grass, or eating the young willows.

September 21.—Ice made tolerably thick during the night, and in the morning the weather cleared up very bright, with a temperature at sunrise of 29°; and I obtained a meridian observation for latitude at the fort, with observations for time. The sky was again covered in the afternoon, and the thermometer at sunset 48°.

September 22.—The morning was cloudy and unpleasant, and at sunrise a cold rain commenced, with a temperature of 41°.

The early approach of winter, and the difficulty of supporting a large party, determined me to send back a number of the men who had become satisfied that they were not fitted for the laborious service and frequent privation to which they were necessarily exposed, and which there was reason to believe would become more severe in the further extension of the voyage. I accordingly called them together, and informing them of my intention to continue our journey during the ensuing winter, in the course of which they would probably be exposed to considerable hardship, succeeded in prevailing upon a number of them to return voluntarily. These were:—Charles De Forrest, Henry Lee, J. Campbell, Wm. Creuss, A. Vasquez, A. Pera, Patrick White, B. Tesson, M. Creely, François Lajeunesse, Basil Lajeunesse. Among these, I regretted very much to lose Basil Lajeunesse, one of the best men in my party, who was obliged, by the condition of his family, to be at home in the coming winter. Our preparations having been completed in the interval of our stay here, both parties were ready this morning to resume their respective routes.

Except that there is a greater quantity of wood used in its construction, Fort Hall very much resembles the other trading posts which have been already described to you, and would be another excellent post of relief for the emigration. It is in the low, rich bottom of the valley, apparently 20 miles long, formed by the confluence of Portneuf river with Lewis's fork of the Columbia, which it enters about nine miles below the fort, and gradually narrowing to the mouth of the Pannack river, where it has a breadth of only two or three miles. Allowing 50 miles for the road from the *Beer springs* of Bear river to Fort Hall, its distance along the *travelled* road from the town of Westport, on the frontier of Missouri, by way of Fort Laramie and the great South Pass, is 1,323 miles. Beyond this place, on the line of road along the *barren* valley of the Upper Columbia, there does not occur, for a distance of nearly 300 miles to the westward, a fertile spot of ground sufficiently large to produce the necessary quantity of grain, or pasturage enough to allow even a temporary repose to the emigrants. On their recent passage, they had been able to obtain, at very high prices, and in insufficient quantity, only such assistance as could be afforded by a small and remote trading post—and that a foreign one—which, in the supply of its own wants, had necessarily drawn around it some of the resources of civilization, but which obtained nearly all its supplies from the distant depôt of Vancouver, by a difficult water carriage of 250 miles up the Columbia river, and a land carriage by pack horses of 600 miles. An American military post, sufficiently strong give to their road a perfect security against the Indian tribes, who are unsettled in locality, and very *uncertain* in their disposition, and which, with the necessary facilities for the repair of their equipage, would be able to afford them relief in stock and grain from the produce of the post, would be of

extraordinary value to the emigration. Such a post (and all others which may be established on the line to Oregon) would naturally form the *nucleus* of a settlement, at which supplies and repose would be obtained by the emigrant or trading caravans, which may hereafter traverse these elevated and, in many places, desolate and inhospitable regions.

I subjoin an analysis of the soil in the river bottom near Fort Hall, which will be of assistance in enabling you to form some correct idea of its general character in the neighbouring country. I characterise it as good land, but the analysis will show its precise properties :—

Analysis of Soil.

Silica	68·55
Alumina	7·45
Carbonate of lime	8·51
Carbonate of magnesia	5·09
Oxide of iron	1·40
Organic vegetable matter	4·74
Water and loss	4·26
	100·00

Our observations place this post in longitude 112° 29′ 54″, latitude 43° 01′ 30″, and in elevation above the sea 4,500 feet.

Taking leave of the homeward party, we resumed our journey down the valley, the weather being very cold, and the rain coming in hard gusts, which the wind blew directly in our faces. We forded the Portneuf in a storm of rain, the water in the river being frequently up to the axles, and about 110 yards wide. After the gust, the weather improved a little, and we encamped about three miles below, at the mouth of the Pannack river, on Lewis's fork, which here has a breadth of about 120 yards. The temperature at sunset was 42°; the sky partially covered with dark, rainy clouds.

September 23.—The temperature at sunrise was 32°; the morning dark, and snow falling steadily and thickly, with a light air from the southward. Profited of being obliged to remain in camp, to take hourly barometrical observations from sunrise to midnight. The wind at eleven o'clock set in from the northward in heavy gusts, and the snow changed into rain. In the afternoon, when the sky brightened, the rain had washed all the snow from the bottoms; but the neighbouring mountains, from summit to foot, were luminously white—an inauspicious commencement of the autumn, of which this was the first day.

September 24.—The thermometer at sunrise was 35°, and a blue sky in the west promised a fine day, The river bottoms here are narrow and swampy, with frequent sloughs; and after crossing the Pannack, the road continued along the uplands, rendered very slippery by the soil of wet clay, and entirely covered with artemisia bushes, among which occur frequent fragments of obsidian. At

noon we encamped in a grove of willows, at the upper end of a group of islands about half a mile above the *American falls* of Snake river. Among the willows here were some bushes of Lewis and Clarke's currant (*ribes aureum*). The river here enters between low mural banks, which consist of a fine vesicular trap rock, the intermediate portions being compact and crystalline. Gradually becoming higher in its downward course, these banks of scoriated volcanic rock form, with occasional interruptions, its characteristic feature along the whole line to the Dalles of the Lower Columbia, resembling a chasm which had been rent through the country, and which the river had afterwards taken for its bed. The immediate valley of the river is a high plain covered with black rocks and artemisias. In the south is a bordering range of mountains, which, although not very high, are broken and covered with snow; and at a great distance to the north is seen the high, snowy line of the Salmon river mountains, in front of which stand out prominently in the plain the three isolated rugged-looking little mountains commonly known as the *Three Buttes*. Between the river and the distant Salmon river range, the plain is represented by Mr. Fitzpatrick as so entirely broken up and rent into chasms as to be impracticable for a man even on foot. In the sketch annexed, the point of view is low, but it conveys very well some idea of the open character of the country, with the buttes rising out above the general line. By measurement, the river above is 870 feet wide, immediately contracted at the fall in the form of a lock, by jutting piles of scoriaceous basalt, over which the foaming river must present a grand appearance at the time of high water. The evening was clear and pleasant, with dew; and at sunset the temperature was 54°. By observation, the latitude is 42° 47′ 05″, and the longitude 112° 40′ 13″. A few hundred yards below the falls, and on the left bank of the river, is an escarpment from which we obtained some specimens.

September 25.—Thermometer at sunrise 47°. The day came in clear, with a strong gale from the south, which commenced at 11 o'clock last night. The road to-day led along the river, which is full of rapids and small falls. Grass is very scanty; and along the rugged banks are scattered cedars, with an abundance of rocks and sage. We travelled 14 miles, and encamped in the afternoon near the river, on a rocky creek, the bed of which was entirely occupied with boulders of a very large size. For the last three or four miles the right bank of the river has a palisaded appearance. One of the oxen was killed here for food. The thermometer at evening was at 55°, the sky almost overcast, and the barometer indicated an elevation of 4,400 feet.

September 26.—Rain during the night, and the temperature at sunrise 42°. Travelling along the river, in about four miles we reached a picturesque stream, to which we gave the name of Fall

creek. It is remarkable for the many falls which occur in a short distance; and its bed is composed of a calcareous tufa, or vegetable rock, composed principally of the remains of reeds and mosses, resembling that at the *Basin spring* on Bear river.

The road along the river bluffs had been occasionally very bad; and imagining that some rough obstacles rendered such a détour necessary, we followed for several miles a plain wagon road leading up this stream, until we reached a point whence it could be seen making directly towards a low place in the range on the south side of the valley, and we became immediately aware that we were on a trail formed by a party of wagons, in company with whom we had encamped at Elm grove, near the frontier of Missouri, and which you will remember were proceeding to Upper California under the direction of Mr. Jos. Chiles. At the time of their departure, no practicable passes were known in the southern Rocky Mountains within the territory of the United States; and the probable apprehension of difficulty in attempting to pass near the settled frontier of New Mexico, together with the desert character of the unexplored region beyond, had induced them to take a more northern and circuitous route by way of the Sweet Water pass and Fort Hall. They had still between them and the valley of the Sacramento a great mass of mountains, forming the *Sierra Nevada,* here commonly known as the *Great California mountain,* and which were at this time considered as presenting an impracticable barrier to wheeled carriages. Various considerations had suggested to them a division of the party; and a greater portion of the camp, including the wagons, with the mail and other stores, were now proceeding under the guidance of Mr. Joseph Walker, who had engaged to conduct them, by a long sweep to the southward, around what is called the *point of the mountain;* and, crossing through a pass known only to himself, gain the banks of the Sacramento by the valley of the San Joaquin. It was a long and a hazardous journey for a party in which there were women and children. Sixty days was the shortest period of time in which they could reach the point of the mountain, and their route lay through a country inhabited by wild and badly disposed Indians, and very poor in game; but the leader was a man possessing great and intimate knowledge of the Indians, with an extraordinary firmness and decision of character. In the mean time, Mr. Chiles had passed down the Columbia with a party of 10 or 12 men, with the intention of reaching the settlements on the Sacramento by a more direct course, which indefinite information from hunters had indicated in the direction of the head waters of the *Rivière aux Malheurs;* and having obtained there a reinforcement of animals, and a supply of provisions, meet the wagons before they should have reached the point of the mountain, at a place which had been previously agreed upon. In the course of our narrative, we shall be able to give you some informa-

tion of the fortune which attended the movements of these adventurous travellers.

Having discovered our error, we immediately regained the line along the river, which the road quitted about noon, and encamped at five o'clock on a stream called Raft river (*Rivière aux Cajeux*), having travelled only 13 miles. In the north, the Salmon river mountains are visible at a very far distance; and on the left, the ridge in which Raft river heads is about 20 miles distant, rocky and tolerably high. Thermometer at sunset 44°, with a partially clouded sky, and a sharp wind from the S.W.

September 27.—It was now no longer possible, as in our previous journey, to travel regularly every day, and find at any moment a convenient place for repose at noon or a camp at night; but the halting places were now generally fixed along the road, by the nature of the country, at places where, with water, there was a little scanty grass. Since leaving the American falls, the road had frequently been very bad; the many short, steep ascents, exhausting the strength of our worn-out animals, requiring always at such places the assistance of the men to get up each cart, one by one; and our progress with twelve or fourteen wheeled carriages, though light and made for the purpose, in such a rocky country, was extremely slow; and I again determined to gain time by a division of the camp. Accordingly, to-day the parties again separated, constituted very much as before—Mr. Fitzpatrick remaining in charge of the heavier baggage.

The morning was calm and clear, with a white frost, and the temperature at sunrise 24°.

To-day the country had a very forbidding appearance; and, after travelling 20 miles over a slightly undulating plain, we encamped at a considerable spring, called Swamp creek, rising in low grounds near the point of a spur from the mountain. Returning with a small party in a starving condition from the westward 12 or 14 years since, Carson had met here three or four buffalo bulls, two of which were killed. They were among the pioneers which had made the experiment of colonizing in the valley of the Columbia, and which had failed, as heretofore stated. At sunset the thermometer was at 46°, and the evening was overcast, with a cold wind from the S.E., and to-night we had only sage for firewood. Mingled with the artemisia, was a shrubby and thorny chenopodiaceous plant.

September 28.—Thermometer at sunrise 40°. The wind rose early to a gale from the west, with a very cold driving rain; and, after an uncomfortable day's ride of 25 miles, we were glad when at evening we found a sheltered camp, where there was an abundance of wood, at some elevated rocky islands covered with cedar, near the commencement of another long cañon of the river. With the exception of a short detention at a deep little stream called Goose creek, and some occasional rocky places, we had

to-day a very good road; but the country has a barren appearance, sandy, and densely covered with the artemisias from the banks of the river to the foot of the mountains. Here I remarked, among the sage bushes, green bunches of what is called the second growth of grass. The river to-day has had a smooth appearance, free from rapids, with a low, sandy hill slope bordering the bottoms, in which there is a little good soil. Thermometer at sunset 45°, blowing a gale, and disagreeably cold.

September 29.—The thermometer at sunrise 36°, with a bright sun, and appearance of finer weather. The road for several miles was *extremely* rocky, and consequently bad; but, entering after this a sandy country, it became very good, with no other interruption than the sage bushes, which covered the river plain so far as the eye could reach, and, with their uniform tint of dark grey, gave to the country a gloomy and sombre appearance. All the day the course of the river has been between walls of the black volcanic rock, a dark line of the escarpment on the opposite side pointing out its course, and sweeping along in foam at places where the mountains which border the valley present always on the left two ranges, the lower one a spur of the higher: and, on the opposite side, the Salmon river mountains are visible at a great distance. Having made 24 miles, we encamped about five o'clock on Rock creek—a stream having considerable water, a swift current, and wooded with willow.

September 30.—Thermometer at sunrise 28°. In its progress towards the river, this creek soon enters a chasm of the volcanic rock, which in places along the wall presents a columnar appearance; and the road becomes extremely rocky whenever it passes near its banks. It is only about 20 feet wide where the road crosses it, with a deep bed, and steep banks, covered with rocky fragments, with willows and a little grass on its narrow bottom. The soil appears to be full of calcareous matter, with which the rocks are incrusted. The fragments of rock which had been removed by the emigrants, in making a road where we ascended from the bed of this creek, were whitened with lime; and during the afternoon's march, I remarked in the soil a considerable quantity of calcareous concretions. Towards evening the sages became more scarce, and the clear spaces were occupied by tufts of green grass. The river still continued its course through a trough or open cañon; and towards sunset we followed the trail of several wagons which had turned in towards Snake river, and encamped, as they had done, on the top of the escarpment. There was no grass here, the soil among the sage being entirely naked; but there is occasionally a little bottom along the river, which a short ravine of rocks, at rare intervals, leaves accessible; and by one of these we drove our animals down, and found some tolerably good grass bordering the water.

Immediately opposite to us, a subterranean river bursts out directly from the face of the escarpment, and falls in white foam to the river below. The main river is enclosed with mural precipices, which form its characteristic feature along a great portion of its course. A melancholy and strange-looking country —one of fracture, and violence, and fire.

We had brought with us, when we separated from the camp, a large gaunt ox, in appearance very poor; but, being killed to-night, to the great joy of the people, he was found to be remarkably fat. As usual at such occurrences, the evening was devoted to gaiety and feasting; abundant fare now made an epoch among us, and in this laborious life, in such a country as this, our men had but little else to enjoy. The temperature at sunset was 65°, with a clear sky and a very high wind. By the observation of the evening, the encampment was in longitude 114° 25′ 04″, and in latitude 42° 38′ 44″.

October 1.—The morning clear, with wind from the west, and the thermometer at 55°. We descended to the bottom, taking with us the boat, for the purpose of visiting the fall in the opposite cliffs; and while it was being filled with air, we occupied ourselves in measuring the river, which is 1,786 feet in breadth, with banks 200 feet high. We were surprised, on our arrival at the opposite side, to find a beautiful basin of clear water, formed by the falling river, around which the rocks were whitened by some saline incrustation. Here the Indians had constructed wicker dams, although I was informed that the salmon do not ascend the river so far; and its character below would apparently render it impracticable.

The ascent of the steep hill side was rendered a little difficult by a dense growth of shrubs and fields of cane; and there were frequent hidden crevices among the rocks, where the water was heard rushing below; but we succeeded in reaching the main stream, which, issuing from between strata of the trap rock in two principal branches, produced almost immediately a torrent 22 feet wide, and white with foam. It is a picturesque spot of singular beauty; overshaded by bushes, from under which the torrent glances, tumbling into the white basin below, where the clear water contrasted beautifully with the muddy stream of the river. Its outlet was covered with a rank growth of canes, and a variety of unusual plants, and nettles (*urtica canabina*), which, before they were noticed, had set our hands and arms on fire. The temperature of the spring was 58°, while that of the river was 51°. The perpendicular height of the place at which this stream issues is 45 feet above the river, and 152 feet below the summit of the precipice, making nearly 200 feet for the height of the wall. On the hill side here was obtained a specimen, consisting principally of fragments of the shells of small crustacea,

and which was probably formed by deposition from these springs proceeding from some lake or river in the highlands above.

We resumed our journey at noon, the day being hot and bright; and, after a march of 17 miles, encamped at sunset on the river near several lodges of Snake Indians.

Our encampment was about one mile below the *Fishing Falls*, a series of cataracts with very inclined planes, which are probably so named because they form a barrier to the ascent of the salmon; and the great fisheries, from which the inhabitants of this barren region almost entirely derive a subsistence, commence at this place. These appeared to be unusually gay savages, fond of loud laughter; and, in their apparent good nature and merry character, struck me as being entirely different from the Indians we had been accustomed to see. From several who visited our camp in the evening, we purchased, in exchange for goods, dried salmon. At this season they are not very fat, but we were easily pleased. The Indians made us comprehend, that when the salmon came up the river in the spring, they are so abundant that they merely throw in their spears at random, certain of bringing out a fish.

These poor people are but slightly provided with winter clothing: there is but little game to furnish skins for the purpose; and of a little animal which seemed to be the most numerous, it required 20 skins to make a covering to the knees. But they are still a joyous talkative race, who grow fat and become poor with the salmon, which at least never fail them—the dried being used in the absence of the fresh. We are encamped immediately on the river bank, and with the salmon jumping up out of the water, and Indians paddling about in boats made of rushes, or laughing around the fires, the camp to-night has quite a lively appearance.

The river at this place is more open than for some distance above; and, for the time, the black precipices have disappeared, and no calcareous matter is visible in the soil. The thermometer at sunset 74°; clear and calm.

October 2.—The sunrise temperature was 48°; the weather clear and calm. Shortly after leaving the encampment, we crossed a stream of clear water, with a variable breadth of 10 to 25 yards, broken by rapids, and lightly wooded with willow, and having a little grass on its small bottom land. The barrenness of the country is in fine contrast to-day with the mingled beauty and grandeur of the river, which is more open than hitherto, with a constant succession of falls and rapids. Over the edge of the black cliffs, and out from their faces, are falling numberless streams and springs; and all the line of the river is in motion with the play of the water. In about seven miles we reached the most beautiful and picturesque fall I had seen on the river.

On the opposite side, the vertical fall is perhaps 18 feet high; and nearer, the sheet of foaming water is divided and broken into cataracts, where several little islands on the brink and in the river above give it much picturesque beauty, and make it one of those places the traveller turns again and again to fix in his memory. There were several lodges of Indians here, from whom we traded salmon. Below this place the river makes a remarkable bend; and the road, ascending the ridge, gave us a fine view of the river below, intersected at many places by numerous fish-dams. In the north, about 50 miles distant, were some high snowy peaks of the Salmon river mountains; and in the north-east, the last peak of the range was visible, at the distance of perhaps 100 miles or more. The river hills consist of very broken masses of sand, covered everywhere with the same interminable fields of sage, and occasionally the road is very heavy. We now very frequently saw Indians, who were strung along the river at every little rapid where fish are to be caught, and the cry, *haggai*, *haggai* (fish), was constantly heard whenever we passed near their huts, or met them in the road. Very many of them were oddly and partially dressed in overcoat, shirt, waistcoat, or pantaloons, or whatever article of clothing they had been able to procure in trade from the emigrants; for we had now entirely quitted the country where hawks' bells, beads, and vermilion were the current coin, and found that here only useful articles, and chiefly clothing, were in great request. These, however, are eagerly sought after; and for a few trifling pieces of clothing, travellers may procure food sufficient to carry them to the Columbia.

We made a long stretch across the upper plain, and encamped on the bluff, where the grass was very green and good; the soil of the upper plains containing a considerable proportion of calcareous matter. This green freshness of the grass was very remarkable for the season of the year. Again we heard the roar of a fall in the river below, where the water in an unbroken volume goes over a descent of several feet. The night is clear, and the weather continues very warm and pleasant, with a sunset temperature of 70°.

October 3.—The morning was pleasant, with a temperature at sunrise of 42°. The road was broken by ravines among the hills, and in one of these, which made the bed of a dry creek, I found a fragmentary stratum, or brecciated conglomerate, consisting of flinty slate pebbles, with fragments of limestone containing fossil shells.

On the left, the mountains are visible at the distance of 20 or 30 miles, appearing smooth and rather low; but at intervals higher peaks look out from beyond, and indicate that the main ridge, which we are leaving with the course of the river, and which forms the northern boundary of the Great Basin, still maintains its elevation. About two o'clock we arrived at the ford where the road crosses to the right bank of Snake river. An Indian was

hired to conduct us through the ford, which proved impracticable for us, the water sweeping away the howitzer and nearly drowning the mules, which we were obliged to extricate by cutting them out of the harness. The river here is expanded into a little bay, in which there are two islands, across which is the road of the ford; and the emigrants had passed by placing two of their heavy wagons abreast of each other, so as to oppose a considerable mass against the body of water. The Indians informed us that one of the men, in attempting to turn some cattle which had taken a wrong direction, was carried off by the current and drowned. Since their passage, the water had risen considerably; but, fortunately, we had a resource in a boat, which was filled with air and launched; and at seven o'clock we were safely encamped on the opposite bank, the animals swimming across, and the carriage, howitzer, and baggage of the camp, being carried over in the boat. At the place where we crossed, above the islands, the river had narrowed to a breadth of 1,049 feet by measurement, the greater portion of which was from six to eight feet deep. We were obliged to make our camp where we landed, among the Indian lodges, which are semi-circular huts made of willow, thatched over with straw, and open to the sunny south. By observation, the latitude of our encampment on the right bank of the river was 42° 55′ 58″; chronometric longitude 115° 04′ 46″, and the travelled distance from Fort Hall 208 miles.

October 4.—Calm pleasant day, with the thermometer at sunrise at 47°. Leaving the river at a considerable distance to the left, and following up the bed of a rocky creek, with occasional holes of water, in about six miles we ascended, by a long and rather steep hill, to a plain 600 feet above the river, over which we continued to travel during the day, having a broken ridge 2,000 or 3,000 feet high on the right. The plain terminates, where we ascended, in an escarpment of vesicular trap rock, which supplies the fragments of the creek below. The sky clouded over, with a strong wind from the N.W., with a few drops of rain and occasional sunlight, threatening a change.

Artemisia still covers the plain, but *Purshia tridentata* makes its appearance here on the hill sides and on bottoms of the creeks —quite a tree in size, and larger than the artemisia. We crossed several hollows with a little water in them, and improved grass; and, turning off from the road, in the afternoon, in search of water, travelled about three miles up the bed of a willow creek, towards the mountain, and found a good encampment, with wood and grass, and little ponds of water in the bed of the creek; which must be of more importance at other seasons, as we found there several old fixtures for fishing. There were many holes on the creek prairie, which had been made by the diggers in search of roots.

Wind increased to a violent gale from the N.W., with a temperature at sunset of 57°.

October 5.—The morning was calm and clear, and at sunrise the

thermometer was at 32°. The road to-day was occasionally extremely rocky, with hard volcanic fragments, and our travelling very slow. In about nine miles the road brought us to a group of smoking hot springs, with a temperature of 164°. There were a few helianthi in bloom, with some other low plants, and the place was green round about; the ground warm, and the air pleasant, with a summer atmosphere that was very grateful in a day of high and cold searching wind. The rocks were covered with a white and red incrustation; and the water has on the tongue the same unpleasant effect as that of the Basin spring on Bear river. They form several branches, and bubble up, with force enough to raise the small pebbles several inches.

The following is an analysis of the deposit with which the rocks are incrusted:—

Analysis.

Silica	72·55
Carbonate of lime	14·60
Carbonate of magnesia	1·20
Oxide of iron	4·65
Alumina	0·70
Chloride of sodium, &c. Sulphate of soda Sulphate of lime, &c.	1·10
Organic vegetable matter Water and loss	5·20
	100·00

These springs are near the foot of the ridge (a dark and rugged looking mountain), in which some of the nearer rocks have a reddish appearance, and probably consist of a reddish-brown trap, fragments of which were scattered along the road after leaving the spring. The road was now about to cross the point of this mountain, which we judged to be a spur from the Salmon river range. We crossed a small creek, and encamped about sunset on a stream, which is probably Lake river. This is a small stream, some five or six feet broad, with a swift current, timbered principally with willows and some few cotton-woods. Along the banks were canes, rose-bushes, and clematis, with Purshia tridentata and artemisias on the upper bottom. The sombre appearance of the country is somewhat relieved in coming unexpectedly from the dark rocks upon these green and wooded watercourses, sunk in chasms; and in the spring, the contrasted effect must make them beautiful.

The thermometer at sunset 47°, and the night threatening snow.

October 6.—The morning warm, the thermometer 46° at sunrise, and sky entirely clouded. After travelling about three miles over an extremely rocky road, the volcanic fragments began to disappear; and, entering among the hills at the point of the mountain, we found ourselves suddenly in a granite country. Here, the character of the vegetation was very much changed; the artemisia

disappeared almost entirely, showing only at intervals towards the close of the day, and was replaced by Purshia tridentata, with flowering shrubs, and small fields of *dieteria divaricata*, which gave bloom and gaiety to the hills. These were everywhere covered with a fresh and green short grass, like that of the early spring. This is the fall or second growth, the dried grass having been burned off by the Indians; and wherever the fire has passed, the bright-green colour is universal. The soil among the hills is altogether different from that of the river plain, being in many places black, in others sandy and gravelly, but of a firm and good character, appearing to result from the decomposition of the granite rocks, which is proceeding rapidly.

In quitting for a time the artemisia (sage) through which we had been so long voyaging, and the sombre appearance of which is so discouraging, I have to remark, that I have been informed that in Mexico wheat is grown upon the ground which produces this shrub; which, if true, relieves the soil from the character of sterility imputed to it. Be this as it may, there is no dispute about the grass, which is almost universal on the hills and mountains, and always nutritious, even in its dry state. We passed on the way masses of granite on the slope of a spur, which was very much weathered and abraded. This is a white feldspathic granite, with small scales of black mica; smoky quartz and garnets appear to constitute this portion of the mountain.

The road at noon reached a broken ridge, on which were scattered many boulders or blocks of granite; and passing very small streams, where, with a little more than the usual timber, was sometimes gathered a little wilderness of plants, we encamped on a small stream, after a march of 22 miles, in company with a few Indians. Temperature at sunset 51°; and the night was partially clear, with a few stars visible through drifting white clouds. The Indians made an unsuccessful attempt to steal a few horses from us—a thing of course with them, and to prevent which the traveller is on perpetual watch.

October 7.—The day was bright, clear, and pleasant, with a temperature of 45°; and we breakfasted at sunrise, the birds singing in the trees as merrily as if we were in the midst of summer. On the upper edge of the hills on the opposite side of the creek, the black volcanic rock re-appears; and ascending these, the road passed through a basin, around which the hills swept in such a manner as to give it the appearance of an old crater. Here were strata and broken beds of black scoriated rock, and hills composed of the same, on the summit of one of which there was an opening resembling a rent. We travelled to-day through a country resembling that of yesterday, where, although the surface was hilly, the road was good, being firm, and entirely free from rocks and artemisia. To our left, below, was the great sage plain; and on the right were the near mountains, which presented a smoothly broken character,

or rather a surface waved into numberless hills. The road was occasionally enlivened by meeting Indians, and the day was extremely beautiful and pleasant; and we were pleased to be free from the sage, even for a day. When we had travelled about eight miles, we were nearly opposite to the highest portion of the mountains on the left side of the Smoke river valley; and continuing on a few miles beyond, we came suddenly in sight of the broad green line of the valley of the *Rivière Boisée* (wooded river), black near the gorge where it debouches into the plains, with high precipices of basalt, between walls of which it passes, on emerging from the mountains. Following with the eye its upward course, it appears to be shut in among lofty mountains, confining its valley in a very rugged country.

Descending the hills, after travelling a few miles along the high plain, the road brought us down upon the bottoms of the river, which is a beautiful rapid stream, with clear mountain water, and as the name indicates, well wooded with some varieties of timber, among which are handsome cotton-woods. Such a stream had become quite a novelty in this country, and we were delighted this afternoon to make a pleasant camp under fine old trees again. There were several Indian encampments scattered along the river, and a number of their inhabitants in the course of the evening came to the camp on horseback with dried and fresh fish to trade. The evening was clear, and the temperature at sunset 57°.

At the time of the first occupation of this region by parties engaged in the fur-trade, a small party of men under the command of —— Reid, constituting all the garrison of a little fort on this river, were surprised and massacred by the Indians; and to this event the stream owes its occasional name of *Reid's River*.

On the 8th we travelled about 26 miles, the ridge on the right having scattered pines on the upper parts; and continuing the next day our road along the river bottom, after a day's travel of 24 miles, we encamped in the evening on the right bank of the river, a mile above the mouth, and early the next morning arrived at Fort *Boisée*. This is a simple dwelling-house on the right bank of Snake River, about a mile below the mouth of Rivière Boissée; and on our arrival we were received with an agreeable hospitality by Mr. Payette, an officer of the Hudson's Bay Company in charge of the fort, all of whose garrison consisted in a Canadian *engagé*.

Here the road recrosses the river, which is broad and deep; but with our good boat, aided by two canoes, which were found at the place, the camp was very soon transferred to the left bank. Here we found ourselves again surrounded by the sage, *artemisia tridentata*, and the different shrubs which during our voyage had always made their appearance abundantly on saline soils, being here the prevailing and almost the only plants; among them the surface was covered with the usual saline efflorescences, which here

consist almost entirely of carbonate of soda, with a small portion of chloride of sodium. Mr. Payette had made but slight attempts at cultivation, his efforts being limited to raising a few vegetables, in which he succeeded tolerably well; the post being principally supported by salmon. He was very hospitable and kind to us, and we made a sensible impression upon all his comestibles; but our principal inroad was into the dairy, which was abundantly supplied, stock appearing to thrive extremely well; and we had an unusual luxury in a present of fresh butter, which was, however, by no means equal to that of Fort Hall, probably from some accidental cause. During the day we remained here there were considerable numbers of miserable half-naked Indians around the fort, who had arrived from the neighbouring mountains. During the summer the only subsistence of these people is derived from the salmon, of which they are not provident enough to lay up a sufficient store for the winter, during which many of them die from absolute starvation.

Many little accounts and scattered histories, together with an acquaintance which I gradually acquired of their modes of life, had left the aboriginal inhabitants of this vast region pictured in my mind as a race of people whose great and constant occupation was the means of procuring a subsistence; and though want of space, and other reasons, will prevent me from detailing the many incidents which made these things familiar to me, this great feature among the characteristics of the country will gradually be forced upon your mind.

Pointing to a group of Indians who had just arrived from the mountains on the left side of the valley, and who were regarding our usual appliances of civilization with an air of bewildered curiosity, Mr. Payette informed me that every year since his arrival at this post he had unsuccessfully endeavoured to induce these people to lay up a store of salmon for their winter provision. While the summer weather and the salmon lasted they lived contentedly and happily, scattered along the different streams where the fish were to be found; and as soon as the winter-snows began to fall, little smokes would be seen rising among the mountains, where they would be found in miserable groups, starving out the winter, and sometimes, according to the general belief, reduced to the horror of cannibalism—the strong, of course, preying on the weak. Certain it is, they are driven to any extremity for food, and eat every insect and every creeping thing, however loathsome and repulsive; snails, lizards, ants, all are devoured with the readiness and greediness of mere animals.

In common with all the other Indians we had encountered since reaching the Pacific waters, these people use the Shoshonee or Snake language, which you will have occasion to remark, in the course of the Narrative, is the universal language over a very extensive region.

On the evening of the 10th, I obtained, with the usual observations, a very excellent emersion of the first satellite, agreeing very nearly with the chronometer. From these observations, the longitude of the fort is 116° 47′ 00″, latitude 43° 49′ 22″, and elevation above the sea 2,100 feet.

Sitting by the fire on the river-bank, and waiting for the immersion of the satellite, which did not take place until after midnight, we heard the monotonous song of the Indians, with which they accompany a certain game of which they are very fond. Of the poetry we could not judge, but the music was miserable.

October 11.—The morning was clear, with a light breeze from the east, and a temperature at sunrise of 33°. A part of a bullock purchased at the fort, together with the boat to assist him in crossing, was left here for Mr. Fitzpatrick, and at 11 o'clock we resumed our journey; and directly leaving the river, and crossing the artemisia plain, in several ascents we reached the foot of a ridge, where the road entered a dry sandy hollow, up which it continued to the head, and crossing a dividing ridge, entered a similar one. We met here two poor emigrants (Irishmen), who had lost their horses two days since—probably stolen by the Indians, and were returning to the fort, in hopes to hear something of them there; they had recently had nothing to eat, and I halted to unpack an animal, and gave them meat for their dinner. In this hollow the artemisia is partially displaced on the hill-sides by grass, and descending it — miles, about sunset we reached the *Rivière aux Malheurs* (the unfortunate or unlucky river), a considerable stream, with an average breadth of 50 feet, and, at this time, 18 inches' depth of water.

The bottom-lands were generally a mile and a half broad, covered principally with long dry grass, and we had difficulty to find sufficient good grass for the camp. With the exception of a bad place of a few hundred yards long, which occurred in rounding a point of hill to reach the ford of the river, the road during the day had been very good.

October 12.—The morning was clear and calm, and the thermometer at sunrise 23°. My attention was attracted by a smoke on the right side of the river, a little below the ford, where I found on the low bank, near the water, a considerable number of hot springs, in which the temperature of the water was 193°. The ground, which was too hot for the naked foot, was covered above and below the springs with an incrustation of common salt, very white and good, and fine-grained.

Leading for five miles up a broad dry branch of the Malheurs river, the road entered a sandy hollow, where the surface was rendered firm by the admixture of other rock; being good and level until arriving near the head of the ravine, where it became a little rocky, and we met with a number of sharp ascents over

an undulating surface. Crossing here a dividing ridge, it became an excellent road of gradual descent down a very marked hollow, in which, after 10 miles, willows began to appear in the dry bed of a head of the *Rivière aux Bouleaux* (Birch river); and, descending seven miles, we found, at its junction with another branch, a little water, not very good or abundant, but sufficient in case of necessity for a camp. Crossing Birch river, we continued for about four miles across a point of hill, the country on the left being entirely mountainous, with no other level spot to be seen, whence we descended to Snake river, here a fine-looking stream, with a large body of water and a smooth current; although we hear the roar, and see below us the commencement of rapids where it enters among the hills. It forms here a deep bay, with a low sand island in the midst, and its course among the mountains is agreeably exchanged for the black volcanic rock. The weather during the day had been very bright, and extremely hot; but, as usual, so soon as the sun went down, it was necessary to put on overcoats.

I obtained this evening an observation of an emersion of the first satellite, and our observations of the evening place this encampment in latitude 44° 17′ 36″, and longitude 116° 56′ 45″, which is the mean of the results from the satellite and chronometer. The elevation above the sea 1,880 feet. At this encampment the grass is scanty and poor.

October 13.—The morning was bright, with the temperature at sunrise 28°. The horses had strayed off during the night, probably in search of grass; and, after a considerable delay, we had succeeded in finding all but two, when, about 9 o'clock, we heard the sound of an Indian song and drum approaching; and, shortly after, three Cayuse Indians appeared in sight, bringing with them the two animals. They belonged to a party which had been on a buffalo hunt in the neighbourhood of the Rocky mountains, and were hurrying home in advance. We presented them with some tobacco, and other things, with which they appeared well satisfied, and, moderating their pace, travelled in company with us.

We were now about to leave the valley of the great southern branch of the Columbia river, to which the absence of timber, and the scarcity of water, give the appearance of a desert, to enter a mountainous region where the soil is good, and in which the face of the country is covered with nutritious grasses and dense forest—land embracing many varieties of trees peculiar to the country, and on which the timber exhibits a luxuriance of growth unknown to the eastern part of the continent and to Europe. This mountainous region connects itself in the southward and westward with the elevated country belonging to the Cascade or California range; and, as will be remarked in the course of the narrative, forms the eastern limit of the fertile and timbered lands along the

desert and mountainous region included within the Great Basin—a term which I apply to the intermediate region between the Rocky mountains and the next range, containing many lakes, with their own system of rivers and creeks (of which the Great Salt is the principal), and which have no connection with the ocean, or the great rivers which flow into it. This Great Basin is yet to be adequately explored. And here, on quitting the banks of a sterile river, to enter on arable mountains, the remark may be made, that, on this western slope of our continent, the usual order or distribution of good and bad soil is often reversed; the river and creek bottoms being often sterile, and darkened with the gloomy and barren artemisia; while the mountain is often fertile, and covered with rich grass, pleasant to the eye, and good for flocks and herds.

Leaving entirely the Snake river, which is said henceforth to pursue its course through cañons, amidst rocky and impracticable mountains, where there is no possibility of travelling with animals, we ascended a long and somewhat steep hill; and, crossing the dividing ridge, came down into the valley of *Burnt* river, which here looks like a hole among the hills. The average breadth of the stream here is 30 feet; it is well fringed with the usual small timber, and the soil in the bottoms is good, with better grass than we had lately been accustomed to see.

We now travelled through a very mountainous country; the stream running rather in a ravine than a valley, and the road is decidedly bad and dangerous for single wagons, frequently crossing the stream where the water is sometimes deep; and all the day the animals were fatigued in climbing up and descending a succession of steep ascents, to avoid the precipitous hill sides; and the common trail, which leads along the mountain side at places where the river strikes the base, is sometimes bad even for a horseman. The mountains along this day's journey were composed, near the river, of a slaty calcareous rock in a metamorphic condition. It appears originally to have been a slaty sedimentary limestone; but its present condition indicates 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 burned 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 20 miles.

October 14.—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 15.—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 ground 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 anolcime, 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. You will remark that 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 grey 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, and 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 3,100 feet.

October 16.—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 13 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 towards evening.

October 17.—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 neighbouring 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 blats, as on the river bottoms; the vegetation being such as is usually found in good ground. The following analytical result shows the precise quali-

ties 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 colour, 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 200 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 20 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 (33 in 100 parts).

The old grass had been lately burned 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 2,940 feet above the sea.

October 18.—It began to rain an hour before sunrise, and continued until 10 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, which they ascended 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, issues 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 north-west 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° 28′ 26″, latitude 45° 26′ 47″; and the elevation was 2,600 feet above the sea.

October 19.—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 evidence of being much frequented by the Indians, and in which the trees were sometimes apparently 200 feet high, and 3 to 7 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 2,700 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 piney 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 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° 28′ 34″, latitude 45° 38′ 07″, and we had ascended to an elevation of 3,830 feet. It appeared to have snowed yesterday on the mountains, their summits showing very white to-day.

October 20.—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 60 to nearly 200 feet in height; the usual circumference being 10 to 12 feet, and in the pines sometimes 21 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 4,760 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 10 miles. Our elevation here was 5,000 feet.

October 21.—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, which could easily be removed, and a very excellent road may be had through this pass, with no other than very moderate ascents or declivities. A laborious day, which had advanced us only six miles on our road, brought us in the afternoon to an opening in the forest, in which there was a fine mountain meadow, with good grass, and a large clear-water stream—one of the head branches of the *Umatilah* river. During this day's journey, the barometer was broken; and the elevations above the sea, hereafter given, depend upon the temperature of boiling water. Some of the white spruces which I measured to-day were 12 feet in circumference, and one of the larches 10; but 8 feet was the average circumference of those measured along the road. I held in my hand a tape line as I walked along, in order to form some correct idea of the size of the timber. Their height appeared to be from 100 to 180, and perhaps 200 feet, and the trunks of the larches were sometimes 100 feet without a limb; but the white spruces were generally covered with branches nearly to the root. All these trees have their branches, particularly the lower ones, declining.

October 22.—The white frost this morning was like snow on the ground; the ice was a quarter of an inch thick on the creek, and the thermometer at sunrise was at 20°. But, in a few hours, the day became warm and pleasant, and our road over the mountains was delightful and full of enjoyment.

The trail passed sometimes through very thick young timber in which there was much cutting to be done; but after travelling a few miles, the mountains became more bald, and we reached a point from which there was a very extensive view to the north-west. We were here on the western verge of the Blue mountains, long

spurs of which, very precipitous on either side, extended down into the valley, the waters of the mountain roaring between them. On our right was a mountain plateau, covered with a dense forest; and to the westward, immediately below us, was the great *Nez Percé* (pierced nosed) prairie, in which dark lines of timber indicated the course of many affluents to a considerable stream that was seen pursuing its way across the plain towards what appeared to be the Columbia river. This I knew to be the Walah-walah river, and occasional spots along its banks, which resembled clearings, were supposed to be the mission or Indian settlements; but the weather was smoky and unfavourable to far views with the glass. The rock displayed here in the escarpments is a compact amorphous trap, which appears to constitute the mass of the Blue mountains in this latitude; and all the region of country through which we have travelled since leaving the Snake river has been the seat of violent and extensive igneous action. Along the Burnt river valley, the strata are evidently sedimentary rocks, altered by the intrusion of volcanic products, which in some instances have penetrated and essentially changed their original condition. Along our line of route from this point to the California mountains, there seems to be but little essential change. All our specimens of sedimentary rocks show them to be much altered, and volcanic productions appear to prevail throughout the whole intervening distance.

The road now led along the mountain side, around heads of the precipitous ravines; and, keeping men ahead to clear a road, we passed alternately through bodies of timber and small open prairies, and encamped in a large meadow, in view of the great prairie below.

At sunset the thermometer was at 40°, and the night was very clear and bright. Water was only to be had here by descending a bad ravine, into which we drove our animals, and had much trouble with them, in a very close growth of small pines. Mr. Preuss had walked ahead, and did not get into camp this evening. The trees here maintained their size, and one of the black spruces measured 15 feet in circumference. In the neighbourhood of the camp, pines have re-appeared here among the timber.

October 23.—The morning was very clear: there had been a heavy white frost during the night, and at sunrise the thermometer was at 31°.

After cutting through two thick bodies of timber, in which I noticed some small trees of *hemlock* spruce (*perusse*), the forest became more open, and we had no longer any trouble to clear a way. The pines here were 11 or 12 feet in circumference, and about 110 feet high, and appeared to love the open grounds. The trail now led along one of the long spurs of the mountain, descending gradually towards the plain; and after a few miles' travelling, we emerged finally from the forest, in full view of the plain below,

and saw the snowy mass of Mount Hood, standing high out above the surrounding country, at the distance of 180 miles. The road along the ridge was excellent, and the grass very green and good; the old grass having been burned off early in the autumn. About 4 o'clock in the afternoon we reached a little bottom on the Walahwalah river, where we found Mr. Preuss, who yesterday had reached this place, and found himself too far in advance of the camp to return. The stream here has just issued from the narrow ravines, which are walled with precipices, in which the rock has a brown and more burnt appearance than above.

At sunset the thermometer was at 48°; and our position was in longitude 118° 00′ 39″, and in latitude 45° 53′ 35″.

The morning was clear, with a temperature at sunrise of 24°. Crossing the river, we travelled over a hilly country with good bunch grass; the river bottom, which generally contains the best soil in other countries, being here a sterile level of rocks and pebbles. We had found the soil in the Blue mountains to be of excellent quality, and it appeared also to be good here among the lower hills. Reaching a little eminence, over which the trail passed, we had an extensive view along the course of the river, which was divided and spread over its bottom in a net-work of water, receiving several other tributaries from the mountains. There was a band of several hundred horses grazing on the hills about two miles ahead; and as we advanced on the road we met other bands, which Indians were driving out to pasture also on the hills. True to its general character, the reverse of other countries, the hills and mountains here were rich in grass, the bottoms barren and sterile.

In six miles we crossed a principal fork, below which the scattered water of the river was gathered into one channel; and, passing on the way several unfinished houses, and same cleared patches, where corn and potatoes were cultivated, we reached, in about eight miles farther, the missionary establishment of Dr. Whitman, which consisted, at this time, of one *adobe* house—*i. e.*, built of unburnt bricks, as in Mexico.

I found Dr. Whitman absent on a visit to the *Dalles* of the Columbia; but had the pleasure to see a fine-looking large family of emigrants, men, women, and children, in robust health, all indemnifying themselves for previous scanty fare in a hearty consumption of potatoes, which are produced here of a remarkably good quality. We were disappointed in our expectation of obtaining corn meal or flour at this station, the mill belonging to the mission having been lately burned down; but an abundant supply of excellent potatoes banished regrets, and furnished a grateful substitute for bread. A small town of Nez Percé Indians gave an inhabited and even a populous appearance to the station; and after remaining about an hour, we continued our route, and

encamped on the river about four miles below, passing on the way an emigrant encampment.

Temperature at sunset, 49°.

October 25.—The weather was pleasant, with a sunrise temperature of 36°. Our road to-day had in it nothing of interest; and the country offered to the eye only a sandy, undulating plain, through which a scantily timbered river takes its course. We halted about three miles above the mouth, on account of grass; and the next morning arrived at the Nez Percé fort, one of the trading establishments of the Hudson's Bay Company, a few hundred yards above the junction of the Walahwalah with the Columbia river. Here we had the first view of this river, and found it about 1,200 yards wide, and presenting the appearance of a fine navigable stream. We made our camp in a little grove of willows on the Walahwalah, which are the only trees to be seen in the neighbourhood; but were obliged to send the animals back to the encampment we had left, as there was scarcely a blade of grass to be found. The post is on the bank of the Columbia, on a plain of bare sands, from which the air was literally filled with clouds of dust and sand, during one of the few days we remained here; this place being one of the several points on the river which are distinguished for prevailing high winds, which come from the sea. The appearance of the post and country was without interest, except that we here saw, for the first time, the great river on which the course of events for the last half century has been directing attention and conferring historical fame. The river is, indeed, a noble object, and has here attained its full magnitude. About nine miles above, and in sight from the heights about the post, is the junction of the two great forks which constitute the main stream—that on which we had been travelling from Fort Hall, and known by the names of Lewis's fork, Shoshonee, and Snake river; and the North fork, which has retained the name of Columbia, as being the main stream.

We did not go up to the junction, being pressed for time; but the union of two large streams, coming one from the south-east, and the other from the north-east, and meeting in what may be treated as the geographical centre of the Oregon valley, thence doubling the volume of water to the ocean, while opening two great lines of communication with the interior continent, constitutes a feature in the map of the country which cannot be overlooked; and it was probably in reference to this junction of waters, and these lines of communication, that this post was established. They are important lines, and from the structure of the country, must for ever remain so—one of them leading to the South Pass, and to the valley of the Mississippi; the other to the pass at the head of the Athabasca river, and to the countries drained by the waters of the Hudson Bay. The British fur companies now use

both lines; the Americans, in their emigration to Oregon, have begun to follow the one which leads towards the United States. Bateaus from tide water ascend to the junction, and thence high up the North fork, or Columbia. Land conveyance only is used upon the line of Lewis's fork. To the emigrants to Oregon, the Nez Percé is a point of interest, as being, to those who choose it, the termination of their overland journey. The broad expanse of the river here invites them to embark on its bosom; and the lofty trees of the forest furnish the means of doing so.

From the South Pass to this place is about 1,000 miles; and as it is about the same distance from that pass to the Missouri river at the mouth of the Kansas, it may be assumed that 2,000 miles is the *necessary* land travel in crossing from the United States to the Pacific Ocean on this line. From the mouth of the Great Platte it would be about 100 miles less.

Mr. McKinley, the commander of the post, received us with great civility; and both to myself, and the heads of the emigrants who were there at the time, extended the rights of hospitality in a comfortable dinner to which he invited us.

By a meridonial altitude of the sun, the only observation that the weather permitted us to obtain, the mouth of the Walahwalah river is in latitude 46° 03′ 46″; and, by the road we had travelled, 612 miles from Fort Hall. At the time of our arrival, a considerable body of the emigrants under the direction of Mr. Applegate, a man of considerable resolution and energy, had nearly completed the building of a number of Mackinaw boats, in which they proposed to continue their further voyage down the Columbia. I had seen, in descending the Walahwalah river, a fine drove of several hundred cattle, which they had exchanged for Californian cattle, to be received at Vancouver, and which are considered a very inferior breed. The other portion of the emigration had preferred to complete their journey by land along the banks of the Columbia, taking their stock and wagons with them.

Having reinforced our animals with eight fresh horses, hired from the post, and increased our stock of provisions with dried salmon, potatoes, and a little beef, we resumed our journey down the left bank of the Columbia, being guided on our road by an intelligent Indian boy, whom I had engaged to accompany us as far as the Dalles.

From an elevated point over which the road led, we obtained another far view of Mount Hood, 150 miles distant. We obtained on the river bank an observation of the sun at noon, which gave for the latitude 45° 58′ 08″. The country to-day was very unprepossessing, and our road bad; and as we toiled slowly along through deep loose sands, and over fragments of black volcanic rock, our laborious travelling was strongly contrasted with the rapid progress of Mr. Applegate's fleet of boats, which suddenly came gliding swiftly down the broad river, which here chanced to

be tranquil and smooth. At evening we encamped on the river bank, where there was very little grass, and less timber. We frequently met Indians on the road, and they were collected at every favourable spot along the river.

October 29.—The road continued along the river, and in the course of the day Mount St. Helens, another snowy peak of the Cascade range, was visible. We crossed the Umàtilah river at a fall near its mouth. This stream is of the same class as the Walahwalah river, with a bed of volcanic rock, in places split into fissures. Our encampment was similar to that of yesterday; there was very little grass, and no wood. The Indians brought us some pieces for sale, which were purchased to make our fires.

October 31.—By observation, our camp is in latitude 45° 50′ 05″, and longitude 119° 22′ 18″. The night has been cold, and we have white frost this morning, with a temperature at daylight of 25°, and at sunrise of 24°. The early morning was very clear and the stars bright; but, as usual since we are on the Columbia clouds formed immediately with the rising sun. The day continued fine, the east being covered with scattered clouds, but the west remaining clear; showing the remarkable cone-like peak of Mount Hood brightly drawn against the sky. This was in view all day in the south-west, but no other peaks of the range were visible. Our road was a bad one, of very loose deep sand. We met on the way a party of Indians unusually well dressed, wearing clothes of civilized texture and form. They appeared intelligent, and, in our slight intercourse, impressed me with the belief that they possessed some aptitude for acquiring languages.

We continued to travel along the river, the stream being interspersed with many sand bars (it being the season of low water) and with many islands, and an apparently good navigation. Small willows were the only wood; rock and sand the prominent geological feature. The rock of this section is a very compact and tough basalt, occurring in strata which have the appearance of being broken into fragments, assuming the form of columnar hills, and appearing always in escarpments, with the broken fragments strewed at the base and over the adjoining country.

We made a late encampment on the river, and used to-night *purshia tridentata* for fire-wood. Among the rocks which formed the bank, was very good green grass. Latitude 45° 44′ 23″, longitude 119° 45′ 09″.

November 1.—Mount Hood is glowing in the sunlight this morning, and the air is pleasant, with a temperature of 38°. We continued down the river, and, passing through a pretty green valley, bounded by high precipitous rocks, encamped at the lower end.

On the right shore, the banks of the Columbia are very high and steep; the river is 1,690 feet broad, and dark bluffs of rock give it a picturesque appearance.

November 2.—The river here entered among bluffs, leaving no longer room for a road; and we accordingly left it, and took a more inland way among the river hills; on which we had no sooner entered than we found a great improvement in the country. The sand had disappeared, and the soil was good, and covered with excellent grass, although the surface was broken into high hills, with uncommonly deep valleys. At noon we crossed John Day's river, a clear and beautiful stream, with a swift current and a bed of rolled stones. It is sunk in a deep valley, which is characteristic of all the streams in this region; and the hill we descended to reach it well deserves the name of mountain. Some of the emigrants had encamped on the river, and others at the summit of the farther hill, the ascent of which had probably cost their wagons a day's labour; and others again had halted for the night a few miles beyond, where they had slept without water. We also encamped in a grassy hollow without water; but as we had been forewarned of this privation by the guide, the animals had all been watered at the river, and we had brought with us a sufficient quantity for the night.

November 3.—After two hours' ride through a fertile, hilly country, covered as all the upland here appears to be with good green grass, we descended again into the river bottom, along which we resumed our sterile road, and in about four miles reached the ford of the Fall river (*Rivière aux Chutes*), a considerable tributary to the Columbia. We had heard, on reaching the Nez Percé fort, a repetition of the account in regard to the unsettled character of the Columbia Indians at the present time; and to our little party they had at various points manifested a not very friendly disposition, in several attempts to steal our horses. At this place I expected to find a badly disposed band, who had plundered a party of 14 emigrant men a few days before, and taken away their horses; and accordingly we made the necessary preparations for our security, but happily met with no difficulty.

The river was high, divided into several arms, with a rocky island at its outlet into the Columbia, which at this place it rivalled in size, and apparently deserved its highly characteristic name, which is received from one of its many falls some 40 miles up the river. It entered the Columbia with a roar of falls and rapids, and is probably a favourite fishing station among the Indians, with whom both banks of the river were populous; but they scarcely paid any attention to us. The ford was very difficult at this time, and, had they entertained any bad intentions, they were offered a good opportunity to carry them out as I drove directly into the river, and during the crossing the howitzer was occasionally several feet under water, and a number of the men appeared to be more often below than above. Our guide was well acquainted with the ford, and we succeeded in getting everything safe over to the left bank. We delayed here only a short

time to put the gun in order, and, ascending a long mountain hill, left both rivers, and resumed our route again among the interior hills.

The roar of the *Falls of the Columbia* is heard from the heights, where we halted a few moments to enjoy a fine view of the river below. In the season of high water it would be a very interesting object to visit, in order to witness what is related of the annual submerging of the fall under the waters which back up from the basin below, constituting a great natural lock at this place. But time had become an object of serious consideration; and the Falls, in their present state, had been seen and described by many.

After a day's journey of 17 miles, we encamped among the hills on a little clear stream, where, as usual, the Indians immediately gathered round us. Among them was a very fine old man, almost blind from age, with long and very white hair. I happened of my own accord to give this old man a present of tobacco, and was struck with the impression which my unpropitiated notice made on the Indians, who appeared in a remarkable manner acquainted with the real value of goods, and to understand the equivalents of trade. At evening, one of them spoke a few words to his people, and, telling me that we need entertain no uneasiness in regard to our animals, as none of them would be disturbed, they went all quietly away. In the morning, when they again came to the camp, I expressed to them the gratification we felt at their reasonable conduct, making them a present of some large knives and a few smaller articles.

November 4.—The road continued among the hills, and, reaching an eminence, we saw before us, watered by a clear stream, a tolerably large valley, through which the trail passed.

In comparison with the Indians of the Rocky Mountains and the great eastern plain, these are disagreeably dirty in their habits. Their huts were crowded with half-naked women and children, and the atmosphere within anything but pleasant to persons who had just been riding in the fresh morning air. We were somewhat amused with the scanty dress of one woman, who, in common with the others, rushed out of the huts on our arrival, and who, in default of other covering, used a child for a fig-leaf.

The road in about half an hour passed near an elevated point, from which we overlooked the valley of the Columbia for many miles, and saw in the distance several houses surrounded by fields, which a chief, who had accompanied us from the village, pointed out to us as the Methodist missionary station.

In a few miles we descended to the river, which we reached at one of its remarkably interesting features, known as the *Dalles of the Columbia*. The whole volume of the river at this place passed between the walls of a chasm, which has the appearance of having been rent through the basaltic strata which form the valley rock

of the region. At the narrowest place we found the breadth, by measurement, 58 yards, and the average height of the walls above the water 25 feet; forming a trough between the rocks—whence the name, probably applied by a Canadian voyageur. The mass of water, in the present low state of the river, passed swiftly between, deep and black, and curled into many small whirlpools and counter currents, but unbroken by foam, and so still that scarcely the sound of a ripple was heard. The rock, for a considerable distance from the river, was worn over a large portion of its surface into circular holes and well-like cavities, by the abrasion of the river, which, at the season of high waters, is spread out over the adjoining bottoms.

In the recent passage through this chasm, an unfortunate event had occurred to Mr. Applegate's party, in the loss of one of their boats, which had been carried under water in the midst of the *Dalles*, and two of Mr. Applegate's children and one man drowned. This misfortune was attributed only to want of skill in the steersman, as at this season there is no impediment to navigation, although the place is entirely impassable at high water, when boats pass safely over the great falls above, in the submerged state in which they then find themselves.

The basalt here is precisely the same as that which constitutes the rock of the valley higher up the Columbia, being very compact, with a few round cavities.

We passed rapidly three or four miles down the level valley, and encamped near the mission. The character of the forest growth here changed, and we found ourselves, with pleasure, again among oaks and other forest trees of the east, to which we had long been strangers; and the hospitable and kind reception with which we were welcomed among our country people at the mission aided the momentary illusion of home.

Two good-looking wooden dwelling-houses, and a large schoolhouse, with stables, barn, and garden, and large cleared fields between the houses and the river bank, on which were scattered the wooden huts of an Indian village, gave to the valley the cheerful and busy air of civilization, and had in our eyes an appearance of abundant and enviable comfort.

Our land journey found here its western termination. The delay involved in getting our camp to the right bank of the Columbia, and in opening a road through the continuous forest to Vancouver, rendered a journey along the river impracticable; and on this side the usual road across the mountain required strong and fresh animals, there being an interval of three days in which they could obtain no food. I therefore wrote immediately to Mr. Fitzpatrick, directing him to abandon the carts at the Walahwalah missionary station, and, as soon as the necessary pack saddles could be made, which his party required, meet me at the

Dalles, from which point I proposed to commence our homeward journey. The day after our arrival being Sunday, no business could be done at the mission; but on Monday Mr. Perkins assisted me in procuring from the Indians a large canoe, in which I designed to complete our journey to Vancouver, where I expected to obtain the necessary supply of provisions and stores for our winter journey. Three Indians, from the family to whom the canoe belonged, were engaged to assist in working her during the voyage, and, with them, our water-party consisted of Mr. Preuss and myself, with Bernier and Jacob Dodson. In charge of the party which was to remain at the Dalles I left Carson, with instructions to occupy the people in making pack-saddles and refitting their equipage. The village from which we were to take the canoe was on the right bank of the river, about 10 miles below, at the mouth of the Tinanens creek; and while Mr. Preuss proceeded down the river with the instruments, in a little canoe paddled by two Indians, Mr. Perkins accompanied me with the remainder of the party by land. The last of the emigrants had just left the Dalles at the time of our arrival, travelling some by water and others by land, making ark-like rafts, on which they had embarked their families and household, with their large wagons and other furniture, while their stock were driven along the shore.

For about five miles below the Dalles the river is narrow, and probably very deep; but during this distance it is somewhat open, with grassy bottoms on the left. Entering, then, among the lower mountains of the Cascade range, it assumes a general character, and high and steep rocky hills shut it in on either side, rising abruptly in places to the height of 1,500 feet above the water, and gradually acquiring a more mountainous character as the river approaches the Cascades.

After an hour's travel, when the sun was nearly down, we searched along the shore for a pleasant place, and halted to prepare supper. We had been well supplied by our friends at the mission with delicious salted salmon, which had been taken at the fattest season; also with potatoes, bread, coffee, and sugar. We were delighted at a change in our mode of travelling and living. The canoe sailed smoothly down the river: at night we encamped upon the shore, and a plentiful supply of comfortable provisions supplied the first of wants. We enjoyed the contrast which it presented to our late toilsome marchings, our night watchings, and our frequent privation of food. We were a motley group, but all happy: three unknown Indians; Jacob, a coloured man; Mr. Preuss, a German; Bernier, creole French; and myself.

Being now upon the ground explored by the South Sea expedition under Captain Wilkes, and having accomplished the object of uniting my survey with his, and thus presenting a connected exploration from the Mississippi to the Pacific, and the winter being

at hand, I deemed it necessary to economise time by voyaging in the night, as is customary here, to avoid the high winds, which rise with the morning, and decline with the day.

Accordingly, after an hour's halt, we again embarked, and resumed our pleasant voyage down the river, The wind rose to a gale after several hours; but the moon was very bright, and the wind was fair, and the canoe glanced rapidly down the stream, the waves breaking into foam alongside; and our night voyage, as the wind bore us rapidly along between the dark mountains, was wild and interesting. About midnight we put to the shore on a rocky beach, behind which was a dark-looking pine forest. We built up large fires among the rocks, which were in large masses round about; and, arranging our blankets on the most sheltered places we could find, passed a delightful night.

After an early breakfast, at daylight we resumed our journey, the weather being clear and beautiful, and the river smooth and still. On either side the mountains are all pine-timbered, rocky, and high. We were now approaching one of the marked features of the lower Columbia, where the river forms a great *cascade*, with a series of rapids, in breaking through the range of mountains to which the lofty peaks of Mount Hood and St. Helens belong, and which rise as great pillars of snow on either side of the passage. The main branch of the *Sacramento* river, and the *Tlamath*, issue in cascades from this range; and the Columbia, breaking through it in a succession of cascades, gives the idea of cascades to the whole range; and hence the name of the CASCADE RANGE, which it bears, and distinguishes it from the Coast Range lower down. In making a short turn to the south, the river forms the cascades in breaking over a point of agglomerated masses of rock, leaving a handsome bay to the right, with several rocky pine-covered islands, and the mountains sweep at a distance around a cove where several small streams enter the bay. In less than an hour we halted on the left bank, about five minutes' walk above the cascades, where there were several Indian huts, and where our guides signified it was customary to hire Indians to assist in making the *portage*. When travelling with a boat as light as a canoe, which may easily be carried on the shoulders of the Indians, this is much the better side of the river for the portage, as the ground here is very good and level, being a handsome bottom, which I remarked was covered (*as was now always the case along the river*) with a growth of green and fresh-looking grass. It was long before we could come to an understanding with the Indians; but at length, when they had first received the price of their assistance in goods, they went vigorously to work; and, in a shorter time than had been occupied in making our arrangements, the canoe, instruments, and baggage, were carried through (a distance of about half a mile) to the bank below the main cascade, where we again embarked, the water being white with foam among

ugly rocks, and boiling into a thousand whirlpools. The boat passed with great rapidity, crossing and recrossing in the eddies of the current. After passing through about two miles of broken water, we ran some wild looking rapids, which are called the Lower Rapids, being the last on the river, which below is tranquil and smooth—a broad magnificent stream. On a low broad point on the right bank of the river, at the lower end of these rapids, were pitched many tents of the emigrants, who were waiting here for their friends from above, or for boats and provisions which were expected from Vancouver. In our passage down the rapids, I had noticed their camps along the shore, or transporting their goods across the portage. This portage makes a head of navigation, ascending the river. It is about two miles in length; and above, to the Dalles, is 45 miles of smooth and good navigation.

We glided on without further interruption between very rocky and high steep mountains, which sweep along the river valley at a little distance, covered with forests of pine, and showing occasionally lofty escarpments of red rock. Nearer, the shore is bordered by steep escarped hills and huge vertical rocks, from which the waters of the mountain reach the river in a variety of beautiful falls, sometimes several hundred feet in height. Occasionally along the river occurred pretty bottoms, covered with the greenest verdure of the spring. To a professional farmer, however, it does not offer many places of sufficient extent to be valuable for agriculture; and after passing a few miles below the Dalles, I had scarcely seen a place on the south shore where wagons could get to the river. The beauty of the scenery was heightened by the continuance of very delightful weather, resembling the Indian summer of the Atlantic. A few miles below the cascades, we passed a singular isolated hill; and in the course of the next six miles occurred five very pretty falls from the heights on the left bank, one of them being of a very picturesque character; and towards sunset we reached a remarkable point of rocks, distinguished, on account of prevailing high winds, and the delay it frequently occasions to the canoe navigation, by the name of *Cape Horn.* It borders the river in a high wall of rock, which comes boldly down into deep water; and in violent gales down the river, and from the opposite shore, which is the prevailing direction of strong winds, the water is dashed against it with considerable violence. It appears to form a serious obstacle to canoe travelling; and I was informed by Mr. Perkins, that in a voyage up the river he had been detained two weeks at this place, and was finally obliged to return to Vancouver.

The winds of this region deserve a particular study. They blow in currents, which show them to be governed by fixed laws; and it is a problem how far they may come from the mountains, or from the ocean through the breaks in the mountains which let out the river.

The hills here had lost something of their rocky appearance, and had already begun to decline. As the sun went down, we searched along the river for an inviting spot; and, finding a clean, rocky beach, where some large dry trees were lying on the ground, we ran our boat to the shore; and, after another comfortable supper, ploughed our way along the river in darkness. Heavy clouds covered the sky this evening, and the wind began to sweep in gusts among the trees, as if bad weather were coming. As we advanced, the hills on both sides grew constantly lower; on the right, retreating from the shore, and forming a somewhat extensive bottom of intermingled prairie and wooded land. In the course of a few hours, and opposite to a small stream coming in from the north, called the *Tea Prairie* river, the highlands on the left declined to the plains, and three or four miles below disappeared entirely on both sides, and the river entered the low country. The river had gradually expanded; and when we emerged from the highlands, the opposite shores were so distant as to appear indistinct in the uncertainty of the light. About 10 o'clock our pilots halted, apparently to confer about the course; and, after a little hesitation, pulled directly across an open expansion of the river, where the waves were somewhat rough for a canoe, the wind blowing very fresh. Much to our surprise, a few minutes afterwards we ran aground. Backing off our boat, we made repeated trials at various places to cross what appeared to be a point of shifting sand-bars, where we had attempted to shorten the way by a cut-off. Finally, one of our Indians got into the water, and waded about until he found a channel sufficiently deep, through which we wound along after him, and in a few minutes again entered the deep water below. As we paddled rapidly down the river, we heard the noise of a saw-mill at work on the right bank; and, letting our boat float quietly down, we listened with pleasure to the unusual sounds; and before midnight encamped on the bank of the river, about a mile above Fort Vancouver. Our fine dry weather had given place to a dark, cloudy night. At midnight it began to rain; and we found ourselves suddenly in the gloomy and humid season, which, in the narrow region lying between the Pacific and the Cascade mountains, and for a considerable distance along the coast, supplies the place of winter.

In the morning, the first object that attracted my attention was the barque Columbia, lying at anchor near the landing. She was about to start on her voyage to England, and was now ready for sea; being detained only in waiting the arrival of the express bateaus, which descend the Columbia and its north fork with the overland mail from Canada and Hudson's Bay, which had been delayed beyond their usual time. I immediately waited upon Dr. McLaughlin, the executive officer of the Hudson's Bay Company, in the territory west of the Rocky Mountains, who received me with the courtesy and hospitality for which he has been eminently dis-

tinguished, and which makes a forcible and delightful impression on a traveller from the long wilderness from which we had issued. I was immediately supplied by him with the necessary stores and provisions to refit and support my party in our contemplated winter journey to the States; and also with a Mackinaw boat and canoes, manned with Canadian and Iroquois voyageurs and Indians, for their transportation to the Dalles of the Columbia. In addition to this efficient kindness in furnishing me with these necessary supplies, I received from him a warm and gratifying sympathy in the suffering which his great experience led him to anticipate for us in our homeward journey, and a letter of recommendation and credit for any officers of the Hudson's Bay Company into whose posts we might be driven by unexpected misfortune.

Of course, the future supplies for my party were paid for, bills on the Government of the United States being readily taken; but every hospitable attention was extended to me, and I accepted an invitation to take a room in the fort, "*and to make myself at home while I stayed.*"

I found many American emigrants at the fort; others had already crossed the river into their land of promise—the Walahmette valley. Others were daily arriving; and all of them had been furnished with shelter, so far as it could be afforded by the buildings connected with the establishment. Necessary clothing and provisions (the latter to be afterwards returned in kind from the produce of their labour) were also furnished. This friendly assistance was of very great value to the emigrants, whose families were otherwise exposed to much suffering in the winter rains, which had now commenced, at the same time that they were in want of all the common necessaries of life. Those who had taken a water conveyance at the Nez Percé fort continued to arrive safely, with no other accident than has been already mentioned. The party which had passed over the Cascade mountains were reported to have lost a number of their animals; and those who had driven their stock down the Columbia had brought them safely in, and found for them a ready and very profitable market, and were already proposing to return to the States in the spring for another supply.

In the space of two days our preparations had been completed, and we were ready to set out on our return. It would have been very gratifying to have gone down to the Pacific, and, solely in the interest and in the love of geography, to have seen the ocean on the western as well as on the eastern side of the continent, so as to give a satisfactory completeness to the geographical picture which had been formed in our minds; but the rainy season had now regularly set in, and the air was filled with fogs and rain, which left no beauty in any scenery, and obstructed observations. The object of my instructions had been entirely fulfilled in having connected our reconnoissance with the surveys of Captain Wilkes; and although it

would have been agreeable and satisfactory to terminate here also our ruder astronomical observations, I was not, for such a reason, justified to make a delay in waiting for favourable weather.

Near sunset of the 10th, the boats left the fort, and encamped after making only a few miles. Our flotilla consisted of a Mackinaw barge and three canoes—one of them that in which we had descended the river; and a party in all of 20 men. One of the emigrants, Mr. Burnet, of Missouri, who had left his family and property at the Dalles, availed himself of the opportunity afforded by the return of our boats to bring them down to Vancouver. This gentleman, as well as the Messrs. Applegate, and others of the emigrants whom I saw, possessed intelligence and character, with the moral and intellectual stamina, as well as the enterprise, which give solidity and respectability to the foundation of colonies.

November 11.—The morning was rainy and misty. We did not move with the practised celerity of my own camp; and it was near 9 o'clock when our motley crew had finished their breakfast, and were ready to start. Once afloat, however, they worked steadily and well, and we advanced at a good rate up the river; and in the afternoon a breeze sprung up, which enabled us to add a sail to the oars. At evening we encamped on a warm-looking beach, on the right bank, at the foot of the high river hill immediately at the lower end of Cape Horn. On the opposite shore is said to be a singular hole in the mountain, from which the Indians believe comes the wind producing these gales. It is called the Devil's hole, and the Indians, I was told, have been resolving to send down one of their slaves to explore the region below. At dark, the wind shifted into its stormy quarter, gradually increasing to a gale from the south-west; and the sky becoming clear, I obtained a good observation of an emersion of the first satellite; the result of which, being an absolute observation, I have adopted for the longitude of the place.

November 12.—The wind during the night had increased to so much violence, that the broad river this morning was angry and white; the waves breaking with considerable force against this rocky wall of the cape. Our old Iroquois pilot was unwilling to risk the boats around the point, and I was not disposed to hazard the stores of our voyage for the delay of a day. Further observations were obtained during the day, giving for the latitude of the place 45° 33′ 09″; and the longitude, obtained from the satellite, is 122° 6′ 15″.

November 13.—We had a day of disagreeable and cold rain; and, late in the afternoon, began to approach the rapids of the cascades. There is here a high timbered island on the left shore, below which, in descending, I had remarked in a bluff on the river the extremities of trunks of trees appearing to be imbedded in the rock. Landing here this afternoon, I found in the lower part of the escarpment a stratum of coal and forest trees, imbedded

between strata of altered clay, containing the remains of vegetables, the leaves of which indicate that the plants were dicotyledonous. Among these, the stems of some of the ferns are not mineralized, but merely charred, retaining still their vegetable structure and substance; and in this condition a portion also of the trees remain. The indurated appearance and compactness of the strata, as well, perhaps, as the mineralized condition of the coal, are probably due to igneous action. Some portions of the coal precisely resemble in aspect the cannel coal of England, and, with the accompanying fossils, have been referred to the tertiary formation.

These strata appear to rest upon a mass of agglomerated rock, being but a few feet above the water of the river; and over them is the escarpment of perhaps 80 feet, rising gradually in the rear towards the mountains. The wet and cold evening, and near approach of night, prevented me from making any other than a very slight examination.

The current was now very swift, and we were obliged to *cordelle* the boat along the left shore, where the bank was covered with large masses of rocks. Night overtook us at the upper end of the island, a short distance below the cascades, and we halted on the open point. In the mean time, the lighter canoes, paddled altogether by Indians, had passed ahead, and were out of sight. With them was the lodge, which was the only shelter we had, with most of the bedding and provisions. We shouted, and fired guns; but all to no purpose, as it was impossible for them to hear above the roar of the river; and we remained all night without shelter, the rain pouring down all the time. The old voyageurs did not appear to mind it much, but covered themselves up as well as they could, and lay down on the sand beach, where they remained quiet until morning. The rest of us spent a rather miserable night; and, to add to our discomfort, the incessant rain extinguished our fires; and we were glad when at last daylight appeared, and we again embarked.

Crossing to the right bank, we *cordelled* the boat along the shore, there being no longer any use for the paddles, and put into a little bay below the upper rapids. Here we found the lodge pitched, and about 20 Indians sitting around a blazing fire within, making a luxurious breakfast with salmon, bread, butter, sugar, coffee, and other provisions. In the forest, on the edge of the high bluff overlooking the river, is an Indian grave-yard, consisting of a collection of tombs, in each of which were the scattered bones of many skeletons. The tombs were made of boards, which were ornamented with many figures of men and animals of the natural size—from their appearance, constituting the armorial device by which, among Indians, the chiefs are usually known.

The masses of rock displayed along the shores of the ravine in the neighbourhood of the cascades are clearly volcanic products.

Between this cove, which I called Grave-yard Bay, and another spot of smooth water above, on the right, called Lüder's Bay, sheltered by a jutting point of huge rocky masses at the foot of the cascades, the shore along the intervening rapids is lined with precipices of distinct strata of red and variously coloured lavas, in inclined positions.

The masses of rock forming the point at Lüder's bay consist of a porous trap, or basalt—a volcanic product of a modern period. The rocks belong to agglomerated masses, which form the immediate ground of the cascades, and have been already mentioned as constituting a bed of cemented conglomerate rocks appearing at various places along the river. Here they are scattered along the shores, and through the bed of the river, wearing the character of convulsion, which forms the impressive and prominent feature of the river at this place.

Wherever we came in contact with the rocks of these mountains, we found them volcanic, which is probably the character of the range; and at this time, two of the great snowy cones, Mount Regnier and St. Helen's, were in action. On the 23rd of the preceding November, St. Helen's had scattered its ashes, like a light fall of snow, over the Dalles of the Columbia 50 miles distant. A specimen of these ashes was given to me by Mr. Brewer, one of the clergymen at the Dalles.

The lofty range of the Cascade mountains forms a distinct boundary between the opposite climates of the regions along its western and eastern bases. On the west, they present a barrier to the clouds of fog and rain which roll up from the Pacific ocean and beat against their rugged sides, forming the rainy season of the winter in the country along the coast. Into the brighter skies of the region along their eastern base, this rainy winter never penetrates; and at the Dalles of the Columbia the rainy season is unknown, the brief winter being limited to a period of about two months, during which the earth is covered with the slight snows of a climate remarkably mild for so high a latitude. The Cascade range has an average distance of about 130 miles from the sea coast. It extends far both north and south of the Columbia, and is indicated to the distant observer, both in course and position, by the lofty volcanic peaks which rise out of it, and which are visible to an immense distance.

During several days of constant rain, it kept our whole force laboriously employed in getting our barge and canoes to the upper end of the cascades. The portage ground was occupied by emigrant families; their thin and insufficient clothing, bareheaded and barefooted children, attesting the length of their journey, and showing that they had, in many instances, set out without a due preparation of what was indispensable.

A gentleman named Lüders, a botanist from the city of Hamburgh, arrived at the bay I have called by his name while we

were occupied in bringing up the boats. I was delighted to meet at such a place a man of kindred pursuits; but we had only the pleasure of a brief conversation, as his canoe, under the guidance of two Indians, was about to run the rapids; and I could not enjoy the satisfaction of regaling him with a breakfast, which, after his recent journey, would have been an extraordinary luxury. All of his few instruments and baggage were in the canoe, and he hurried around by land to meet it at the Grave-yard bay; but he was scarcely out of sight, when, by the carelessness of the Indians, the boat was drawn into the midst of the rapids, and glanced down the river, bottom up, with the loss of everything it contained. In the natural concern I felt for his misfortune, I gave to the little cove the name of Lüder's Bay.

November 15.—We continued to-day our work at the portage.

About noon, the two barges of the express from Montreal arrived at the upper portage landing, which, for large boats, is on the right bank of the river. They were a fine looking crew, and among them I remarked a fresh-looking woman and her daughter, emigrants from Canada. It was satisfactory to see the order and speed with which these experienced watermen effected the portage, and passed their boats over the cascades. They had arrived at noon, and in the evening they expected to reach Vancouver. These bateaus carry the express of the Hudson's Bay Company to the highest navigable point of the north fork of the Columbia, whence it is carried by an overland party to Lake Winipec, where it is divided—part going to Montreal, and part to Hudson's Bay. Thus a regular communication is kept up between three very remote points.

The Canadian emigrants were much chagrined at the change of climate, and informed me that, only a few miles above, they had left a country of bright blue sky and a shining sun. The next morning the upper parts of the mountains which directly overlook the cascades were white with the freshly fallen snow, while it continued to rain steadily below.

Late in the afternoon we finished the portage, and, embarking again, moved a little distance up the right bank, in order to clear the smaller rapids of the cascades, and have a smooth river for the next morning. Though we made but a few miles, the weather improved immediately; and though the rainy country and the cloudy mountains were close behind, before us was the bright sky; so distinctly is climate here marked by a mountain boundary.

November 17.—We had to-day an opportunity to complete the sketch of that portion of the river down which we had come by night.

Many places occur along the river, where the stumps, or rather portions of the trunks of pine trees, are standing along the shore and in the water, where they may be seen at a considerable depth

below the surface, in the beautifully clear water. These collections of dead trees are called on the Columbia the *submerged forest*, and are supposed to have been created by the effects of some convulsion which formed the cascades, and which, by damming up the river, placed these trees under water and destroyed them. But I venture to presume that the cascades are older than the trees; and as these submerged forests occur at five or six places along the river, I had an opportunity to satisfy myself that they have been formed by immense land slides from the mountains, which here closely shut in the river, and which brought down with them into the river the pines of the mountain. At one place, on the right bank, I remarked a place where a portion of one of these slides seemed to have planted itself, with all the evergreen foliage, and the vegetation of the neighbouring hill, directly amidst the falling and yellow leaves of the river trees. It occurred to me that this would have been a beautiful illustration to the eye of a botanist.

Following the course of a slide, which was very plainly marked along the mountain, I found that in the interior parts the trees were in their usual erect position; but at the extremity of the slide they were rocked about, and thrown into a confusion of inclinations.

About 4 o'clock in the afternoon we passed a sandy bar in the river, whence we had an unexpected view of Mount Hood, bearing directly south by compass.

During the day we used oar and sail, and at night had again a delightful camping-ground, and a dry place to sleep upon.

November 18.—The day again was pleasant and bright. At 10 o'clock we passed a rock island, on the right shore of the river, which the Indians use as a burial-ground; and halting for a short time, about an hour afterwards, at the village of our Indian friends, early in the afternoon we arrived again at the Dalles.

Carson had removed the camp up the river a little nearer to the hills, where the animals had better grass. We found everything in good order, and arrived just in time to partake of an excellent roast of California beef. My friend, Mr. Gilpin, had arrived in advance of the party. His object in visiting this country had been to obtain correct information of the Walahmette settlements; and he had reached this point in his journey, highly pleased with the country over which he had travelled, and with invigorated health. On the following day he continued his journey, in our returning boats, to Vancouver.

The camp was now occupied in making the necessary preparations for our homeward journey, which, though homeward, contemplated a new route, and a great circuit to the south and south-east, and the exploration of the Great Basin between the Rocky Mountains and the *Sierra Nevada*. Three principal objects were indicated, by report or by maps, as being on this

route; the character or existence of which I wished to ascertain, and which I assumed as landmarks, or leading points, on the projected line of return. The first of these points was the *Tlamath* lake, on the table land between the head of Fall river, which comes to the Columbia, and the Sacramento, which goes to the bay of San Francisco; and from which lake a river of the same name makes its way westwardly direct to the ocean. This lake and river are often called *Klamet*, but I have chosen to write its name according to the Indian pronunciation. The position of this lake, on the line of inland communication between Oregon and California; its proximity to the demarcation boundary of latitude 42°; its imputed double character of lake, or meadow, according to the season of the year, and the hostile and warlike character attributed to the Indians about it, all make it a desirable object to visit and examine. From this lake our course was intended to be about south-east, to a reported lake called Mary's, at some days' journey in the Great Basin; and thence, still on south-east, to the reputed *Buenaventura* river, which has had a place in so many maps, and countenanced the belief of the existence of a great river flowing from the Rocky Mountains to the bay of San Francisco. From the Buenaventura the next point was intended to be in that section of the Rocky Mountains which includes the heads of Arkansas river, and of the opposite waters of the Californian gulf; and thence down the Arkansas to Bent's Fort, and home. This was our projected line of return—a great part of it absolutely new to geographical, botanical, and geological science—and the subject of reports in relation to lakes, rivers, deserts, and savages hardly above the condition of mere wild animals, which inflamed desire to know what this *terra incognita* really contained.

It was a serious enterprise, at the commencement of winter, to undertake the traverse of such a region, and with a party consisting only of 25 persons, and they of many nations—American, French, German, Canadian, Indian, and coloured—and most of them young, several being under 21 years of age. All knew that a strange country was to be explored, and dangers and hardships to be encountered; but no one blenched at the prospect. On the contrary, courage and confidence animated the whole party. Cheerfulness, readiness, subordination, prompt obedience, characterized all; nor did any extremity of peril and privation, to which we were afterwards exposed, ever belie, or derogate from, the fine spirit of this brave and generous commencement. The course of the narrative will show at what point, and for what reasons, we were prevented from the complete execution of this plan, after having made considerable progress upon it, and how we were forced by desert plains and mountain ranges, and deep snows, far to the south, and near to the Pacific ocean, and along the western base of the Sierra Nevada; where, indeed, a new and ample field

of exploration opened itself before us. For the present, we must follow the narrative, which will first lead us south along the valley of Fall river, and the eastern base of the Cascade range, to the Tlamath lake, from which, or its margin, three rivers go in three directions—one west, to the ocean; another north, to the Columbia; the third south, to California.

For the support of the party, I had provided at Vancouver a supply of provisions for not less than three months, consisting principally of flour, peas, and tallow—the latter being used in cooking; and, in addition to this, I had purchased at the mission some California cattle, which were to be driven on the hoof. We had 104 mules and horses—part of the latter procured from the Indians about the mission; and for the sustenance of which, our reliance was upon the grass which we should find, and the soft porous wood, which was to be substituted when there was none.

Mr. Fitzpatrick, with Mr. Talbot and the remainder of the party, arrived on the 21st; and the camp was now closely engaged in the labour of preparation. Mr. Perkins succeeded in obtaining as a guide to the Tlamath lake two Indians—one of whom had been there, and bore the marks of several wounds he had received from some of the Indians in the neighbourhood, and the other went along for company. In order to enable us to obtain horses, he despatched messengers to the various Indian villages in the neighbourhood, informing them that we were desirous to purchase, and appointing a day for them to bring them in.

We made, in the mean time, several excursions in the vicinity. Mr. Perkins walked with Mr. Preuss and myself to the heights, about nine miles distant, on the opposite side of the river, whence, in fine weather, an extensive view may be had over the mountains, including seven great peaks of the Cascade range; but clouds, on this occasion, destroyed the anticipated pleasure, and we obtained bearings only to three that were visible—Mount Regnier, St. Helens, and Mount Hood. On the heights, about one mile south of the mission, a very fine view may be had of Mount Hood and St. Helens. In order to determine their position with as much accuracy as possible, the angular distances of the peaks were measured with the sextant, at different fixed points from which they could be seen.

The Indians brought in their horses at the appointed time, and we succeeded in obtaining a number in exchange for goods; but they were relatively much higher here, where goods are plenty and at moderate prices, than we had found them in the more eastern part of our voyage. Several of the Indians inquired very anxiously to know if we had any *dollars;* and the horses we procured were much fewer in number than I had desired, and of thin, inferior quality, the oldest and poorest being those that were sold to us. These horses, as ever in our journey you will have occasion to remark, are valuable for hardihood and great endurance.

November 24.—At this place one of the men was discharged; and at the request of Mr. Perkins, a Chinook Indian, a lad of 19, who was extremely desirous to "see the whites," and make some acquaintance with our institutions, was received into the party, under my special charge, with the understanding that I would again return him to his friends. He had lived for some time in the household of Mr. Perkins, and spoke a few words of the English language.

November 25.—We were all up early, in the excitement of turning towards home. The stars were brilliant, and the morning cold—the thermometer at daylight 26°.

Our preparations had been finally completed, and to-day we commenced our journey. The little wagon which had hitherto carried the instruments I judged it necessary to abandon; and it was accordingly presented to the mission. In all our long travelling, it had never been overturned or injured by any accident of the road; and the only things broken were the glass lamps, and one of the front panels, which had been kicked out by an unruly Indian horse. The howitzer was the only wheeled carriage now remaining. We started about noon, when the weather had become disagreeably cold, with flurries of snow. Our friend Mr. Perkins, whose kindness had been active and efficient during our stay, accompanied us several miles on our road, when he bade us farewell, and consigned us to the care of our guides. Ascending to the uplands beyond the southern fork of the *Tinanens* creek, we found the snow lying on the ground in frequent patches, although the pasture appeared good, and the new short grass was fresh and green. We travelled over high, hilly land, and encamped on a little branch of Tinanens creek, where there were good grass and timber. The southern bank was covered with snow, which was scattered over the bottom; and the little creek, its borders lined with ice, had a chilly and wintry look. A number of Indians had accompanied us so far on our road, and remained with us during the night. Two bad-looking fellows, who were detected in stealing, were tied and laid before the fire, and guard mounted over them during the night. The night was cold, and partially clear.

November 26.—The morning was cloudy and misty, and but a few stars visible. During the night water froze in the tents, and at sunrise the thermometer was at 20°. Left camp at 10 o'clock, the road leading along tributaries of the Tinanens, and being, so far, very good. We turned to the right at the fork of the trail, ascending by a steep ascent along a spur to the dividing grounds between this stream and the waters of Fall river. The creeks we had passed were timbered principally with oak and other deciduous trees. Snow lies everywhere here on the ground, and we had a slight fall during the morning; but towards noon the gray sky yielded to a bright sun. This morning we had a grand view of St. Helens and Regnier: the latter appeared of a conical form,

and very lofty, leading the eye far up into the sky. The line of the timbered country is very distinctly marked here, the bare hills making with it a remarkable contrast. The summit of the ridge commanded a fine view of the Taih prairie, and the stream running through it, which is a tributary to the Fall river, the chasm of which is visible to the right. A steep descent of a mountain hill brought us down into the valley, and we encamped on the stream after dark, guided by the light of fires, which some naked Indians belonging to a village on the opposite side were kindling for us on the bank. This is a large branch of the Fall river. There was a broad band of thick ice some 15 feet wide on either bank, and the river current is swift and bold. The night was cold and clear, and we made our astronomical observation this evening with the thermometer at 20°.

In anticipation of coming hardship, and to spare our horses, there was much walking done to-day; and Mr. Fitzpatrick and myself made the day's journey on foot. Somewhere near the mouth of this stream are the falls from which the river takes its name.

November 27.—A fine view of Mount Hood this morning; a rose-coloured mass of snow, bearing S. 85° W. by compass. The sky is clear, and the air cold; the thermometer 2°·5 below zero; the trees and bushes glittering white, and the rapid stream filled with floating ice.

Stiletsi and *the White Crane,* two Indian chiefs who had accompanied us thus far, took their leave, and we resumed our journey at 10 o'clock. We ascended by a steep hill from the river bottom, which is sandy, to a volcanic plain, around which lofty hills sweep in a regular form. It is cut up by gullies of basaltic rock, escarpments of which appear everywhere in the hills. This plain is called the Taih prairie, and is sprinkled with some scattered pines. The country is now far more interesting to a traveller than the route along the Snake and Columbia rivers. To our right we had always the mountains, from the midst of whose dark pine forests the isolated snowy peaks were looking out like giants. They served us for grand beacons to show the rate at which we advanced in our journey. Mount Hood was already becoming an old acquaintance; and, when we ascended the prairie, we obtained a bearing to Mount Jefferson, S. 23° W. The Indian superstition has peopled these lofty peaks with evil spirits, and they have never yet known the tread of a human foot. Sternly drawn against the sky, they look so high and steep, so snowy and rocky, that it would appear almost impossible to climb them; but still a trial would have its attractions for the adventurous traveller. A small trail takes off through the prairie, towards a low point in the range, and perhaps there is here a pass into the Walahmette valley. Crossing the plain, we descended by a rocky hill into the bed of a tributary of Fall river, and made an early encampment. The

water was in holes, and frozen over, and we were obliged to cut through the ice for the animals to drink. An ox, which was rather troublesome to drive, was killed here for food.

The evening was fine, the sky being very clear, and I obtained an immersion of the third satellite, with a good observation of an emersion of the first; the latter of which gives for the longitude 121° 02′ 43″; the latitude, by observation, being 45° 06′ 45″. The night was cold—the thermometer during the observations standing at 9°.

November 28.—The sky was clear in the morning, but suddenly clouded over, and at sunrise began to snow, with the thermometer at 18°.

We traversed a broken high country, partly timbered with pine, and about noon crossed a mountainous ridge, in which, from the rock occasionally displayed, the formation consists of compact lava. Frequent tracks of elk were visible in the snow. On our right, in the afternoon, a high plain, partially covered with pine, extended about 10 miles, to the foot of the Cascade mountains.

At evening we encamped in a basin narrowly surrounded by rocky hills, after a day's journey of 21 miles. The surrounding rocks are either volcanic products, or highly altered by volcanic action, consisting of quartz and reddish-coloured siliceous masses.

November 29.—We emerged from the basin, by a narrow pass, upon a considerable branch of Fall river, running to the eastward through a narrow valley. The trail, descending this stream, brought us to a locality of hot springs, which were on either bank. Those on the left, which were formed into deep handsome basins, would have been delightful baths, if the outer air had not been so keen, the thermometer in these being at 89°. There were others, on the opposite side, at the foot of an escarpment, in which the temperature of the water was 134°. These waters deposited around the spring a brecciated mass of quartz and feldspar, much of it of a reddish colour.

We crossed the stream here, and ascended again to a high plain, from an elevated point of which we obtained a view of six of the great peaks—Mount Jefferson, followed to the southward by two others of the same class; and succeeding, at a still greater distance to the southward, were three other lower peaks, clustering together in a branch ridge. These, like the great peaks, were snowy masses, secondary only to them; and, from the best examination our time permitted, we are inclined to believe that the range to which they belong is a branch from the great chain which here bears to the westward. The trail during the remainder of the day followed near to the large stream on the left, which was continuously walled in between high rocky banks. We halted for the night on a little bye-stream.

November 30.—Our journey to-day was short. Passing over a high plain, on which were scattered cedars, with frequent beds of

volcanic rock in fragments interspersed among the grassy grounds, we arrived suddenly on the verge of the steep and rocky descent to the valley of the stream we had been following, and which here ran directly across our path, emerging from the mountains on the right. You will remark that the country is abundantly watered with large streams, which pour down from the neighbouring range.

These streams are characterized by the narrow and chasm-like valleys in which they run, generally sunk a thousand feet below the plain. At the verge of this plain, they frequently commence in vertical precipices of basaltic rock, and which leave only casual places at which they can be entered by horses. The road across the country, which would otherwise be very good, is rendered impracticable for wagons by these streams. There is another trail among the mountains, usually followed in the summer, which the snows now compelled us to avoid; and I have reason to believe that this, passing nearer the heads of these streams, would afford a much better road.

At such places, the gun carriage was unlimbered, and separately descended by hand. Continuing a few miles up the left bank of the river, we encamped early in an open bottom among the pines, a short distance below a lodge of Indians. Here, along the river, the bluffs present escarpments 700 or 800 feet in height, containing strata of a very fine porcelain clay, overlaid, at the height of about 500 feet, by a massive stratum of compact basalt 100 feet in thickness, which again is succeeded above by other strata of volcanic rocks. The clay strata are variously coloured, some of them very nearly as white as chalk, and very fine grained. Specimens brought from these have been subjected to microscopical examination by Professor Bailey, of West Point, and are considered by him to constitute one of the most remarkable deposits of fluviatile infusoria on record. While they abound in genera and species which are common in fresh water, but which rarely thrive where the water is even brackish, not one decidedly marine form is to be found among them; and their fresh-water origin is therefore beyond a doubt. It is equally certain that they lived and died at the situation where they were found, as they could scarcely have been transported by running waters without an admixture of sandy particles, from which, however, they are remarkably free. Fossil infusoria of a fresh-water origin had been previously detected by Mr. Bailey in specimens brought by Mr. James D. Dana from the tertiary formation of Oregon. Most of the species in those specimens differed so much from those now living and known, that he was led to infer that they might belong to extinct species, and considered them also as affording proof of an alternation, in the formation from which they were obtained, of fresh and salt water deposits, which, common enough in Europe, had not hitherto been noticed in the United States. Coming

evidently from a locality entirely different, our specimens show very few species in common with those brought by Mr. Dana, but bear a much closer resemblance to those inhabiting the north-eastern states. It is possible that they are from a more recent deposit; but the presence of a few remarkable forms which are common to the two localities renders it more probable that there is no great difference in their age.

I obtained here a good observation of an emersion of the second satellite; but clouds, which rapidly overspread the sky, prevented the usual number of observations. Those which we succeeded in obtaining are, however, good; and give for the latitude of the place 44° 35′ 23″, and for the longitude from the satellite 121° 10′ 25″.

December 1.—A short distance above our encampment, we crossed this river, which was thickly lined along its banks with ice. In common with all these mountain streams, the water was very clear, and the current swift. It was not everywhere fordable, and the water was three or four feet deep at our crossing, and perhaps 100 feet wide. As was frequently the case at such places, one of the mules got his pack, consisting of sugar, thoroughly wet, and turned into molasses. One of the guides informed me that this was a "salmon water," and pointed out several ingeniously-contrived places to catch the fish; among the pines in the bottom I saw an immense one, about 12 feet in diameter. A steep ascent from the opposite bank delayed us again; and as, by the information of our guides, grass would soon become very scarce, we encamped on the height of land, in a marshy place among the pines, where there was an abundance of grass. We found here a single Nez Percé family, who had a very handsome horse in their drove, which we endeavoured to obtain in exchange for a good cow; but the man "had two hearts," or, rather, he had one and his wife had another: she wanted the cow, but he loved the horse too much to part with it. These people attach great value to cattle, with which they are endeavouring to supply themselves.

December 2.—In the first rays of the sun, the mountain peaks this morning presented a beautiful appearance, the snow being entirely covered with a hue of rosy gold. We travelled to-day over a very stony, elevated plain, about which were scattered cedar and pine, and encamped on another large branch of Fall river. We were gradually ascending to a more elevated region, which would have been indicated by the rapidly-increasing quantities of snow and ice, had we not known it by other means. A mule which was packed with our cooking utensils wandered off among the pines unperceived, and several men were sent back to search for it.

December 3.—Leaving Mr. Fitzpatrick with the party, I went ahead with the howitzer and a few men, in order to gain time, as our progress with the gun was necessarily slower. The country

continued the same—very stony, with cedar and pine; and we rode on until dark, when we encamped on a hill-side covered with snow, which we used to-night for water, as we were unable to reach any stream.

December 4.—Our animals had taken the back track, although a great number were hobbled; and we were consequently delayed until noon. Shortly after we had left this encampment, the mountain trail from the Dalles joined that on which we were travelling. After passing for several miles over an artemisia plain, the trail entered a beautiful pine forest, through which we travelled for several hours; and about four o'clock descended into the valley of another large branch, on the bottom of which were spaces of open pines, with occasional meadows of good grass, in one of which we encamped. The stream is very swift and deep, and about 40 feet wide, and nearly half frozen over. Among the timber here, are larches 140 feet high, and over 3 feet in diameter. We had to-night the rare sight of a lunar rainbow.

December 5.—To-day the country was all pine forest, and beautiful weather made our journey delightful. It was too warm at noon for winter clothes; and the snow, which lay everywhere in patches through the forest, was melting rapidly. After a few hours' ride we came upon a fine stream in the midst of the forest, which proved to be the principal branch of Fall river. It was occasionally 200 feet wide—sometimes narrowed to 50 feet; the waters very clear, and frequently deep. We ascended along the river, which sometimes presented sheets of foaming cascades; its banks occasionally blackened with masses of scoriated rock, and found a good encampment on the verge of an open bottom, which had been an old camping ground of the Cayuse Indians. A great number of deer-horns were lying about, indicating game in the neighbourhood. The timber was uniformly large; some of the pines measuring 22 feet in circumference at the ground, and 12 to 13 feet at six feet above.

In all our journeying we had never travelled through a country where the rivers were so abounding in falls; and the name of this stream is singularly characteristic. At every place where we come in the neighbourhood of the river, is heard the roaring of falls. The rock along the banks of the stream, and the ledge over which it falls, is a scoriated basalt, with a bright metallic fracture. The stream goes over in one clear pitch succeeded by a foaming cataract of several hundred yards. In the little bottom above the falls, a small stream discharges into an *entonnoir*, and disappears below.

We had made an early encampment, and in the course of the evening Mr. Fitzpatrick joined us here with the lost mule. Our lodge poles were nearly worn out, and we found here a handsome set, leaning against one of the trees, very white, and

cleanly scraped. Had the owners been here we would have purchased them; but as they were not, we merely left the old ones in their place, with a small quantity of tobacco.

December 6.—The morning was frosty and clear. We continued up the stream on undulating forest ground, over which there was scattered much falling timber. We met here a village of Nez Percé Indians, who appeared to be coming down from the mountains, and had with them fine bands of horses. With them were a few Snake Indians of the root-digging species. From the forest we emerged into an open valley 10 or 12 miles wide, through which the stream was flowing tranquilly, upwards of 200 feet broad, with occasional islands, and bordered with fine broad bottoms. Crossing the river, which here issues from a great mountain ridge on the right, we continued up the southern and smaller branch, over a level country, consisting of fine meadow land, alternating with pine forests, and encamped on it early in the evening. A warm sunshine made the day pleasant.

December 7.—To-day we had good travelling ground; the trail leading sometimes over rather sandy soils in the pine forest, and sometimes over meadow land along the stream. The great beauty of the country in summer constantly suggested itself to our imaginations; and even now we found it beautiful, as we rode along these meadows, from half a mile to two miles wide. The rich soil and excellent water, surrounded by noble forests, make a picture that would delight the eye of a farmer.

I observed to-night an occultation of η *Geminorum;* which, although at the bright limb of the moon, appears to give a very good result, that has been adopted for the longitude. The occultation, observations of satellites, and our position deduced from daily surveys with the compass, agree remarkably well together, and mutually support and strengthen each other. The latitude of the camp is 43° 30′ 36″; and longitude, deduced from the occultation, 121° 33′ 55″.

December 8.—To-day we crossed the last branch of the Fall river, issuing, like all the others we had crossed, in a south-westerly direction from the mountains. Our direction was a little east of south, the trail leading constantly through pine forests. The soil was generally bare, consisting, in greater part, of a yellowish-white pumice stone, producing varieties of magnificent pines, but not a blade of grass; and to-night our horses were obliged to do without food, and use snow for water. These pines are remarkable for the red colour of the bolls; and among them occurs a species, of which the Indians had informed me when leaving the Dalles. The unusual size of the cone (16 or 18 inches long) had attracted their attention; and they pointed it out to me among the curiosities of the country. They are more remarkable for their large diameter than their height, which

usually averages only about 120 feet. The leaflets are short, only two or three inches long, and five in a sheath; the bark of a red colour.

December 9.—The trail leads always through splendid pine forests. Crossing dividing grounds by a very fine road, we descended very gently towards the south. The weather was pleasant, and we halted late. The soil was very much like that of yesterday; and on the surface of a hill, near our encampment, were displayed beds of pumice-stone; but the soil produced no grass, and again the animals fared badly.

December 10.—The country began to improve; and about 11 o'clock we reached a spring of cold water on the edge of a savannah, or grassy meadow, which our guides informed us was an arm of the Tlamath lake; and a few miles further we entered upon an extensive meadow, or lake of grass, surrounded by timbered mountains. This was the Tlamath lake. It was a picturesque and beautiful spot, and rendered more attractive to us by the abundant and excellent grass which our animals, after travelling through pine forests, so much needed; but the broad sheet of water which constitutes a lake was not to be seen. Overlooking it, immediately west, were several snowy knobs, belonging to what we have considered a branch of the Cascade range. A low point covered with pines made out into the lake, which afforded us a good place for an encampment, and for the security of our horses, which were guarded in view on the open meadow. The character of courage and hostility attributed to the Indians of this quarter induced more than usual precaution; and, seeing smokes rising from the middle of the lake (or savannah) and along the opposite shores, I directed the howitzer to be fired. It was the first time our guides had seen it discharged; and the bursting of the shell at a distance, which was something like the second fire of the gun, amazed and bewildered them with delight. It inspired them with triumphant feelings; but on the camps at a distance the effect was different, for the smokes in the lake and on the shores immediately disappeared.

The point on which we were encamped forms, with the opposite eastern shore, a narrow neck, connecting the body of the lake with a deep cove or bay which receives the principal affluent stream, and over the greater part of which the water (or rather ice) was at this time dispersed in shallow pools. Among the grass, and scattered over the prairie lake, appeared to be similar marshes. It is simply a shallow basin, which, for a short period at the time of melting snows, is covered with water from the neighbouring mountains; but this probably soon runs off, and leaves for the remainder of the year a green savannah, through the midst of which the river Tlamath, which flows to the ocean, winds its way to the outlet on the south-western side.

December 11.—No Indians made their appearance, and I deter-

mined to pay them a visit. Accordingly the people were gathered together, and we rode out towards the village in the middle of the lake, which one of our guides had previously visited. It could not be directly approached, as a large part of the lake appeared a marsh; and there were sheets of ice among the grass on which our horses could not keep their footing. We therefore followed the guide for a considerable distance along the forest, and then turned off towards the village, which we soon began to see was a few large huts, on the tops of which were collected the Indians. When we had arrived within half a mile of the village, two persons were seen advancing to meet us; and, to please the fancy of our guides, we ranged ourselves into a long line, riding abreast, while they galloped ahead to meet the strangers.

We were surprised, on riding up, to find one of them a woman, having never before known a squaw to take any part in the business of war. They were the village chief and his wife, who, in excitement and alarm at the unusual event and appearance, had come out to meet their fate together. The chief was a very prepossessing Indian, with very handsome features, and a singularly soft and agreeable voice—so remarkable as to attract general notice.

The huts were grouped together on the bank of the river, which, from being spread out in a shallow marsh at the upper end of the lake, was collected here into a single stream. They were large round huts, perhaps 20 feet in diameter, with rounded tops, on which was the door by which they descended into the interior. Within, they were supported by posts and beams.

Almost like plants, these people seem to have adapted themselves to the soil, and to be growing on what the immediate locality afforded. Their only subsistence at this time appeared to be a small fish, great quantities of which that had been smoked and dried were suspended on strings about the lodge. Heaps of straw were lying around; and their residence, in the midst of grass and rushes, had taught them a peculiar skill in converting this material to useful purposes. Their shoes were made of straw or grass, which seemed well adapted for a snowy country; and the women wore on their head a closely-woven basket, which made a very good cap. Among other things were party-coloured mats about four feet square, which we purchased to lay on the snow under our blankets, and to use for table-cloths.

Numbers of singular-looking dogs, resembling wolves, were sitting on the tops of the huts; and of these we purchased a young one, which, after its birthplace, was named Tlamath. The language spoken by these Indians is different from that of the Shoshonee and Columbia river tribes; and otherwise than by signs they cannot understand each other. They made us comprehend that they were at war with the people who lived to the southward and to the eastward; but I could obtain from them no certain in-

formation. The river on which they live enters the Cascade mountains on the western side of the lake, and breaks through them by a passage impracticable for travellers; but over the mountains, to the northward, are passes which present no other obstacle than in the almost impenetrable forests. Unlike any Indians we had previously seen, these wore shells in their noses. We returned to our camp, after remaining here an hour or two, accompanied by a number of Indians.

In order to recruit a little the strength of our animals, and obtain some acquaintance with the locality, we remained here for the remainder of the day. By observation, the latitude of the camp was 42° 56′ 51″; and the diameter of the lake, or meadow, as has been intimated, about 20 miles. It is a picturesque and beautiful spot; and, under the hand of cultivation, might become a little paradise. Game is found in the forest; timbered and snowy mountains skirt it, and fertility characterizes it. Situated near the heads of three rivers, and on the line of inland communication with California, and near to Indians noted for treachery, it will naturally, in the progress of the settlement of Oregon, become a point for military occupation and settlement.

From Tlamath lake, the further continuation of our voyage assumed a character of discovery and exploration, which, from the Indians here, we could obtain no information to direct, and where the imaginary maps of the country, instead of assisting, exposed us to suffering and defeat. In our journey across the desert, Mary's lake, and the famous Buenaventura river, were two points on which I relied to recruit the animals and repose the party. Forming, agreeably to the best maps in my possession, a connected water line from the Rocky Mountains to the Pacific Ocean, I felt no other anxiety than to pass safely across the intervening desert to the banks of the Buenaventura, where, in the softer climate of a more southern latitude, our horses might find grass to sustain them, and ourselves be sheltered from the rigours of winter and from the inhospitable desert. The guides who had conducted us thus far on our journey were about to return; and I endeavoured in vain to obtain others to lead us, even for a few days, in the direction (east) which we wished to go. The chief to whom I applied alleged the want of horses, and the snow on the mountains across which our course would carry us, and the sickness of his family, as reasons for refusing to go with us.

December 12.—This morning the camp was thronged with Tlamath Indians from the south-eastern shore of the lake; but, knowing the treacherous disposition which is a remarkable characteristic of the Indians south of the Columbia, the camp was kept constantly on its guard. I was not unmindful of the disasters which Smith and other travellers had met with in this country, and therefore was equally vigilant in guarding against treachery and violence.

According to the best information I had been able to obtain from the Indians, in a few days' travelling we should reach another large water, probably a lake, which they indicated exactly in the course we were about to pursue. We struck our tents at 10 o'clock, and crossed the lake in a nearly east direction, where it has the least extension—the breadth of the arm being here only about a mile and a half. There were ponds of ice, with but little grass, for the greater part of the way; and it was difficult to get the pack animals across, which fell frequently, and could not get up with their loads unassisted. The morning was very unpleasant, snow falling at intervals in large flakes, and the sky dark. In about two hours we succeeded in getting the animals over; and, after travelling another hour along the eastern shore of the lake, we turned up into a cove where there was a sheltered place among the timber, with good grass, and encamped. The Indians, who had accompanied us so far, returned to their village on the south-eastern shore. Among the pines here, I noticed some five or six feet in diameter.

December 13.—The night has been cold; the peaks around the lake gleam out brightly in the morning sun, and the thermometer is at zero. We continued up the hollow formed by a small affluent to the lake, and immediately entered an open pine forest on the mountain. The way here was sometimes obstructed by fallen trees, and the snow was 4 to 12 inches deep. The mules at the gun pulled heavily, and walking was a little laborious. In the midst of the wood we heard the sound of galloping horses, and were agreeably surprised by the unexpected arrival of our Tlamath chief, with several Indians. He seemed to have found his conduct inhospitable in letting the strangers depart without a guide through the snow, and had come, with a few others, to pilot us a day or two on the way. After travelling in an easterly direction through the forest for about four hours, we reached a considerable stream, with a border of good grass; and here, by the advice of our guides, we encamped. It is about 30 feet wide, and 2 to 4 feet deep; the water clear, with some current; and, according to the information of our Indians, is the principal affluent to the lake, and the head-water of the Tlamath river.

A very clear sky enabled me to obtain here to-night good observations, including an emersion of the first satellite of Jupiter, which give for the longitude 121° 20′ 42″, and for the latitude 42° 51′ 26″. This emersion coincides remarkably well with the result obtained from an occultation at the encampment of December 7th to 8th, 1843; from which place, the line of our survey gives an easting of 13 miles. The day's journey was 12 miles.

December 14.—Our road was over a broad mountain, and we rode seven hours in a thick snow-storm, always through pine forests, when we came down upon the head-waters of another

stream, on which there was grass. The snow lay deep on the ground, and only the high swamp grass appeared above. The Indians were thinly clad, and I had remarked during the day that they suffered from the cold. This evening they told me that the snow was getting too deep on the mountain, and I could not induce them to go any farther. The stream we had struck issued from the mountain in an easterly direction, turning to the southward a short distance below; and, drawing its course upon the ground, they made us comprehend that it pursued its way for a long distance in that direction, uniting with many other streams, and gradually becoming a great river. Without the subsequent information, which confirmed the opinion, we became immediately satisfied that this water formed the principal stream of the *Sacramento* river; and, consequently, that this main affluent of the bay of San Francisco had its source within the limits of the United States, and opposite a tributary to the Columbia, and near the head of the Tlamath river; which goes to the ocean north of 42°, and within the United States.

December 15.—A present, consisting of useful goods, afforded much satisfaction to our guides; and showing them the national flag, I explained that it was a symbol of our nation, and they engaged always to receive it in a friendly manner. The chief pointed out a course, by following which we would arrive at the big water, where no more snow was to be found. Travelling in a direction N. 60° E. by compass, which the Indians informed me would avoid a bad mountain to the right, we crossed the Sacramento, where it turned to the southward, and entered a grassy level plain—a smaller Grand Rond; from the lower end of which the river issued into an inviting country of low rolling hills. Crossing a hard-frozen swamp on the farther side of the Rond, we entered again the pine forest, in which very deep snow made our travelling slow and laborious. We were slowly but gradually ascending a mountain; and after a hard journey of seven hours, we came to some naked places among the timber, where a few tufts of grass showed above the snow, on the side of a hollow; and here we encamped. Our cow, which every day got poorer, was killed here, but the meat was rather tough.

December 16.—We travelled this morning through snow about three feet deep, which, being crusted, very much cut the feet of our animals. The mountain still gradually rose; we crossed several spring heads covered with quaking asp; otherwise it was all pine forest. The air was dark with falling snow, which everywhere weighed down the trees. The depths of the forest were profoundly still; and below, we scarcely felt a breath of the wind which whirled the snow through their branches. I found that it required some exertion of constancy to adhere steadily to one course through the woods, when we were uncertain how far the forest extended, or what lay beyond; and, on account of our

animals, it would be bad to spend another night on the mountain. Towards noon the forest looked clear ahead, appearing suddenly to terminate; and beyond a certain point we could see no trees. Riding rapidly ahead to this spot, we found ourselves on the verge of a vertical and rocky wall of the mountain. At our feet, more than a thousand feet below, we looked into a green prairie country, in which a beautiful lake, some 20 miles in length, was spread along the foot of the mountains, its shores bordered with green grass. Just then the sun broke out among the clouds, and illuminated the country below, while around us the storm raged fiercely. Not a particle of ice was to be seen on the lake, or snow on its borders, and all was like summer or spring. The glow of the sun in the valley below brightened up our hearts with sudden pleasure, and we made the woods ring with joyful shouts to those behind; and gradually, as each came up, he stopped to enjoy the unexpected scene. Shivering on snow three feet deep, and stiffening in a cold north wind, we exclaimed at once that the names of Summer Lake and Winter Ridge should be applied to these two proximate places of such sudden and violent contrast.

We were now immediately on the verge of the forest land, in which we had been travelling so many days; and, looking forward to the east, scarce a tree was to be seen. Viewed from our elevation, the face of the country exhibited only rocks and grass, and presented a region in which the artemisia became the principal wood, furnishing to its scattered inhabitants fuel for their fires, building material for their huts, and shelter for the small game which ministers to their hunger and nakedness. Broadly marked by the boundary of the mountain wall, and immediately below us, were the first waters of that Great Interior Basin which has the Wahsatch and Bear river mountains for its eastern, and the Sierra Nevada for its western rim; and the edge of which we had entered upwards of three months before, at the Great Salt lake.

When we had sufficiently admired the scene below, we began to think about descending, which here was impossible, and we turned towards the north, travelling always along the rocky wall. We continued on for four or five miles, making ineffectual attempts at several places; and at length succeeded in getting down at one which was extremely difficult of descent. Night had closed in before the foremost reached the bottom, and it was dark before we all found ourselves together in the valley. There were three or four half dead dry cedar trees on the shore, and those who first arrived kindled bright fires to light on the others. One of the mules rolled over and over 200 or 300 feet into a ravine, but recovered himself, without any other injury than to his pack; and the howitzer was left midway the mountain until morning. By observation, the latitude of this encampment is 42° 57′ 22″. It delayed us until near noon the next day to recover ourselves and put every-

thing in order; and we made only a short camp along the western shore of the lake, which, in the summer temperature we enjoyed to-day, justified the name we had given it. Our course would have taken us to the other shore, and over the highlands beyond; but I distrusted the appearance of the country, and decided to follow a plainly beaten Indian trail leading along this side of the lake. We were now in a country where the scarcity of water and of grass makes travelling dangerous, and great caution was necessary.

December 18.—We continued on the trail along the narrow strip of land between the lake and the high rocky wall, from which we had looked down two days before. Almost every half mile we crossed a little spring, or stream of cold pure water; and the grass was certainly as fresh and green as in the early spring. From the white efflorescence along the shore of the lake, we were enabled to judge that the water was impure, like that of the lakes we subsequently found; but the mud prevented us from approaching it. We encamped near the eastern point of the lake, where there appeared between the hills a broad and low connecting hollow with the country beyond. From a rocky hill in the rear, I could see, marked out by a line of yellow dried grass, the bed of a stream, which probably connected the lake with other waters in the spring.

The observed latitude of this encampment is 42° 42′ 37″.

December 19.—After two hours' ride in an easterly direction, through a low country, the high ridge with pine forests still to our right, and a rocky and bald but lower one on the left, we reached a considerable fresh-water stream, which issues from the piney mountains. So far as we had been able to judge, between this stream and the lake we had crossed dividing grounds; and there did not appear to be any connection, as might be inferred from the impure condition of the lake water.

The rapid stream of pure water, roaring along between banks overhung with aspens and willows, was a refreshing and unexpected sight; and we followed down the course of the stream, which brought us soon into a marsh, or dry lake, formed by the expanding waters of the stream. It was covered with high reeds and rushes, and large patches of ground had been turned up by the squaws in digging for roots, as if a farmer had been preparing the land for grain. I could not succeed in finding the plant for which they had been digging. There were frequent trails, and fresh tracks of Indians; and, from the abundant signs visible, the black-tailed hare appears to be numerous here. It was evident that, in other seasons, this place was a sheet of water. Crossing this marsh towards the eastern hills, and passing over a bordering plain of heavy sands, covered with artemisia, we encamped before sundown on the creek, which here was very small, having lost its water in the marshy grounds. We

found here tolerably good grass. The wind to-night was high, and we had no longer our huge pine fires, but were driven to our old resource of small dried willows and artemisia. About 12 miles ahead, the valley appears to be closed in by a high, dark-looking ridge.

December 20.—Travelling for a few hours down the stream this morning, we turned a point of the hill on our left, and came suddenly in sight of another and much larger lake, which, along its eastern shore, was closely bordered by the high black ridge which walled it in by a precipitous face on this side. Throughout this region the face of the country is characterized by these precipices of black volcanic rock, generally enclosing the valleys of streams, and frequently terminating the hills. Often in the course of our journey we would be tempted to continue our road up the gentle ascent of a sloping hill, which, at the summit, would terminate abruptly in a black precipice. Spread out over a length of 20 miles, the lake, when we first came in view, presented a handsome sheet of water; and I gave to it the name of Lake Abert, in honour of the chief of the corps to which I belonged. The fresh-water stream we had followed emptied into the lake by a little fall; and I was doubtful for a moment whether to go on or encamp at this place. The miry ground in the neighbourhood of the lake did not allow us to examine the water conveniently, and being now on the borders of a desert country, we were moving cautiously. It was, however, still early in the day, and I continued on, trusting either that the water would be drinkable, or that we should find some little spring from the hill side. We were following an Indian trail which led along the steep rocky precipice; a black ridge along the western shore holding out no prospect whatever. The white efflorescences which lined the shore like a bank of snow, and the disagreeable odour which filled the air as soon as we came near, informed us too plainly that the water belonged to one of those fetid salt lakes which are common in this region. We continued until late in the evening to work along the rocky shore, but as often afterwards, the dry inhospitable rock deceived us; and halting on the lake, we kindled up fires to guide those who were straggling along behind. We tried the water, but it was impossible to drink it, and most of the people to-night lay down without eating; but some of us, who had always a great reluctance to close the day without supper, dug holes along the shore, and obtained water, which, being filtered, was sufficiently palatable to be used, but still retained much of its nauseating taste. There was very little grass for the animals, the shore being lined with a luxuriant growth of chenopodiaceous shrubs, which burnt with a quick bright flame, and made our firewood.

The next morning we had scarcely travelled two hours along the shore when we reached a place where the mountains made

a bay, leaving at their feet a low bottom around the lake. Here we found numerous hillocks covered with rushes, in the midst of which were deep holes or springs of pure water; and the bottom was covered with grass, which, although of a salt and unwholesome quality, and mixed with saline efflorescences, was still abundant, and made a good halting-place to recruit our animals; and we accordingly encamped here for the remainder of the day. I rode ahead several miles to ascertain if there was any appearance of a watercourse entering the lake, but found none, the hills preserving their dry character, and the shore of the lake sprinkled with the same white powdery substance, and covered with the same shrubs. There were flocks of ducks on the lake, and frequent tracks of Indians along the shore, where the grass had been recently burned by their fires.

We ascended the bordering mountain, in order to obtain a more perfect view of the lake in sketching its figure; hills sweep entirely around its basin, from which the waters have no outlet.

December 22.—To-day we left this forbidding lake. Impassable rocky ridges barred our progress to the eastward, and I accordingly bore off towards the south, over an extensive sage plain. At a considerable distance ahead, and a little on our left, was a range of snowy mountains, and the country declined gradually towards the foot of a high and nearer ridge immediately before us, which presented the feature of black precipices, now becoming common to the country. On the summit of the ridge, snow was visible, and there being every indication of a stream at its base, we rode on until after dark, but were unable to reach it, and halted among the sage bushes on the open plain, without either grass or water. The two India-rubber bags had been filled with water in the morning, which afforded sufficient for the camp; and rain in the night formed pools, which relieved the thirst of the animals. Where we encamped on the bleak sandy plain, the Indians had made huts or circular enclosures, about four feet high and 12 feet broad, of artemisia bushes. Whether these had been forts or houses, or what they had been doing in such a desert place, we could not ascertain.

December 23.—The weather is mild; the thermometer at daylight 38°; the wind having been from the southward for several days. The country has a very forbidding appearance, presenting to the eye nothing but sage and barren ridges. We rode up towards the mountain, along the foot of which we found a lake, which we could not approach on account of the mud; and passing around its southern end, ascended the slope at the foot of the ridge, where in some hollows we had discovered bushes and small trees—in such situations, a sure sign of water. We found here several springs, and the hill-side was well sprinkled with a species of *festuca*—a better grass than we had found for many days. Our elevated position gave us a good view over the country, but

we discovered nothing very encouraging. Southward, about 10 miles distant, was another small lake, towards which a broad trail led along the ridge; and this appearing to afford the most practicable route, I determined to continue our journey in that direction.

December 24.—We found the water of the lake tolerably pure, and encamped at the farther end. There were some good grass and canes along the shore, and the vegetation at this place consisted principally of chenopodiaceous shrubs.

December 25.—We were roused on Christmas morning by a discharge from the small arms and howitzer, with which our people saluted the day, and the name of which we bestowed on the lake. It was the first time, perhaps, in this remote and desolate region in which it had been so commemorated. Always, on days of religious or national commemoration, our voyageurs expect some unusual allowance; and, having nothing else, I gave them each a little brandy, (which was carefully guarded, as one of the most useful articles a traveller can carry,) with some coffee and sugar, which here, where every eatable was a luxury, was sufficient to make them a feast. The day was sunny and warm; and, resuming our journey, we crossed some slight dividing grounds into a similar basin, walled in on the right by a lofty mountain ridge. The plainly beaten trail still continued, and occasionally we passed camping grounds of the Indians, which indicated to me that we were on one of the great thoroughfares of the country. In the afternoon I attempted to travel in a more eastern direction; but, after a few laborious miles, was beaten back into the basin by an impassable country. There were fresh Indian tracks about the valley, and last night a horse was stolen. We encamped on the valley bottom, where there was some cream-like water in ponds, coloured by a clay soil, and frozen over. Chenopodiaceous shrubs constituted the growth, and made again our firewood. The animals were driven to the hill, where there was tolerably good grass.

December 26.—Our general course was again south. The country consists of larger or smaller basins, into which the mountain waters run down, forming small lakes; they present a perfect level, from which the mountains rise immediately and abruptly. Between the successive basins the dividing grounds are usually very slight; and it is probable that, in the seasons of high water, many of these basins are in communication. At such times there is evidently an abundance of water, though now we find scarcely more than the dry beds. On either side, the mountains, though not very high, appear to be rocky and sterile. The basin in which we were travelling declined towards the south-west corner, where the mountains indicated a narrow outlet; and, turning round a rocky point or cape, we continued up a lateral branch valley, in which we encamped at night on a rapid, pretty little stream of fresh water, which we found unexpectedly among the sage near the ridge, on the right side of the

valley. It was bordered with grassy bottoms and clumps of willows, the water partially frozen. This stream belongs to the basin we had left. By a partial observation to-night, our camp was found to be directly on the 42nd parallel. To-night a horse, belonging to Carson, one of the best we had in the camp, was stolen by the Indians.

December 27.—We continued up the valley of the stream, the principal branch of which here issues from a bed of high mountains. We turned up a branch to the left, and fell into an Indian trail, which conducted us by a good road over open bottoms along the creek, where the snow was five or six inches deep. Gradually ascending, the trail led through a good broad pass in the mountain, where we found the snow about one foot deep. There were some remarkably large cedars in the pass, which were covered with an unusual quantity of frost, which we supposed might possibly indicate the neighbourhood of water; and as, in the arbitrary position of Mary's lake, we were already beginning to look for it, this circumstance contributed to our hope of finding it near. Descending from the mountain, we reached another basin, on the flat lake bed of which we found no water, and encamped among the sage on the bordering plain, where the snow was still about one foot deep. Among this the grass was remarkably green, and to-night the animals fared tolerably well.

December 28.—The snow being deep, I had determined, if any more horses were stolen, to follow the tracks of the Indians into the mountains, and put a temporary check to their sly operations; but it did not occur again.

Our road this morning lay down a level valley, bordered by steep mountainous ridges, rising very abruptly from the plain. Artemisia was the principal plant, mingled with Fremontia and the chenopodiaceous shrubs. The artemisia was here extremely large, being sometimes a foot in diameter and eight feet high. Riding quietly along over the snow, we came suddenly upon smokes rising among these bushes; and, galloping up, we found two huts, open at the top, and loosely built of sage, which appeared to have been deserted at the instant; and, looking hastily around, we saw several Indians on the crest of the ridge near by, and several others scrambling up the side. We had come upon them so suddenly, that they had been wellnigh surprised in their lodges. A sage fire was burning in the middle; a few baskets made of straw were lying about, with one or two rabbit-skins; and there was a little grass scattered about, on which they had been lying. "Tabibo—bo!" they shouted from the hills—a word which, in the Snake language, signifies *white*—and remained looking at us from behind the rocks. Carson and Godey rode towards the hill, but the men ran off like deer. They had been so much pressed, that a woman with two children had dropped behind a sage bush near the lodge, and when Carson accidentally stumbled upon her, she immediately

began screaming in the extremity of fear, and shut her eyes fast, to avoid seeing him. She was brought back to the lodge, and we endeavoured in vain to open a communication with the men. By dint of presents, and friendly demonstrations, she was brought to calmness; and we found that they belonged to the Snake nation, speaking the language of that people. Eight or ten appeared to live together, under the same little shelter; and they seemed to have no other subsistence than the roots or seeds they might have stored up, and the hares which live in the sage, and which they are enabled to track through the snow, and are very skilful in killing. Their skins afford them a little scanty covering. Herding together among bushes, and crouching almost naked over a little sage fire, using their instinct only to procure food, these may be considered, among human beings, the nearest approach to the mere animal creation. We have reason to believe that these had never before seen the face of a white man.

The day had been pleasant, but about two o'clock it began to blow; and crossing a slight dividing ground, we encamped on the sheltered side of a hill, where there was good bunch grass, having made a day's journey of 24 miles. The night closed in, threatening snow; but the large sage bushes made bright fires.

December 29.—The morning mild, and at four o'clock it commenced snowing. We took our way across a plain, thickly covered with snow, towards a range of hills in the south-east. The sky soon became so dark with snow, that little could be seen of the surrounding country; and we reached the summit of the hills in a heavy snow-storm. On the side we had approached, this had appeared to be only a ridge of low hills; and we were surprised to find ourselves on the summit of a bed of broken mountains, which, as far as the weather would permit us to see, declined rapidly to some low country ahead, presenting a dreary and savage character; and for a moment I looked around in doubt on the wild and inhospitable prospect, scarcely knowing what road to take which might conduct us to some place of shelter for the night. Noticing among the hills the head of a grassy hollow, I determined to follow it, in the hope that it would conduct us to a stream. We followed a winding descent for several miles, the hollow gradually broadening into little meadows, and becoming the bed of a stream as we advanced; and towards night we were agreeably surprised by the appearance of a willow grove, where we found a sheltered camp, with water and excellent and abundant grass. The grass, which was covered by the snow on the bottom, was long and green, and the face of the mountain had a more favourable character in its vegetation, being smoother, and covered with good bunch grass. The snow was deep, and the night very cold. A broad trail had entered the valley from the right, and a short distance below the camp were the tracks, where a considerable party

of the Indians had passed on horseback, who had turned out to the left, apparently with the view of crossing the mountains to the eastward.

December 30.—After following the stream for a few hours in a south-easterly direction, it entered a cañon where we could not follow; but determined not to leave the stream, we searched a passage below, where we could regain it, and entered a regular narrow valley. The water had now more the appearance of a flowing creek: several times we passed groves of willows, and we began to feel ourselves out of all difficulty. From our position, it was reasonable to conclude that this stream would find its outlet in Mary's lake, and conduct us into a better country. We had descended rapidly, and here we found very little snow. On both sides the mountains showed often stupendous and curious-looking rocks, which at several places so narrowed the valley, that scarcely a pass was left for the camp. It was a singular place to travel through—shut up in the earth, a sort of chasm, the little strip of grass under our feet, the rough walls of bare rock on either hand, and the narrow strip of sky above. The grass to-night was abundant, and we encamped in high spirits.

December 31.—After an hour's ride this morning, our hopes were once more destroyed. The valley opened out, and before us again lay one of the dry basins. After some search, we discovered a high-water outlet, which brought us in a few miles, and by a descent of several hundred feet, into another long broad basin, in which we found the bed of a stream, and obtained sufficient water by cutting the ice. The grass on the bottoms was salt and unpalatable.

Here we concluded the year 1843, and our new-year's eve was rather a gloomy one. The result of our journey began to be very uncertain; the country was singularly unfavourable to travel; the grasses being frequently of a very unwholesome character, and the hoofs of our animals were so worn and cut by the rocks, that many of them were lame, and could scarcely be got along.

New-Year's Day, 1844.—We continued down the valley, between a dry-looking black ridge on the left and a more snowy and high one on the right. Our road was bad along the bottom, being broken by gullies, and impeded by sage, and sandy on the hills, where there is not a blade of grass, nor does any appear on the mountains. The soil in many places consists of a fine powdery sand, covered with a saline efflorescence; and the general character of the country is desert. During the day we directed our course towards a black cape, at the foot of which a column of smoke indicated hot springs.

January 2.—We were on the road early, and the face of the country hidden by fallen snow. We travelled along the bed of the stream, in some places dry, in others covered with ice; the travelling being very bad, through deep fine sand, rendered

tenacious by a mixture of clay. The weather cleared up a little at noon, and we reached the hot springs, of which we had seen the vapour the day before. There was a large field of the usual salt grass here, peculiar to such places. The country otherwise is a perfect barren, without a blade of grass, the only plants being some dwarf Fremontias. We passed the rocky cape, a jagged broken point, bare and torn. The rocks are volcanic, and the hills here have a burnt appearance—cinders and coal occasionally appearing as at a blacksmith's forge. We crossed the large dry bed of a muddy lake in a south-easterly direction, and encamped at night without water and without grass, among sage bushes covered with snow. The heavy road made several mules give out to-day; and a horse, which had made the journey from the States successfully thus far, was left on the trail.

January 3.—A fog, so dense that we could not see a hundred yards, covered the country, and the men that were sent out after the horses were bewildered and lost; and we were consequently detained at camp until late in the day. Our situation had now become a serious one. We had reached and run over the position where, according to the best maps in my possession, we should have found Mary's lake or river. We were evidently on the verge of the desert which had been reported to us; and the appearance of the country was so forbidding, that I was afraid to enter it, and determined to bear away to the southward, keeping close along the mountains, in the full expectation of reaching the Buenaventura river. This morning I put every man in the camp on foot—myself, of course, among the rest—and in this manner lightened by distribution the loads of the animals. We travelled seven or eight miles along the ridge bordering the valley, and encamped where there were a few bunches of grass on the bed of a hill-torrent, without water. There were some large artemisias; but the principal plants are chenopodiaceous shrubs. The rock composing the mountains is here changed suddenly into white granite. The fog showed the tops of the hills at sunset, and stars enough for observations in the early evening, and then closed over us as before. Latitude by observation, 40° 48′ 15″.

January 4.—The fog to-day was still more dense, and the people again were bewildered. We travelled a few miles around the western point of the ridge, and encamped where there were a few tufts of grass, but no water. Our animals now were in a very alarming state, and there was increased anxiety in the camp.

January 5.—Same dense fog continued, and one of the mules died in camp this morning. I have had occasion to remark, on such occasions as these, that animals which are about to die leave the band, and, coming into the camp, lie down about the fires. We moved to a place where there was a little better grass, about two miles distant. Taplin, one of our best men, who had gone out on a scouting excursion, ascended a mountain near by, and to

his great surprise, emerged into a region of bright sunshine, in which the upper parts of the mountain were glowing, while below all was obscured in the darkest fog.

January 6.—The fog continued the same; and, with Mr. Preuss and Carson, I ascended the mountain, to sketch the leading features of the country, as some indication of our future route, while Mr. Fitzpatrick explored the country below. In a very short distance we had ascended above the mist, but the view obtained was not very gratifying. The fog had partially cleared off from below when we reached the summit; and in the south-west corner of a basin communicating with that in which we had encamped, we saw a lofty column of smoke, 16 miles distant, indicating the presence of hot springs. There, also, appeared to be the outlet of those draining channels of the country, and, as such places afforded always more or less grass, I determined to steer in that direction. The ridge we had ascended appeared to be composed of fragments of white granite. We saw here traces of sheep and antelope.

Entering the neighbouring valley, and crossing the bed of another lake, after a hard day's travel over ground of yielding mud and sand, we reached the springs, where we found an abundance of grass, which, though only tolerably good, made this place, with reference to the past, a refreshing and agreeable spot.

This is the most extraordinary locality of hot springs we have met during the journey. The basin of the largest one has a circumference of several hundred feet; but there is at one extremity a circular space of about fifteen feet in diameter, entirely occupied by the boiling water. It boils up at irregular intervals, and with much noise. The water is clear, and the spring deep; a pole, about sixteen feet long, was easily immersed in the centre; but we had no means of forming a good idea of the depth. It was surrounded on the margin with a border of *green* grass, and near the shore the temperature of the water was 206°. We had no means of ascertaining that of the centre, where the heat was greatest; but, by dispersing the water with a pole, the temperature at the margin was increased to 208°, and in the centre it was doubtless higher. By driving the pole towards the bottom, the water was made to boil up with increased force and noise. There are several other interesting places, where water and smoke or gas escape; but they would require a long description. The water is impregnated with common salt, but not so much so as to render it unfit for general cooking; and a mixture of snow made it pleasant to drink.

In the immediate neighbourhood, the valley bottom is covered almost exclusively with chenopodiaceous shrubs, of greater luxuriance and larger growth than we have seen them in any preceding part of the journey.

I obtained this evening some astronomical observations.

Our situation now required caution. Including those which gave out from the injured condition of their feet, and those stolen by Indians, we had lost, since leaving the Dalles of the Columbia, fifteen animals; and of those, nine had been left in the last few days. I therefore determined, until we should reach a country of water and vegetation, to feel our way ahead, by having the line of route explored some fifteen or twenty miles in advance, and only to leave a present encampment when the succeeding one was known.

Taking with me Godey and Carson, I made to-day a thorough exploration of the neighbouring valleys, and found in a ravine in the bordering mountains a good camping-place, where was water in springs, and a sufficient quantity of grass for a night. Overshadowing the springs were some trees of the sweet cotton-wood, which, after a long interval of absence, we saw again with pleasure, regarding them as harbingers of a better country. To us, they were eloquent of green prairies and buffalo. We found here a broad and plainly-marked trail, on which there were tracks of horses, and we appeared to have regained one of the thoroughfares which pass by the watering-places of the country. On the western mountains of the valley, with which this of the boiling spring communicates, we remarked scattered cedars—probably an indication that we were on the borders of the timbered region extending to the Pacific. We reached the camp at sunset, after a day's ride of about 40 miles. The horses we rode were in good order, being of some that were kept for emergencies, and rarely used.

Mr. Preuss had ascended one of the mountains, and occupied the day in sketching the country; and Mr. Fitzpatrick had found, a few miles distant, a hollow of excellent grass and pure water, to which the animals were driven, as I remained another day to give them an opportunity to recruit their strength. Indians appear to be everywhere prowling about like wild animals, and there is a fresh trail across the snow in the valley near.

Latitude of the boiling springs, 40° 39′ 46″.

On the 9th we crossed over to the cotton-wood camp. Among the shrubs on the hills were a few bushes of *ephedra occidentalis*, which afterwards occurred frequently along our road, and, as usual, the lowlands were occupied with artemisia. While the party proceeded to this place, Carson and myself reconnoitred the road in advance, and found another good encampment for the following day.

January 10.—We continued our reconnoisance ahead, pursuing a south direction in the basin along the ridge; the camp following slowly after. On a large trail there is never any doubt of finding suitable places for encampments. We reached the end of the basin, where we found, in a hollow of the mountain which enclosed

it, an abundance of good bunch grass. Leaving a signal for the party to encamp, we continued our way up the hollow, intending to see what lay beyond the mountain. The hollow was several miles long, forming a good pass, the snow deepening to about a foot as we neared the summit. Beyond, a defile between the mountains descended rapidly about two thousand feet; and, filling up all the lower space, was a sheet of green water, some 20 miles broad. It broke upon our eyes like the ocean. The neighbouring peaks rose high above us, and we ascended one of them to obtain a better view. The waves were curling in the breeze, and their dark green colour showed it to be a body of deep water. For a long time we sat enjoying the view, for we had become fatigued with mountains, and the free expanse of moving waves was very grateful. It was set like a gem in the mountains, which, from our position, seemed to enclose it almost entirely. At the western end it communicated with the line of basins we had left a few days since; and on the opposite side it swept a ridge of snowy mountains, the foot of the great Sierra. Its position at first inclined us to believe it Mary's lake, but the rugged mountains were so entirely discordant with descriptions of its low rushy shores and open country, that we concluded it some unknown body of water, which it afterwards proved to be.

On our road down, the next day, we saw herds of mountain sheep, and encamped on a little stream at the mouth of the defile, about a mile from the margin of the water, to which we hurried down immediately. The water is so slightly salt, that at first we thought it fresh, and would be pleasant to drink when no other could be had. The shore was rocky; a handsome beach which reminded us of the sea. On some large *granite* boulders that were scattered about the shore, I remarked a coating of a calcareous substance, in some places a few inches, and in others a foot in thickness. Near our camp the hills, which were of primitive rock, were also covered with this substance, which was in too great quantity on the mountains along the shore of the lake to have been deposited by water, and has the appearance of having been spread over the rocks in mass.*

Where we had halted appeared to be a favourite camping place for Indians.

January 13.—We followed again a broad Indian trail along the shore of the lake to the southward. For a short space we

* The label attached to a specimen of this rock was lost; but I append an analysis of that which, from memory, I judge to be the specimen :—

Carbonate of lime	77·31
Carbonate of magnesia	5·25
Oxide of iron	1·60
Alumina	1·05
Silica	8·55
Organic matter, water, and loss	6·24
	100·00

had room enough in the bottom, but after travelling a short distance, the water swept the foot of the precipitous mountains, the peaks of which are about 3,000 feet above the lake. The trail wound along the base of these precipices, against which the water dashed below, by a way nearly impracticable for the howitzer. During a greater part of the morning the lake was nearly hidden by a snow storm, and the waves broke on the narrow beach in a long line of foaming surf, five or six feet high. The day was unpleasantly cold, the wind driving the snow sharp against our faces; and, having advanced only about 12 miles, we encamped in a bottom formed by a ravine, covered with good grass, which was fresh and green.

We did not get the howitzer into camp, but were obliged to leave it on the rocks until morning. We saw several flocks of sheep, but did not succeed in killing any. Ducks were riding on the waves, and several large fish were seen. The mountain sides were crusted with the calcareous cement previously mentioned. There were chenopodiaceous and other shrubs along the beach, and, at the foot of the rocks, an abundance of *ephedra occidentalis*, whose dark green colour makes them evergreens among the shrubby growth of the lake. Towards evening the snow began to fall heavily, and the country had a wintry appearance.

The next morning the snow was rapidly melting under a warm sun. Part of the morning was occupied in bringing up the gun; and, making only nine miles, we encamped on the shore, opposite a very remarkable rock in the lake, which had attracted our attention for many miles. It rose, according to our estimate, 600 feet above the water, and, from the point we viewed it, presented a pretty exact outline of the great pyramid of Cheops. Like other rocks along the shore, it seemed to be encrusted with calcareous cement. This striking feature suggested a name for the lake, and I called it Pyramid lake; and though it may be deemed by some a fanciful resemblance, I can undertake to say that the future traveller will find a much more striking resemblance between this rock and the pyramids of Egypt than there is between them and the object from which they take their name.

The elevation of this lake above the sea is 4,890 feet, being nearly 700 feet higher than the Great Salt lake, from which it lies nearly west, and distant about eight degrees of longitude. The position and elevation of this lake make it an object of geographical interest. It is the nearest lake to the western rim, as the Great Salt lake is to the eastern rim, of the Great Basin which lies between the base of the Rocky Mountains and the Sierra Nevada; and the extent and character of which, its whole circumference and contents, it is so desirable to know.

The last of the cattle which had been driven from the Dalles was killed here for food, and was still in good condition.

January 15.—A few poor-looking Indians made their appear-