Through the Cumberland Mountains, the River Country of Georgia, and across Florida to Cedar Keys

SEPTEMBER 12.

Awoke drenched with mountain mist, which made a grand show, as it moved away before the hot sun. Passed Montgomery, a shabby village at the head of the east slope of the Cumberland Mountains. Obtained breakfast in a clean house and began the descent of the mountains. Obtained fine views of a wide, open country, and distant flanking ridges and spurs. Crossed a wide cool stream [Emory River], a branch of the Clinch River. There is nothing more eloquent in nature than a mountain stream, and this is the first I ever saw. Its banks are luxuriantly peopled with rare and lovely flowers and overarching trees, making one of Nature's coolest and most hospitable places. Every tree, every flower, every ripple and eddy of this lovely stream seemed solemnly to feel the presence of the great Creator. Lingered in this sanctuary a long time, thanking the Lord with all my heart for his goodness in allowing me to enter and enjoy it.

Discovered two ferns, *Dicksonia* and a small matted polypod on trees, common farther south. Also a species of magnolia with very large leaves and scarlet conical fruit. Near this stream I spent some joyous time in a grand rock dwelling full of mosses, birds, and flowers. Most heavenly place I ever entered. The long, narrow valleys of the mountainside, all well watered and nobly adorned with oaks, magnolias, laurels, azaleas, asters, ferns, *Hypnurn* mosses, *Madotheca*

[scale mosses], etc. Also towering clumps of beautiful hemlocks. The hemlock, judging from the common species of Canada, I regarded as the least noble of the conifers. But those of the eastern valleys of the Cumberland Mountains are as perfect in form and regal in port as the pines themselves. The latter abundant. Obtained fine glimpses from open places as I descended to the great valley between these mountains and the Unaka Mountains on the state line. Forded the Clinch, a, beautiful clear stream that knows many of the dearest mountain retreats that ever heard the music of running water. Reached Kingston before dark. Sent back my plant collections by express to my brother in Wisconsin.

SEPTEMBER 13.

Walked all day across small parallel valleys that flute the surface of the one wide valley. These flutings appear to have been formed by lateral pressure, are fertile, and contain some fine forms, though the seal of war is on all things. The roads never seem to proceed with any fixed purpose, but wander as if lost. In seeking the way to Philadelphia [in Loudon County, Tennessee], I was told by a buxom Tennessee "gal" that over the hills was much the nearer way, that she always went that way, and that surely I could travel it.

I started over the flint ridges, but soon reached a set of enchanted little valleys among which, no matter how or in what direction I traveled, I could not get a foot nearer to Philadelphia. At last, consulting my map and compass, I neglected all directions and finally reached the house of a Negro driver, with whom I put up for the night. Received a good deal of knowledge which may be of use should I ever be a Negro teamster.

SEPTEMBER 14.

Philadelphia is a very filthy village in a beautiful situation. More or less of pine. Black oak most abundant. *Polypodium hexagonopterum* and *Aspidium acrostichoides* [Christmas fern] most abundant of ferns and most generally distributed. *Osmunda claytoniana* rare, not in fruit, small. *Dicksonia* abundant after leaving the Cumberland Mountains. *Asplenium ebeneum* [ebony spleenwort] quite common in Tennessee and many parts of Kentucky. *Cystopteris*

[bladder fern], and *Aspleniumfilix foemina* not common through the same range. *Pteris aquilina* [common brake] abundant, but small.

Walked through many a leafy valley, shady grove, and cool brooklet. Reached Madisonville, a brisk village. Came in full view of the Unaka Mountains, a magnificent sight. Stayed overnight with a pleasant young farmer.

The River Country of Georgia

OCTOBER 3.

In "pine barrens" most of the day. Low, level, sandy tracts; the pines wide apart; the sunny spaces between full of beautiful abounding grasses, *Liatris,* long, wandlike *Solidago,* saw palmettos, etc., covering the ground in garden style. Here I sauntered in delightful freedom, meeting none of the cat-clawed vines, or shrubs, of the alluvial bottoms. Dwarf live oaks common.

Toward evening I arrived at the home of Mr. Cameron, a wealthy planter, who had large bands of slaves at work in his cotton fields. They still call him "Massa." He tells me that labor costs him less now than it did before the emancipation of the Negroes. When I arrived I found him busily engaged in scouring the rust off some cotton-gin saws which had been lying for months at the bottom of his millpond to prevent Sherman's "bummers" from destroying them. The most valuable parts of the gristmill and cotton press were hidden in the same way. "If Bill Sherman," he said, "should come down now without his army, he would never go back."

When I asked him if he could give me food and lodging for the night he said, "No, no, we have no accommodations for travelers." I said, "But I am traveling as a botanist and either have to find lodgings when night overtakes me or lie outdoors, which I often have had to do in my long walk from Indiana. But you see that the country here is very swampy. If you will at least sell me a piece of bread and give me a drink at your well, I shall have to look around for a dry spot to lie down on."

Then, asking me a few questions, and narrowly examining me, he said, "Well, it is barely possible that we may find a place for you, and if you will come to the house I will ask my wife." Evidently he was cautious to get his wife's opinion of the kind of creature I was

before committing himself to hospitality. He halted me at the door and called out his wife, a fine-looking woman, who also questioned me narrowly as to my object in coming so far down through the South, so soon after the war. She said to her husband that she thought they could, perhaps, give me a place to sleep.

After supper, as we sat by the fire talking on my favorite subject of botany, I described the country I had passed through, its botanical character, etc. Then, evidently, all doubt as to my being a decent man vanished, and they both said that they wouldn't for anything have turned me away; but I must excuse their caution, for perhaps fewer than one in a hundred, who passed through this unfrequented part of the country were to be relied upon. "Only a short time ago we entertained a man who was well spoken and well dressed, and he vanished some time during the night with some valuable silverware."

Mr. Cameron told me that when I arrived he tried me for a Mason, and finding that I was not a Mason he wondered still more that I would venture into the country without being able to gain the assistance of brother Masons in these troublous times.

"Young man," he said, after hearing my talks on botany, "I see that your hobby is botany. My hobby is e-lec-tricity. I believe that the time is coming, though we may not live to see it, when that mysterious power or force, used now only for telegraphy, will eventually supply the power for running railroad trains and steamships, for lighting and, in a word, electricity will do all the work of the world."

Many times since then I have thought of the wonderfully correct vision of this Georgia planter, so far in advance of almost everybody else in the world. Already nearly all that he foresaw has been accomplished, and the use of electricity is being extended more and more every year.

OCTOBER 4.

New plants constantly appearing. All day in dense, wet, dark, mysterious forest of flat-topped *Taxodiums*.

Cedar Keys

OCTOBER 23.

Today I reached the sea. While I was yet many miles back in the palmy woods, I caught the scent of the salt sea breeze which, although I had so many years lived far from sea breezes, suddenly conjured up Dunbar, its rocky coast, winds and waves; and my whole childhood, which seemed to have utterly vanished in the New World, was now restored amid the Florida woods by that one breath from the sea. Forgotten were the palms and magnolias and the thousand flowers that enclosed me. I could see only dulse and tangle, long-winged gulls, the Bass Rock in the Firth of Forth, and the old castle, schools, churches, and long country rambles in search of birds' nests. I do not wonder that the weary camels coming from the scorching African deserts should be able to scent the Nile.

How imperishable are all the impressions that ever vibrate one's life! We cannot forget anything. Memories may escape the action of will, may sleep a long time, but when stirred by the right influence, though that influence be light as a shadow, they flash into full stature and life with everything in place. For nineteen years my vision was bounded by forests, but today, emerging from a multitude of tropical plants, I beheld the Gulf of Mexico stretching away unbounded, except by the sky. What dreams and speculative matter for thought arose as I stood on the strand, gazing out on the burnished, treeless plain!

But now at the seaside I was in difficulty. I had reached a point that I could not ford, and Cedar Keys had an empty harbor. Would I proceed down the peninsula to Tampa and Key West, where I would be sure to find a vessel for Cuba, or would I wait here, like Crusoe, and pray for a ship. Full of these thoughts, I stepped into a little store which had a considerable trade in quinine and alligator and rattlesnake skins, and inquired about shipping, means of travel, etc.

The proprietor informed me that one of several sawmills near the village was running, and that a schooner chartered to carry a load of lumber to Galveston, Texas, was expected at the mills for a load. This mill was situated on a tongue of land a few miles along the coast from Cedar Keys, and I determined to see Mr. Hodgson, the owner, to find out particulars about the expected schooner, the

time she would take to load, whether I would be likely to obtain passage on her, etc.

Found Mr. Hodgson at his mill. Stated my case, and was kindly furnished the desired information. I determined to wait the two weeks likely to elapse before she sailed, and go on her to the flowery plains of Texas, from any of whose ports, I fancied, I could easily find passage to the West Indies. I agreed to work for Mr. Hodgson in the mill until I sailed, as I had but little money. He invited me to his spacious house, which occupied a shell hillock and commanded a fine view of the Gulf and many gems of palmy islets, called "keys," that fringe the shore like huge bouquets—not too big, however, for the spacious waters. Mr. Hodgson's family welcomed me with that open, unconstrained cordiality which is characteristic of the better class of Southern people.

At the sawmill a new cover had been put on the main driving pulley, which, made of rough plank, had to be turned off and smoothed. He asked me if I was able to do this job, and I told him that I could. Fixing a rest and making a tool out of an old file, I directed the engineer to start the engine and run slow. After turning down the pulley and getting it true, I put a keen edge on a common carpenter's plane, quickly finished the job, and was assigned a bunk in one of the employees' lodging houses.

The next day I felt a strange dullness and headache while I was botanizing along the coast. Thinking that a bath in the salt water might refresh me, I plunged in and swam a little distance, but this seemed only to make me feel worse. I felt anxious for something sour, and walked back to the village to buy lemons.

Thus and here my long walk was interrupted. I thought that a few days' sail would land me among the famous flower beds of Texas. But the expected ship came and went while I was helpless with fever. The very day after reaching the sea I began to be weighed down by inexorable leaden numbness, which I resisted and tried to shake off for three days, by bathing in the Gulf, by dragging myself about among the palms, plants, and strange shells of the shore, and by doing a little mill work. I did not fear any serious illness, for I never was sick before and was unwilling to pay attention to my feelings.

But yet heavier and more remorselessly pressed the growing fever, rapidly gaining on my strength. On the third day after my arrival I could not take any nourishment, but craved acid. Cedar Keys was only a mile or two distant, and I managed to walk there to buy lemons. On returning, about the middle of the afternoon, the fever broke on me like a storm, and before I had staggered halfway to the mill I fell down unconscious on the narrow trail among dwarf palmettos.

When I awoke from the hot fever sleep, the stars were shining and I was at a loss to know which end of the trail to take, but fortunately, as it afterwards proved, I guessed right. Subsequently, as I fell again and again after walking only a hundred yards or so, I was careful to lie with my head in the direction in which I thought the mill was. I rose, staggered, and fell, I know not how many times, in delirious bewilderment, gasping and throbbing with only moments of consciousness. Thus passed the hours till after midnight, when I reached the mill lodging house.

The watchman on his rounds found me lying on a heap of sawdust at the foot of the stairs. I asked him to assist me up the steps to bed, but he thought my difficulty was only intoxication and refused to help me. The mill hands, especially on Saturday nights, often returned from the village drunk. This was the cause of the watchman's refusal. Feeling that I must get to bed, I made out to reach it on hands and knees, tumbled in after a desperate struggle, and immediately became oblivious to everything.

I awoke at a strange hour on a strange day to hear Mr. Hodgson ask a watcher beside me whether I had yet spoken, and when he replied that I had not, he said: "Well, you must keep on pouring in quinine. That's all we can do." How long I lay unconscious I never found out, but it must have been many days. Some time or other I was moved on a horse from the mill quarters to Mr. Hodgson's house, where I was nursed about three months with unfailing kindness, and to the skill and care of Mr. and Mrs. Hodgson I doubtless owe my life. Through quinine and calomel—in sorry abundance—with other milder medicines, my malarial fever became typhoid. I had night sweats, and my legs became like posts of the temper and consistency of clay on account of dropsy. So on until January, a weary time.

As soon as I was able to get out of bed, I crept away to the edge of the wood and sat, day after day, beneath a moss-draped live oak, watching birds feeding on the shore when the tide was out. Later, as I gathered some strength, I sailed in a little skiff from one key to another. Nearly all the shrubs and trees here are evergreen, and a few of the smaller plants are in flower all winter. The principal trees on this Cedar Key are the juniper, long-leafed pine, and live oak. All of the latter, living and dead, are heavily draped with *Tillandsia*, like those of Bonaventure. The leaf is oval, about two inches long, three-fourths of an inch wide, glossy and dark green above, pale beneath. The trunk is usually much-divided, and is extremely unwedgeable. The specimen on the opposite page [of the original journal] is growing in the dooryard of Mr. Hodgson's house. It is a grand old king, whose crown gleamed in the bright sky long ere the Spanish shipbuilders felled a single tree of this noble species.

The live oaks of these keys divide empire with the long-leafed pine and palmetto, but in many places on the mainland there are large tracts exclusively occupied by them. Like the Bonaventure oaks, they have the upper side of their main spreading branches thickly planted with ferns, grasses, small saw palmettos, etc. There is also a dwarf oak here, which forms dense thickets. The oaks of this key are not, like those of the Wisconsin openings, growing on grassy slopes, but stand, sunk to the shoulders, in flowering magnolias, heathworts, etc.

During my long sojourn here as a convalescent I used to lie on my back for whole days beneath the ample arms of these great trees, listening to the winds and the birds. There is an extensive shallow on the coast, close by, which the receding tide exposes daily. This is the feeding-ground of thousands of waders of all sizes, plumage, and language, and they make a lively picture and noise when they gather at the great family board to eat their daily bread, so bountifully provided for them.

Their leisure in time of high tide they spend in various ways and places. Some go in large flocks to reedy margins about the islands and wade and stand about quarreling or making sport, occasionally finding a stray mouthful to eat. Some stand on the mangroves of the solitary shore, now and then plunging into the water after a fish.

Some go long journeys inland, up creeks and inlets. A few lonely old herons of solemn look and wing retire to favorite oaks. It was my delight to watch those old white sages of immaculate feather as they stood erect drowsing away the dull hours between tides, curtained by long skeins of *Tillandsia*. White-bearded hermits gazing dreamily from dark caves could not appear more solemn or more becomingly shrouded from the rest of their fellow beings.

One of the characteristic plants of these keys is the Spanish bayonet, a species of *Yucca*, about eight or ten feet in height, and with a trunk three or four inches in diameter when full-grown. It belongs to the lily family and develops palm-like from terminal buds. The stout leaves are very rigid, sharp-pointed, and bayonet-like. By one of these leaves a man might be as seriously stabbed as by an army bayonet, and woe to the luckless wanderer who dares to urge his way through these armed gardens after dark. Vegetable cats of many species will rob him of his clothes and claw his flesh, while dwarf palmettos will saw his bones, and the bayonets will glide to his joints and marrow without the smallest consideration for Lord Man.

The climate of these precious islets is simply warm summer and warmer summer, corresponding in time with winter and summer in the North. The weather goes smoothly over the points of union betwixt the twin summers. Few of the storms are very loud or variable. The average temperature during the day, in December, was about sixty-five degrees in the shade, but on one day a little damp snow fell.

Cedar Key is two-and-one-half or three miles in diameter, and its highest point is forty-four feet above mean tidewater. It is surrounded by scores of other keys, many of them looking like a clump of palms, arranged like a tasteful bouquet, and placed in the sea to be kept fresh. Others have quite a sprinkling of oaks and junipers, beautifully united with vines. Still others consist of shells, with a few grasses and mangroves, circled with a rim of rushes. Those which have sedgy margins furnish a favorite retreat for countless waders and divers, especially for the pelicans that frequently whiten the shore like a ring of foam.

t is delightful to observe the assembling of these feathered
ple from the woods and reedy isles; herons white as wave-tops,
lue as the sky, winnowing the warm air on wide, quiet wings;
cans coming with baskets to fill, and the multitude of smaller
rs of the air, swift as swallows, gracefully taking their places at
re's family table for their daily bread. Happy birds!

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Part Three:

The Nature Scribe and Rhapsode

A Near View of the High Sierra

Early one bright morning in the middle of Indian summer, while the glacier meadows were still crisp with frost crystals, I set out from the foot of Mount Lyell on my way down to Yosemite Valley, to replenish my exhausted store of bread and tea. I had spent the past summer, as many preceding ones, exploring the glaciers that lie on the head waters of the San Joaquin, Tuolumne, Merced, and Owen's rivers; measuring and studying their movements, trends, crevasses, moraines, etc., and the part they had played during the period of their greater extension in the creation and development of the landscapes of this alpine wonderland. The time for this kind of work was nearly over for the year, and I began to look forward with delight to the approaching winter with its wondrous storms, when I would be warmly snowbound in my Yosemite cabin with plenty of bread and books; but a tinge of regret came on when I considered that possibly I might not see this favorite region again until the next summer, excepting distant views from the heights about the Yosemite walls.

To artists, few portions of the High Sierra are, strictly speaking, picturesque. The whole massive uplift of the range is one great picture, not clearly divisible into smaller ones; differing much in this respect from the older, and what may be called, riper mountains of the Coast Range. All the landscapes of the Sierra, as we have seen, were born again, remodeled from base to summit by the developing ice floods of the last glacial winter. But all these new landscapes were not brought forth simultaneously; some of the highest, where the ice lingered longest, are tens of centuries younger than those of the warmer regions below them. In general, the younger the mountain landscapes—younger, I mean, with reference to the time of their emergence from the ice of the glacial period—the less separable are

they into artistic bits capable of being made into warm, sympathetic, lovable pictures with appreciable humanity in them.

Here, however, on the head waters of the Tuolumne, is a group of wild peaks on which the geologist may say that the sun has but just begun to shine, which is yet in a high degree picturesque, and in its main features so regular and evenly balanced as almost to appear conventional—one somber cluster of snow-laden peaks with gray pine-fringed granite bosses braided around its base, the whole surging free into the sky from the head of a magnificent valley, whose lofty walls are beveled away on both sides so as to embrace it all without admitting anything not strictly belonging to it. The foreground was now aflame with autumn colors, brown and purple and gold, ripe in the mellow sunshine; contrasting brightly with the deep, cobalt blue of the sky, and the black and gray, and pure, spiritual white of the rocks and glaciers. Down through the midst, the young Tuolumne was seen pouring from its crystal fountains, now resting in glassy pools as if changing back again into ice, now leaping in white cascades as if turning to snow; gliding right and left between granite bosses, then sweeping on through the smooth, meadowy levels of the valley, swaying pensively from side to side with calm, stately gestures past dipping willows and sedges, and around groves of arrowy pine; and throughout its whole eventful course, whether flowing fast or slow, singing loud or low, ever filling the landscape with spiritual animation, and manifesting the grandeur of its sources in every movement and tone.

Pursuing my lonely way down the valley, I turned again and again to gaze on the glorious picture, throwing up my arms to enclose it as in a frame. After long ages of growth in the darkness beneath the glaciers, through sunshine and storms, it seemed now to be ready and waiting for the elected artist, like yellow wheat for the reaper; and I could not help wishing that I might carry colors and brushes with me on my travels, and learn to paint. In the mean time I had to be content with photographs on my mind and sketches in my notebooks. At length, after I had rounded a precipitous headland that puts out from the west wall of the valley, every peak vanished from sight, and I pushed rapidly along the frozen meadows, over the divide between the waters of the Merced and

Tuolumne, and down through the forests that clothe the slopes of Cloud's Rest, arriving in Yosemite in due time—which, with me, is any time. And, strange to say, among the first people I met here were two artists who, with letters of introduction, were awaiting my return. They inquired whether in the course of my explorations in the adjacent mountains I had ever come upon a landscape suitable for a large painting; whereupon I began a description of the one that had so lately excited my admiration. Then, as I went on further and further into details, their faces began to glow, and I offered to guide them to it, while they declared that they would gladly follow, far or near, whithersoever I could spare the time to lead them.

Since storms might come breaking down through the fine weather at any time, burying the colors in snow and cutting off the artists' retreat, I advised getting ready at once. I led them out of the valley by the Vernal and Nevada Falls, thence over the main dividing ridge to the Big Tuolumne Meadows, by the old Mono trail, and thence along the upper Tuolumne River to its head. This was my companions' first excursion into the High Sierra, and as I was almost always alone in my mountaineering, the way that the fresh beauty was reflected in their faces made for me a novel and interesting study. They naturally were affected most of all by the colors: the intense azure of the sky, the purplish grays of the granite, the red and browns of dry meadows, and the translucent purple and crimson of huckleberry bogs; the flaming yellow of aspen groves, the silvery flashing of the streams, and the bright green and blue of the glacier lakes. But the general expression of the scenery—rocky and savage—seemed sadly disappointing; and as they threaded the forest from ridge to ridge, eagerly scanning the landscapes as they were unfolded, they said: "All this is huge and sublime, but we see nothing as yet at all available for effective pictures. Art is long, and art is limited, you know; and here are foregrounds, middle-grounds, backgrounds, all alike; bare rock-waves, woods, groves, diminutive flecks of meadow, and strips of glittering water." "Never mind," I replied, "only bide a wee, and I will show you something you will like."

At length, toward the end of the second day, the Sierra Crown began to come into view, and when we had fairly rounded the

projecting headland before mentioned, the whole picture stood revealed in the flush of the alpenglow. Their enthusiasm was excited beyond bounds, and the more impulsive of the two, a young Scotchman, dashed ahead, shouting and gesticulating and tossing his arms in the air like a madman. Here, at last, was a typical alpine landscape.

After feasting awhile on the view, I proceeded to make camp in a sheltered grove a little way back from the meadow, where pine boughs could be obtained for beds, and where there was plenty of dry wood for fires, while the artists ran here and there, along the river bends and up the sides of the canyon, choosing foregrounds for sketches. After dark, when our tea was made and a rousing fire had been built, we began to make our plans. They decided to remain several days, at the least, while I concluded to make an excursion in the mean time to the untouched summit of Ritter.

It was now about the middle of October, the springtime of snow flowers. The first winter clouds had already bloomed, and the peaks were strewn with fresh crystals, without, however, affecting the climbing to any dangerous extent. And as the weather was still profoundly calm, and the distance to the foot of the mountain only a little more than a day, I felt that I was running no great risk of being storm-bound.

Mount Ritter is king of the mountains of the middle portion of the High Sierra, as Shasta of the north and Whitney of the south sections. Moreover, as far as I know, it had never been climbed. I had explored the adjacent wilderness summer after summer, but my studies thus far had never drawn me to the top of it. Its height above sea level is about 13,300 feet, and it is fenced 'round by steeply inclined glaciers, and canyons of tremendous depth and ruggedness, which render it almost inaccessible. But difficulties of this kind only exhilarate the mountaineer.

Next morning, the artists went heartily to their work and I to mine. Former experiences had given good reason to know that passionate storms, invisible as yet, might be brooding in the calm sun-gold; therefore, before bidding farewell, I warned the artists not to be alarmed should I fail to appear before a week or ten days, and advised them, in case a snowstorm should set in, to keep up big fires

and shelter themselves as best they could, and on no account to become frightened and attempt to seek their way back to Yosemite alone through the drifts.

My general plan was simply this: to scale the canyon wall, cross over to the eastern flank of the range, and then make my way southward to the northern spurs of Mount Ritter in compliance with the intervening topography; for to push on directly southward from camp through the innumerable peaks and pinnacles that adorn this portion of the axis of the range, however interesting, would take too much time, besides being extremely difficult and dangerous at this time of year.

All my first day was pure pleasure; simply mountaineering indulgence, crossing the dry pathways of the ancient glaciers, tracing happy streams, and learning the habits of the birds and marmots in the groves and rocks. Before I had gone a mile from camp, I came to the foot of a white cascade that beats its way down a rugged gorge in the canyon wall, from a height of about nine hundred feet, and pours its throbbing waters into the Tuolumne. I was acquainted with its fountains, which, fortunately, lay in my course. What a fine traveling companion it proved to be, what songs it sang, and how passionately it told the mountain's own joy! Gladly I climbed along its dashing border, absorbing its divine music, and bathing from time to time in waftings of irised spray. Climbing higher, higher, new beauty came streaming on the sight: painted meadows, late-blooming gardens, peaks of rare architecture, lakes here and there, shining like silver, and glimpses of the forested middle region and the yellow lowlands far in the west. Beyond the range I saw the so-called Mono Desert, lying dreamily silent in thick purple light—a desert of heavy sun-glare beheld from a desert of ice-burnished granite. Here the waters divide, shouting in glorious enthusiasm, and falling eastward to vanish in the volcanic sands and dry sky of the Great Basin, or westward to the Great Valley of California, and thence through the Bay of San Francisco and the Golden Gate to the sea.

Passing a little way down over the summit until I had reached an elevation of about ten thousand feet, I pushed on southward toward a group of savage peaks that stand guard about Ritter on the north

and west, groping my way, and dealing instinctively with every obstacle as it presented itself. Here a huge gorge would be found cutting across my path, along the dizzy edge of which I scrambled until some less precipitous point was discovered where I might safely venture to the bottom and then, selecting some feasible portion of the opposite wall, reascend with the same slow caution. Massive, flat-topped spurs alternate with the gorges, plunging abruptly from the shoulders of the snowy peaks, and planting their feet in the warm desert. These were everywhere marked and adorned with characteristic sculptures of the ancient glaciers that swept over this entire region like one vast ice-wind, and the polished surfaces produced by the ponderous flood are still so perfectly preserved that in many places the sunlight reflected from them is about as trying to the eyes as sheets of snow.

God's glacial-mills grind slowly, but they have been kept in motion long enough in California to grind sufficient soil for a glorious abundance of life, though most of the grist has been carried to the lowlands, leaving these high regions comparatively lean and bare; while the postglacial agents of erosion have not yet furnished sufficient available food over the general surface for more than a few tufts of the hardiest plants, chiefly carices and eriogonae. And it is interesting to learn in this connection that the sparseness and repressed character of the vegetation at this height is caused more by want of soil than by harshness of climate; for here and there, in sheltered hollows (countersunk beneath the general surface) into which a few rods of well ground moraine chips have been dumped, we find groves of spruce and pine thirty to forty feet high, trimmed around the edges with willow and huckleberry bushes, and oftentimes still farther by an outer ring of tall grasses, bright with lupines, larkspurs, and showy columbines, suggesting a climate by no means repressingly severe. All the streams, too, and the pools at this elevation are furnished with little gardens wherever soil can be made to lie, which, though making scarce any show at a distance, constitute charming surprises to the appreciative observer. In these bits of leafiness a few birds find grateful homes. Having no acquaintance with man, they fear no ill, and flock curiously about the stranger, almost allowing themselves to be taken in the hand.

In so wild and so beautiful a region was spent my first day, every sight and sound inspiring, leading one far out of himself, yet feeding and building up his individuality.

Now came the solemn, silent evening. Long, blue, spiky shadows crept out across the snowfields, while a rosy glow, at first scarce discernible, gradually deepened and suffused every mountaintop, flushing the glaciers and the harsh crags above them. This was the alpenglow, to me one of the most impressive of all the terrestrial manifestations of God. At the touch of this divine light, the mountains seemed to kindle to a rapt, religious consciousness, and stood hushed and waiting like devout worshipers. Just before the alpenglow began to fade, two crimson clouds came streaming across the summit like wings of flame, rendering the sublime scene yet more impressive; then came darkness and the stars.

Icy Ritter was still miles away, but I could proceed no farther that night. I found a good campground on the rim of a glacier basin about eleven thousand feet above the sea. A small lake nestles in the bottom of it, from which I got water for my tea, and a storm-beaten thicket nearby furnished abundance of resiny firewood. Somber peaks, hacked and shattered, circled halfway around the horizon, wearing a savage aspect in the gloaming, and a waterfall chanted solemnly across the lake on its way down from the foot of a glacier. The fall and the lake and the glacier were almost equally bare; while the scraggy pines anchored in the rock fissures were so dwarfed and shorn by storm winds that you might walk over their tops. In tone and aspect the scene was one of the most desolate I ever beheld. But the darkest scriptures of the mountains are illumined with bright passages of love that never fail to make themselves felt when one is alone.

I made my bed in a nook of the pine-thicket, where the branches were pressed and crinkled overhead like a roof, and bent down around the sides. These are the best bedchambers the high mountains afford—snug as squirrel nests, well ventilated, full of spicy odors, and with plenty of wind-played needles to sing one asleep. I little expected company, but, creeping in through a low side door, I found five or six birds nestling among the tassels. The night wind began to blow soon after dark; at first only a gentle breathing, but

increasing toward midnight to a rough gale that fell upon my leafy roof in ragged surges like a cascade, bearing wild sounds from the crags overhead. The waterfall sang in chorus, filling the old ice fountain with its solemn roar, and seeming to increase in power as the night advanced—fit voice for such a landscape. I had to creep out many times to the fire during the night, for it was biting cold and I had no blankets. Gladly I welcomed the morning star.

The dawn in the dry, wavering air of the desert was glorious. Everything encouraged my undertaking and betokened success. There was no cloud in the sky, no storm tone in the wind. Breakfast of bread and tea was soon made. I fastened a hard, durable crust to my belt by way of provision, in case I should be compelled to pass a night on the mountaintop; then, securing the remainder of my little stock against wolves and wood rats, I set forth free and hopeful.

How glorious a greeting the sun gives the mountains! To behold this alone is worth the pains of any excursion a thousand times over. The highest peaks burned like islands in a sea of liquid shade. Then the lower peaks and spires caught the glow, and long lances of light, streaming through many a notch and pass, fell thick on the frozen meadows. The majestic form of Ritter was full in sight, and I pushed rapidly on over rounded rock bosses and pavements, my iron-shod shoes making a clanking sound, suddenly hushed now and then in rugs of *Bryanthus*, and sedgy lake margins soft as moss. Here, too, in this so-called "land of desolation," I met *Cassiope*, growing in fringes among the battered rocks. Her blossoms had faded long ago, but they were still clinging with happy memories to the evergreen sprays, and still so beautiful as to thrill every fiber of one's being. Winter and summer, you may hear her voice, the low, sweet melody of her purple bells. No evangel among all the mountain plants speaks Nature's love more plainly than *Cassiope*. Where she dwells, the redemption of the coldest solitude is complete. The very rocks and glaciers seem to feel her presence, and become imbued with her own fountain sweetness. All things were warming and awakening. Frozen rills began to flow, the marmots came out of their nests in boulder piles and climbed sunny rocks to bask, and the dun-headed sparrows were flitting about seeking their breakfasts. The lakes seen from every ridgetop were brilliantly rippled

and spangled, shimmering like the thickets of the low dwarf pines. The rocks, too, seemed responsive to the vital heat—rock crystals and snow crystals thrilling alike. I strode on exhilarated, as if never more to feel fatigue, limbs moving of themselves, every sense unfolding like the thawing flowers, to take part in the new day harmony.

All along my course thus far, excepting when down in the canyons, the landscapes were mostly open to me, and expansive, at least on one side. On the left were the purple plains of Mono, reposing dreamily and warm; on the right, the near peaks springing keenly into the thin sky with more and more impressive sublimity. But these larger views were at length lost. Rugged spurs, and moraines, and huge, projecting buttresses began to shut me in. Every feature became more rigidly alpine, without, however, producing any chilling effect; for going to the mountains is like going home. We always find that the strangest objects in these fountain wilds are in some degree familiar, and we look upon them with a vague sense of having seen them before.

On the southern shore of a frozen lake, I encountered an extensive field of hard, granular snow, up which I scampered in fine tone, intending to follow it to its head, and cross the rocky spur against which it leans, hoping thus to come direct upon the base of the main Ritter peak. The surface was pitted with oval hollows, made by stones and drifted pine needles that had melted themselves into the mass by the radiation of absorbed sun heat. These afforded good footholds, but the surface curved more and more steeply at the head, and the pits became shallower and less abundant, until I found myself in danger of being shed off like avalanching snow. I persisted, however, creeping on all fours, and shuffling up the smoothest places on my back, as I had often done on burnished granite, until, after slipping several times, I was compelled to retrace my course to the bottom, and make my way around the west end of the lake, and thence up to the summit of the divide between the head waters of Rush Creek and the northernmost tributaries of the San Joaquin.

Arriving on the summit of this dividing crest, one of the most exciting pieces of pure wilderness was disclosed that I ever

discovered in all my mountaineering. There, immediately in front, loomed the majestic mass of Mount Ritter, with a glacier swooping down its face nearly to my feet, then curving westward and pouring its frozen flood into a dark blue lake, whose shores were bound with precipices of crystalline snow; while a deep chasm drawn between the divide and the glacier separated the massive picture from everything else. I could see only the one sublime mountain, the one glacier, the one lake; the whole veiled with one blue shadow-rock, ice, and water close together without a single leaf or sign of life. After gazing spellbound, I began instinctively to scrutinize every notch and gorge and weathered buttress of the mountain, with reference to making the ascent. The entire front above the glacier appeared as one tremendous precipice, slightly receding at the top, and bristling with spires and pinnacles set above one another in formidable array. Massive lichen-stained battlements stood forward here and there, hacked at the top with angular notches, and separated by frosty gullies and recesses that have been veiled in shadow ever since their creation; while to right and left, as far as I could see, were huge, crumbling buttresses, offering no hope to the climber. The head of the glacier sends up a few finger-like branches through narrow couloir, but these seemed too steep and short to be available, especially as I had no ax with which to cut steps, and the numerous narrow-throated gullies down which stones and snow are avalanched seemed hopelessly steep, besides being interrupted by vertical cliffs; while the whole front was rendered still more terribly forbidding by the chill shadow and the gloomy blackness of the rocks.

Descending the divide in a hesitating mood, I picked my way across the yawning chasm at the foot and climbed out upon the glacier. There were no meadows now to cheer with their brave colors, nor could I hear the dun-headed sparrows, whose cheery notes so often relieve the silence of our highest mountains. The only sounds were the gurgling of small rills down in the veins and crevasses of the glacier, and now and then the rattling report of falling stones, with the echoes they shot out into the crisp air.

I could not distinctly hope to reach the summit from this side, yet I moved on across the glacier as if driven by fate. Contending

with myself, the season is too far spent, I said, and even should I be successful, I might be stormbound on the mountain; and in the cloud darkness, with the cliffs and crevasses covered with snow, how could I escape? No; I must wait till next summer. I would only approach the mountain now, and inspect it, creep about its flanks, learn what I could of its history, holding myself ready to flee on the approach of the first storm cloud. But we little know until tried how much of the uncontrollable there is in us, urging across glaciers and torrents, and up dangerous heights, let the judgment forbid as it may.

I succeeded in gaining the foot of the cliff on the eastern extremity of the glacier, and there discovered the mouth of a narrow avalanche gully, through which I began to climb, intending to follow it as far as possible, and at least obtain some fine wild views for my pains. Its general course is oblique to the plane of the mountain face, and the metamorphic slates of which the mountain is built are cut by cleavage planes in such a way that they weather off in angular blocks, giving rise to irregular steps that greatly facilitate climbing on the sheer places. I thus made my way into a wilderness of crumbling spires and battlements, built together in bewildering combinations, and glazed in many places with a thin coating of ice, which I had to hammer off with stones. The situation was becoming gradually more perilous; but, having passed several dangerous spots, I dared not think of descending; for, so steep was the entire ascent, one would inevitably fall to the glacier in case a single misstep were made. Knowing, therefore, the tried danger beneath, I became all the more anxious concerning the developments to be made above, and began to be conscious of a vague foreboding of what actually befell; not that I was given to fear, but rather because my instincts, usually so positive and true, seemed vitiated in some way, and were leading me astray. At length, after attaining an elevation of about 12,800 feet, I found myself at the foot of a sheer drop in the bed of the avalanche channel I was tracing, which seemed absolutely to bar further progress. It was only about forty-five or fifty feet high, and somewhat roughened by fissures and projections, but these seemed so slight and insecure as footholds that I tried hard to avoid the precipice altogether by scaling the wall of

the channel on either side. But, though less steep, the walls were smoother than the obstructing rock, and repeated efforts only showed that I must either go right ahead or turn back. The tried dangers beneath seemed even greater than that of the cliff in front; therefore, after scanning its face again and again, I began to scale it, picking my holds with intense caution. After gaining a point about halfway to the top, I was suddenly brought to a dead stop, with arms outspread, clinging close to the face of the rock, unable to move hand or foot either up or down. My doom appeared fixed. I must fall. There would be a moment of bewilderment, and then a lifeless rumble down the one general precipice to the glacier below.

When this final danger flashed upon me, I became nerve-shaken for the first time since setting foot on the mountains, and my mind seemed to fill with a stifling smoke. But this terrible eclipse lasted only a moment, when life blazed forth again with preternatural clearness. I seemed suddenly to become possessed of a new sense. The other self, bygone experiences, instinct, or guardian angel—call it what you will—came forward and assumed control. Then my trembling muscles became firm again, every rift and flaw in the rock was seen as through a microscope, and my limbs moved with a positiveness and precision with which I seemed to have nothing at all to do. Had I been borne aloft upon wings, my deliverance could not have been more complete.

Above this memorable spot, the face of the mountain is still more savagely hacked and torn. It is a maze of yawning chasms and gullies, in the angles of which rise beetling crags and piles of detached boulders that seem to have been gotten ready to be launched below. But the strange influx of strength I had received seemed inexhaustible. I found a way without effort, and soon stood upon the topmost crag in the blessed light.

How truly glorious the landscape circled around this noble summit—giant mountains, valleys innumerable, glaciers and meadows, rivers and lakes, with the wide blue sky bent tenderly over them all. But in my first hour of freedom from that terrible shadow, the sunlight in which I was laying seemed all in all.

Looking southward along the axis of the range, the eye is first caught by a row of exceedingly sharp and slender spires, which rise

openly to a height of about a thousand feet, above a series of short, residual glaciers that lean back against their bases; their fantastic sculpture and the unrelieved sharpness with which they spring out of the ice rendering them peculiarly wild and striking. These are "The Minarets." Beyond them you behold a sublime wilderness of mountains, their snowy summits towering together in crowded abundance, peak beyond peak, swelling higher, higher as they sweep on southward, until the culminating point of the range is reached on Mount Whitney, near the head of the Kern River, at an elevation of nearly 14,700 feet above the level of the sea.

Westward, the general flank of the range is seen flowing sublimely away from the sharp summits, in smooth undulations; a sea of huge, gray, granite waves dotted with lakes and meadows, and fluted with stupendous canyons that grow steadily deeper as they recede in the distance. Below this gray region lies the dark forest zone, broken here and there by upswelling ridges and domes; and yet beyond lies a yellow, hazy belt, marking the broad plain of the San Joaquin, bounded on its farther side by the blue mountains of the coast.

Turning now to the northward, there in the immediate foreground is the glorious Sierra Crown, with Cathedral Peak, a temple of marvelous architecture, a few degrees to the left of it; the gray, massive form of Mammoth Mountain to the right; while mounts Ord, Gibbs, Dana, Conness, Tower Peak, Castle Peak, Silver Mountain, and a host of noble companions, as yet nameless, make a sublime show along the axis of the range.

Eastward, the whole region seems a land of desolation covered with beautiful light. The torrid volcanic basin of Mono, with its one bare lake fourteen miles long; Owen's Valley and the broad lava table land at its head, dotted with craters, and the massive Inyo Range, rivaling even the Sierra in height; these are spread, map-like, beneath you, with countless ranges beyond, passing and overlapping one another and fading on the glowing horizon.

At a distance of less than three thousand feet below the summit of Mount Ritter you may find tributaries of the San Joaquin and Owen's rivers, bursting forth from the ice and snow of the glaciers that load its flanks; while a little to the north of here are found

the highest affluents of the Tuolumne and Merced. Thus, the fountains of four of the principal rivers of California are within a radius of four or five miles.

Lakes are seen gleaming in all sorts of places—round, or oval, or square, like very mirrors; others narrow and sinuous, drawn close around the peaks like silver zones, the highest reflecting only rocks, snow, and the sky. But neither these nor the glaciers, nor the bits of brown meadow and moorland that occur here and there, are large enough to make any marked impression upon the mighty wilderness of mountains. The eye, rejoicing in its freedom, roves about the vast expanse, yet returns again and again to the fountain peaks. Perhaps some one of the multitude excites special attention, some gigantic castle with turret and battlement, or some Gothic cathedral more abundantly spired than Milan's. But, generally, when looking for the first time from an all-embracing standpoint like this, the inexperienced observer is oppressed by the incomprehensible grandeur, variety, and abundance of the mountains rising shoulder to shoulder beyond the reach of vision; and it is only after they have been studied one by one, long and lovingly, that their far-reaching harmonies become manifest. Then, penetrate the wilderness where you may, the main telling features, to which all the surrounding topography is subordinate, are quickly perceived, and the most complicated clusters of peaks stand revealed harmoniously correlated and fashioned like works of art—eloquent monuments of the ancient ice rivers that brought them into relief from the general mass of the range. The canyons, too, some of them a mile deep, mazing wildly through the mighty host of mountains, however lawless and ungovernable at first sight they appear, are at length recognized as the necessary effects of causes which followed each other in harmonious sequence—Nature's poems carved on tables of stone—the simplest and most emphatic of her glacial compositions.

Could we have been here to observe during the glacial period, we should have overlooked a wrinkled ocean of ice as continuous as that now covering the landscapes of Greenland; filling every valley and canyon with only the tops of the fountain peaks rising darkly above the rock-encumbered ice waves like islets in a stormy sea—

those islets the only hints of the glorious landscapes now smiling in the sun. Standing here in the deep, brooding silence all the wilderness seems motionless, as if the work of creation were done. But in the midst of this outer steadfastness we know there is incessant motion and change. Ever and anon, avalanches are falling from yonder peaks. These cliff-bound glaciers, seemingly wedged and immovable, are flowing like water and grinding the rocks beneath them. The lakes are lapping their granite shores and wearing them away, and every one of these rills and young rivers is fretting the air into music, and carrying the mountains to the plains. Here are the roots of all the life of the valleys, and here more simply than elsewhere is the eternal flux of nature manifested. Ice changing to water, lakes to meadows, and mountains to plains. And while we thus contemplate nature's methods of landscape creation, and, reading the records she has carved on the rocks, reconstruct, however imperfectly, the landscapes of the past, we also learn that as these we now behold have succeeded those of the preglacial age, so they in turn are withering and vanishing to be succeeded by others yet unborn.

But in the midst of these fine lessons and landscapes, I had to remember that the sun was wheeling far to the west, while a new way down the mountain had to be discovered to some point on the timber line where I could have a fire; for I had not even burdened myself with a coat. I first scanned the western spurs, hoping some way might appear through which I might reach the northern glacier, and cross its snout; or pass around the lake into which it flows, and thus strike my morning track. This route was soon sufficiently unfolded to show that, if practicable at all, it would require so much time that reaching camp that night would be out of the question. I therefore scrambled back eastward, descending the southern slopes obliquely at the same time. Here the crags seemed less formidable, and the head of a glacier that flows northeast came in sight, which I determined to follow as far as possible, hoping thus to make my way to the foot of the peak on the east side, and thence across the intervening canyons and ridges to camp.

The inclination of the glacier is quite moderate at the head, and, as the sun had softened the névé, I made safe and rapid progress,

running and sliding, and keeping up a sharp outlook for crevasses. About half a mile from the head, there is an ice cascade, where the glacier pours over a sharp declivity and is shattered into massive blocks separated by deep, blue fissures. To thread my way through the slippery mazes of this crevassed portion seemed impossible, and I endeavored to avoid it by climbing off to the shoulder of the mountain. But the slopes rapidly steepened and at length fell away in sheer precipices, compelling a return to the ice. Fortunately, the day had been warm enough to loosen the ice crystals so as to admit of hollows being dug in the rotten portions of the blocks, thus enabling me to pick my way with far less difficulty than I had anticipated. Continuing down over the snout, and along the left lateral moraine, was only a confident saunter, showing that the ascent of the mountain by way of this glacier is easy, provided one is armed with an ax to cut steps here and there.

The lower end of the glacier was beautifully waved and barred by the outcropping edges of the bedded ice layers, which represent the annual snowfalls and, to some extent, the irregularities of structure caused by the weathering of the walls of crevasses, and by separate snowfalls which have been followed by rain, hail, thawing and freezing, etc. Small rills were gliding and swirling over the melting surface with a smooth, oily appearance, in channels of pure ice—their quick, compliant movements contrasting most impressively with the rigid, invisible flow of the glacier itself, on whose back they all were riding.

Night drew near before I reached the eastern base of the mountain, and my camp lay many a rugged mile to the north, but ultimate success was assured. It was now only a matter of endurance and ordinary mountain-craft. The sunset was, if possible, yet more beautiful than that of the day before. The Mono landscape seemed to be fairly saturated with warm, purple light. The peaks marshaled along the summit were in shadow, but through every notch and pass streamed vivid sun-fire, soothing and irradiating their rough, black angles, while companies of small, luminous clouds hovered above them like very angels of light.

Darkness came on, but I found my way by the trends of the canyons and the peaks projected against the sky. All excitement

died with the light, and then I was weary. But the joyful sound of the waterfall across the lake was heard at last, and soon the stars were seen reflected in the lake itself. Taking my bearings from these, I discovered the little pine thicket in which my nest was, and then I had a rest such as only a tired mountaineer may enjoy. After lying loose and lost for a while, I made a sunrise fire, went down to the lake, dashed water on my head, and dipped a cupful for tea. The revival brought about by bread and tea was as complete as the exhaustion from excessive enjoyment and toil. Then I crept beneath the pine tassels to bed. The wind was frosty and the fire burned low, but my sleep was nonetheless sound, and the evening constellations had swept far to the west before I awoke.

After thawing and resting in the morning sunshine, I sauntered home—that is, back to the Tuolumne camp—bearing away toward a cluster of peaks that hold the fountain snows of one of the north tributaries of Rush Creek. Here I discovered a group of beautiful glacier lakes, nestled together in a grand amphitheater. Toward evening, I crossed the divide separating the Mono waters from those of the Tuolumne, and entered the glacier basin that now holds the fountain snows of the stream that forms the upper Tuolumne cascades. This stream I traced down through its many dells and gorges, meadows and bogs, reaching the brink of the main Tuolumne at dusk.

A loud whoop for the artists was answered again and again. Their campfire came in sight, and half an hour afterward I was with them. They seemed unreasonably glad to see me. I had been absent only three days; nevertheless, though the weather was fine, they had already been weighing chances as to whether I would ever return, and trying to decide whether they should wait longer or begin to seek their way back to the lowlands. Now their curious troubles were over. They packed their precious sketches, and next morning we set out homeward bound, and in two days entered the Yosemite Valley from the north by way of Indian Canyon.

A Windstorm in the Forest

The mountain winds, like the dew and rain, sunshine and snow, are measured and bestowed with love on the forests to develop their strength and beauty. However restricted the scope of other forest influences, that of the winds is universal. The snow bends and trims the upper forests every winter, the lightning strikes a single tree here and there, while avalanches mow down thousands at a swoop as a gardener trims out a bed of flowers. But the winds go to every tree, fingering every leaf and branch and furrowed bole; not one is forgotten; the mountain pine towering with outstretched arms on the rugged buttresses of the icy peaks, the lowliest and most retiring tenant of the dells; they seek and find them all, caressing them tenderly, bending them in lusty exercise, stimulating their growth, plucking off a leaf or limb as required, or removing an entire tree or grove, now whispering and cooing through the branches like a sleepy child, now roaring like the ocean; the winds blessing the forests, the forests the winds, with ineffable beauty and harmony as the sure result.

After one has seen pines six feet in diameter bending like grasses before a mountain gale, and ever and anon some giant falling with a crash that shakes the hills, it seems astonishing that any, save the lowest thickset trees, could ever have found a period sufficiently stormless to establish themselves; or, once established, that they should not, sooner or later, have been blown down. But when the storm is over, and we behold the same forests tranquil again, towering fresh and unscathed in erect majesty, and consider what centuries of storms have fallen upon them since they were first planted—hail, to break the tender seedlings; lightning, to scorch and shatter; snow, winds, and avalanches, to crush and

overwhelm—while the manifest result of all this wild storm culture is the glorious perfection we behold; then faith in Nature's forestry is established, and we cease to deplore the violence of her most destructive gales, or of any other storm implement whatsoever.

There are two trees in the Sierra forests that are never blown down, so long as they continue in sound health. These are the juniper and the dwarf pine of the summit peaks. Their stiff, crooked roots grip the storm-beaten ledges like eagles' claws, while their lithe, cord-like branches bend round compliantly, offering but slight holds for winds, however violent. The other alpine conifers—the needle pine, mountain pine, two-leaved pine, and hemlock spruce—are never thinned out by this agent to any destructive extent, on account of their admirable toughness and the closeness of their growth. In general the same is true of the giants of the lower zones. The kingly sugar pine, towering aloft to a height of more than two hundred feet, offers a fine mark to storm winds; but it is not densely foliaged, and its long, horizontal arms swing 'round compliantly in the blast, like tresses of green, fluent algae in a brook; while the silver firs in most places keep their ranks well together in united strength. The yellow or silver pine is more frequently overturned than any other tree on the Sierra, because its leaves and branches form a larger mass in proportion to its height, while in many places it is planted sparsely, leaving open lanes through which storms may enter with full force. Furthermore, because it is distributed along the lower portion of the range, which was the first to be left bare on the breaking up of the ice sheet at the close of the glacial winter, the soil it is growing upon has been longer exposed to postglacial weathering, and consequently is in a more crumbling, decayed condition than the fresher soils farther up the range, and therefore offers a less secure anchorage for the roots.

While exploring the forest zones of Mount Shasta, I discovered the path of a hurricane strewn with thousands of pines of this species. Great and small had been uprooted or wrenched off by sheer force, making a clean gap, like that made by a snow avalanche. But hurricanes capable of doing this class of work are rare in the Sierra, and when we have explored the forests from one extremity of the

range to the other, we are compelled to believe that they are the most beautiful on the face of the earth, however we may regard the agents that have made them so.

There is always something deeply exciting, not only in the sounds of winds in the woods, which exert more or less influence over every mind, but in their varied waterlike flow as manifested by the movements of the trees, especially those of the conifers. By no other trees are they rendered so extensively and impressively visible, not even by the lordly tropic palms or tree ferns responsive to the gentlest breeze. The waving of a forest of the giant sequoias is indescribably impressive and sublime, but the pines seem to me the best interpreters of winds. They are mighty waving goldenrods, ever in tune, singing and writing wind music all their long century lives. Little, however, of this noble tree waving and tree music will you see or hear in the strictly alpine portion of the forests. The burly juniper, whose girth sometimes more than equals its height, is about as rigid as the rocks on which it grows. The slender lash-like sprays of the dwarf pine stream out in wavering ripples, but the tallest and slenderest are far too unyielding to wave even in the heaviest gales. They only shake in quick, short vibrations. The hemlock spruce, however, and the mountain pine, and some of the tallest thickets of the two-leaved species bow in storms with considerable scope and gracefulness. But it is only in the lower and middle zones that the meeting of winds and woods is to be seen in all its grandeur.

One of the most beautiful and exhilarating storms I ever enjoyed in the Sierra occurred in December 1874, when I happened to be exploring one of the tributary valleys of the Yuba River. The sky and the ground and the trees had been thoroughly rain-washed and were dry again. The day was intensely pure, one of those incomparable bits of California winter, warm and balmy and full of white, sparkling sunshine, redolent of all the purest influences of the spring and at the same time enlivened with one of the most bracing windstorms conceivable. Instead of camping out, as I usually do, I then chanced to be stopping at the house of a friend. But when the storm began to sound, I lost no time in pushing out into the woods to enjoy it. For, on such occasions, nature has always something rare

to show us, and the danger to life and limb is hardly greater than one would experience crouching deprecatingly beneath a roof.

It was still early morning when I found myself fairly adrift. Delicious sunshine came pouring over the hills, lighting the tops of the pines and setting free a steam of summery fragrance that contrasted strangely with the wild tones of the storm. The air was mottled with pine tassels and bright green plumes that went flashing past in the sunlight like birds pursued. But there was not the slightest dustiness, nothing less pure than leaves, and ripe pollen, and flecks of withered bracken and moss. I heard trees falling for hours at the rate of one every two or three minutes; some uprooted, partly on account of the loose, water-soaked condition of the ground; others broken straight across, where some weakness caused by fire had determined the spot. The gestures of the various trees made a delightful study. Young sugar pines, light and feathery as squirrel tails, were bowing almost to the ground, while the grand old patriarchs, whose massive boles had been tried in a hundred storms, waved solemnly above them, their long, arching branches streaming fluently on the gale, and every needle thrilling and ringing and shedding off keen lances of light like a diamond. The Douglas spruces, with long sprays drawn out in level tresses, and needles massed in a gray, shimmering glow, presented a most striking appearance as they stood in bold relief along the hilltops. The madronos in the dells, with their red bark and large glossy leaves tilted every way, reflected the sunshine in throbbing spangles like those one so often sees on the rippled surface of a glacier lake. But the silver pines were now the most impressively beautiful of all. Colossal spires 200 feet in height waved like supple goldenrods, chanting and bowing low as if in worship, while the whole mass of their long, tremulous foliage was kindled into one continuous blaze of white sun-fire. The force of the gale was such that the most steadfast monarch of them all rocked down to its roots with a motion plainly perceptible when one leaned against it. Nature was holding high festival, and every fiber of the most rigid giants thrilled with glad excitement.

I drifted on through the midst of this passionate music and motion, across many a glen, from ridge to ridge, often halting in the

lee of a rock for shelter, or to gaze and listen. Even when the grand anthem had swelled to its highest pitch, I could distinctly hear the varying tones of individual trees, spruce, and fir, and pine, and leafless oak—and even the infinitely gentle rustle of the withered grasses at my feet. Each was expressing itself in its own way—singing its own song and making its own peculiar gestures—manifesting a richness of variety to be found in no other forest I have yet seen. The coniferous woods of Canada, and the Carolinas, and Florida, are made up of trees that resemble one another about as nearly as blades of grass, and grow close together in much the same way. Coniferous trees, in general, seldom possess individual character, such as is manifest among oaks and elms. But the California forests are made up of a greater number of distinct species than any other in the world. And in them we find, not only a marked differentiation into special groups, but also a marked individuality in almost every tree, giving rise to storm effects indescribably glorious.

Toward midday, after a long, tingling scramble through copses of hazel and *Ceanothus*, I gained the summit of the highest ridge in the neighborhood; and then it occurred to me that it would be a fine thing to climb one of the trees to obtain a wider outlook and get my ear close to the Aeolian music of its topmost needles. But under the circumstances, the choice of a tree was a serious matter. One whose instep was not very strong seemed in danger of being blown down, or of being struck by others in case they should fall; another was branchless to a considerable height above the ground, and at the same time too large to be grasped with arms and legs in climbing; while others were not favorably situated for clear views. After cautiously casting about, I made choice of the tallest of a group of Douglas spruces that were growing close together like a tuft of grass, no one of which seemed likely to fall unless all the rest fell with it. Though comparatively young, they were about 100 feet high, and their lithe, brushy tops were rocking and swirling in wild ecstasy. Being accustomed to climb trees in making botanical studies, I experienced no difficulty in reaching the top of this one, and never before did I enjoy so noble an exhilaration of motion. The slender tops fairly flapped and swished in the passionate torrent, bending and swirling backward and forward, round and round,

tracing indescribable combinations of vertical and horizontal curves, while I clung with muscles firm braced, like a bobolink on a reed.

In its widest sweeps, my tree-top described an arc of from twenty to thirty degrees, but I felt sure of its elastic temper, having seen others of the same species still more severely tried—bent almost to the ground indeed, in heavy snows without breaking a fiber. I was therefore safe, and free to take the wind into my pulses and enjoy the excited forest from my superb outlook. The view from here must be extremely beautiful in any weather. Now my eye roved over the piney hills and dales as over fields of waving grain, and felt the light running in ripples and broad swelling undulations across the valleys from ridge to ridge, as the shining foliage was stirred by corresponding waves of air. Oftentimes these waves of reflected light would break up suddenly into a kind of beaten foam, and again, after chasing one another in regular order, they would seem to bend forward in concentric curves, and disappear on some hillside, like sea waves on a shelving shore. The quantity of light reflected from the bent needles was so great as to make whole groves appear as if covered with snow, while the black shadows beneath the trees greatly enhanced the effect of the silvery splendor.

Excepting only the shadows, there was nothing somber in all this wild sea of pines. On the contrary, notwithstanding this was the winter season, the colors were remarkably beautiful. The shafts of the pine and *Libocedrus* were brown and purple, and most of the foliage was well tinged with yellow; the laurel groves, with the pale undersides of their leaves turned upward, made masses of gray; and then there was many a dash of chocolate color from clumps of manzanita, and jet of vivid crimson from the bark of the madronos, while the ground on the hillsides, appearing here and there through openings between the groves, displayed masses of pale purple and brown.

The sounds of the storm corresponded gloriously with this wild exuberance of light and motion. The profound bass of the naked branches and boles booming like waterfalls; the quick, tense vibrations of the pine needles, now rising to a shrill, whistling hiss, now falling to a silky murmur; the rustling of laurel groves in the dells,

and the keen metallic click of leaf on leaf—all this was heard in easy analysis when the attention was calmly bent.

The varied gestures of the multitude were seen to fine advantage, so that one could recognize the different species at a distance of several miles by this means alone, as well as by their forms and colors, and the way they reflected the light. All seemed strong and comfortable, as if really enjoying the storm, while responding to its most enthusiastic greetings. We hear much nowadays concerning the universal struggle for existence, but no struggle in the common meaning of the word was manifest here; no recognition of danger by any tree; no deprecation; but rather an invincible gladness as remote from exultation as from fear.

I kept my lofty perch for hours, frequently closing my eyes to enjoy the music by itself, or to feast quietly on the delicious fragrance that was streaming past. The fragrance of the woods was less marked than that produced during warm rain, when so many balsamic buds and leaves are steeped like tea; but, from the chafing of resiny branches against each other, and the incessant attrition of myriad needles, the gale was spiced to a very tonic degree. And besides the fragrance from these local sources, there were traces of scents brought from afar. For this wind came first from the sea, rubbing against its fresh, briny waves, then distilled through the redwoods, threading rich ferny gulches, and spreading itself in broad undulating currents over many a flower-enameled ridge of the coast mountains, then across the golden plains, up the purple foothills, and into these piney woods with the varied incense gathered by the way.

Winds are advertisements of all they touch, however much or little we may be able to read them; telling their wanderings even by their scents alone. Mariners detect the flowery perfume of land winds far at sea, and sea winds carry the fragrance of dulse and tangle far inland, where it is quickly recognized, though mingled with the scents of a thousand land flowers. As an illustration of this, I may tell here that I breathed sea air on the Firth of Forth in Scotland, while a boy; then was taken to Wisconsin, where I remained nineteen years; then, without in all this time having breathed one breath of the sea, I walked quietly, alone, from the

middle of the Mississippi Valley to the Gulf of Mexico, on a botanical excursion, and while in Florida, far from the coast, my attention wholly bent on the splendid tropical vegetation about me, I suddenly recognized a sea breeze, as it came sifting through the palmettos and blooming vine-tangles, which at once awakened and set free a thousand dormant associations, and made me a boy again in Scotland, as if all the intervening years had been annihilated.

Most people like to look at mountain rivers, and bear them in mind, but few care to look at the winds, though far more beautiful and sublime, and though they become at times about as visible as flowing water. When the north winds in winter are making upward sweeps over the curving summits of the High Sierra, the fact is sometimes published with flying snow-banners a mile long. Those portions of the winds thus embodied can scarce be wholly invisible, even to the darkest imagination. And when we look around over an agitated forest, we may see something of the wind that stirs it, by its effects upon the trees. Yonder it descends in a rush of water-like ripples and sweeps over the bending pines from hill to hill. Nearer, we see detached plumes and leaves, now speeding by on level currents, now whirling in eddies, or, escaping over the edges of the whirls, soaring aloft on grand, upswelling domes of air, or tossing on flame-like crests. Smooth, deep currents, cascades, falls, and swirling eddies sing around every tree and leaf, and over all the varied topography of the region with telling changes of form, like mountain rivers conforming to the features of their channels.

After tracing the Sierra streams from their fountains to the plains, marking where they bloom white in falls, glide in crystal plumes, surge gray and foam-filled in boulder-choked gorges, and slip through the woods in long, tranquil reaches after thus learning their language and forms in detail, we may at length hear them chanting all together in one grand anthem, and comprehend them all in clear inner vision, covering the range like lace. But even this spectacle is far less sublime and not a whit more substantial than what we may behold of these storm-streams of air in the mountain woods.

We all travel the Milky Way together, trees and men, but it never occurred to me until this storm day, while swinging in the wind,

that trees are travelers in the ordinary sense. They make many journeys, not extensive ones it is true; but our own little journeys, away and back again, are only little more than tree wavings—many of them not so much.

When the storm began to abate, I dismounted and sauntered down through the calming woods. The storm tones died away, and, turning toward the east, I beheld the countless hosts of the forests hushed and tranquil, towering above one another on the slopes of the hills like a devout audience. The setting sun filled them with amber light and seemed to say, while they listened, "My peace I give unto you."

As I gazed on the impressive scene, all the so-called ruin of the storm was forgotten, and never before did these noble woods appear so fresh, so joyous, so immortal.

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Yosemite Falls at Midnight

To Mrs. Ezra S. Carr

MIDNIGHT, YOSEMITE
APRIL 3, 1871

Oh, Mrs. Carr, that you could be here to mingle in this night-noon glory! I am in the upper Yosemite Falls and can hardly calm to write, but from my first baptism hours ago, you have been so present that I must try to fix you a written thought.

In the afternoon I came up the mountain here with a blanket and a piece of bread to spend the night in prayer among the spouts of this fall. But what can I say more than wish again that you might expose your soul to the rays of this heaven?

Silver from the moon illumines this glorious creation which we term "falls," and has laid a magnificent double prismatic bow at its base.

The tissue of the fall is delicately filmed on the outside like the substance of spent clouds, and the stars shine dimly through it. In the solid shafted body of the fall is a vast number of passing caves, black and deep, with close, white, convolving spray for sills and shooting-comet sheaves above and down their sides, like lime crystals in a cave. And every atom of the magnificent being, from the thin, silvery crest that does not dim the stars to the inner arrowy hardened shafts that strike onward like thunderbolts in sound and energy, all is life and spirit: every bolt and spray feels the hand of God. Oh, the music that is blessing me now! The sun of last week has given the grandest notes of all the yearly anthem.

I said that I was going to stop here until morning and pray a whole blessed night with the falls and the moon, but I am too wet and must go down. An hour or two ago I went out somehow on a little seam that extends along the wall behind the falls. I suppose I was in a trance, but I can positively say that I was in the body, for it is sorely battered and wetted. As I was gazing past the thin edge of the fall and away beneath the column to the brow of the rock, some heavy splashes of water struck me, driven hard against the wall. Suddenly I was darkened, down came a section of the outside tissue composed of spent comets. I crouched low, holding my breath, and anchored to some angular flakes of rock, took my baptism with moderately good faith.

When I dared to look up after the swaying column admitted light, I pounced behind a piece of ice and the wall which was wedging tight, and I no longer feared being washed off, and steady moonbeams slanting past the arching meteors gave me confidence to escape to this snug place where McChesney and I slept one night, where I have a fire to dry my socks. This rock shell, extending behind the falls, is about five hundred feet above the base of the fall on the perpendicular rock face.

How little do we know of ourselves, of our profoundest attractions and repulsions, of our spiritual affinities! How interesting does man become considered in his relations to the spirit of this rock and water! How significant does every atom of our world become amid the influences of those beings unseen, spiritual, angelic mountaineers that so throng these pure mansions of crystal foam and purple granite.

I cannot refrain from speaking to this little bush at my side and to the spray drops that come to my paper and to the individual sands of the slopelet I am sitting upon. Ruskin says that the idea of foulness is essentially connected with what he calls dead, unorganized matter. How cordially I disbelieve him tonight, and were he to dwell awhile among the powers of these mountains he would forget all dictionary differences betwixt the clean and the unclean, and he would lose all memory and meaning of the diabolical sin-begotten term foulness.

Well, I must go down. I am disregarding all of the doctors' physiology in sitting here in this universal moisture. Farewell to you, and to all the beings about us. I shall have a glorious walk down the mountain in this thin, white light, over the open brows grayed with *Selaginella* and through the thick black shadow caves in the live oaks, all stuck full of snowy lances of moonlight.

[John Muir]

Nut Time in Squirrelville

To Mrs. Ezra S. Carr
Squirrelville, Sequoia Co.
Nut Time

Dear Mrs. Carr:

Do behold the King in his glory, King Sequoia! Behold! Behold! seems all I can say. Some time ago I left all for Sequoia and have been and am at his feet, fasting and praying for light, for is he not the greatest light in the woods, in the world? Where are such columns—of sunshine, tangible, accessible, terrestrialized? Well may I fast, not from bread, but from business, book-making, duty-going, and other trifles, and great is my reward already for the manly, treely sacrifice. What giant truths since coming to Gigantea, what magnificent clusters of Sequoic *becauses*. From here I cannot recite you one, for you are down a thousand fathoms deep in dark political quag, not a burr-length less. But I'm in the woods, woods, woods, and they are in *me-ee-ee*. The King tree and I have sworn eternal love—sworn it without swearing, and I've taken the sacrament with Douglas squirrel, drunk Sequoia wine, Sequoia blood, and with its rosy purple drops I am writing this woody gospel letter.

I never before knew the virtue of Sequoia juice. Seen with sunbeams in it, its color is the most royal of all royal purples. No wonder the Indians instinctively drink it for they know not what. I wish I were so drunk and Sequoical that I could preach the green brown woods to all the juiceless world, descending from this divine wilderness like a John the Baptist, eating Douglas squirrels

and wild honey or wild anything, crying, Repent, for the Kingdom of Sequoia is at hand!

There is balm in these leafy Gileads—pungent burrs and living King juice for all defrauded civilization; for sick grangers and politicians; no need of Salt rivers. Sick or successful, come suck Sequoia and be saved.

Douglas squirrel is so pervaded with rosin and burr juice, his flesh can scarce be eaten even by mountaineers. No wonder he is so charged with magnetism! One of the little lions ran across my feet the other day as I lay resting under a fir, and the effect was a thrill like a battery shock. I would eat him no matter how rosiny for the lightning he holds. I wish I could eat wilder things. Think of the grouse with balsam-scented crop stored with spruce buds, the wild sheep full of glacier meadow grass and daisies azure, and the bear burly and brown as Sequoia, eating pine-burrs and wasps' stings and all; then think of the soft lightningless poultice-like pap reeking upon town tables. No wonder cheeks and legs become flabby and fungoid! I wish I were wilder, and so, bless Sequoia, I will be. There is at least a punky spark in my heart and it may blaze in this autumn gold, fanned by the King. Some of my grandfathers must have been born on a muirland for there is heather in me, and tinctures of bog juices, that send me to Cassiope, and oozing through all my veins impel me unhaltingly through endless glacier meadows, seemingly the deeper and danker the better.

See Sequoia aspiring in the upper skies, every summit modeled in fine cycloidal curves as if pressed into unseen molds, every bole warm in the mellow amber sun. How truly godful in mien! I was talking the other day with a duchess and was struck with the grand bow with which she bade me good-bye and thanked me for the glaciers I gave her, but this forenoon King Sequoia bowed to me down in the grove as I stood gazing, and the highbred gestures of the lady seemed rude by contrast.

There goes Squirrel Douglas, the masterspirit of the treetop. It has just occurred to me how his belly is buffy brown, and his back silver gray. Ever since the first Adam of his race saw trees and burrs, his belly has been rubbing upon buff bark, and his back has been combed with silver needles. Would that some of you, wise—

terribly wise—social scientists, might discover some method of living as true to nature as the buff people of the woods, running as free as the winds and waters among the burrs and filbert thickets of these leafy, mothery woods.

The sun is set, and the star candles are being lighted to show me and Douglas squirrel to bed. Therefore, my Carr, good night. You say, "When are you coming down?" Ask the Lord—Lord Sequoia.

[John Muir]

Yosemite Glaciers

YOSEMITE VALLEY, CAL.,
SEPT. 28.

Two years ago, when picking flowers in the mountains back of Yosemite Valley, I found a book. It was blotted and storm-beaten; all of its outer pages were mealy and crumbly, the paper seeming to dissolve like the snow beneath which it had been buried, but many of the inner pages were well preserved, and though all were more or less stained and torn, whole chapters were easily readable. In just this condition is the great open book of Yosemite glaciers today; its granite pages have been torn and blurred by the same storms that wasted the castaway book. The grand central chapters of the Hoffman, and Tenaya, and Nevada glaciers are stained and corroded by the frosts and rains, yet, nevertheless, they contain scarce one unreadable page; but the outer chapters of the Pohono, and the Illilouette, and the Yosemite Creek, and Ribbon, and Cascade glaciers are all dimmed and eaten away on the bottom, though the tops of their pages have not been so long exposed, and still proclaim in splendid characters the glorious actions of their departed ice. The glacier which filled the basin of Yosemite Creek was the fourth ice stream that flowed to Yosemite Valley. It was about fifteen miles in length by five in breadth at the middle of the main stream, and in many places was not less than one thousand feet in depth. It united with the central glaciers in the valley by a mouth reaching from the east side of El Capitan to Yosemite Point, east of the falls. Its western rim was rayed with short tributaries, and on the north its divide from the Tuolumne glacier was deeply grooved; but few if

any of its ridges were here high enough to separate the descending ice into distinct tributaries. The main central trunk flowed nearly south, and, at a distance of about ten miles, separated into three nearly equal branches, which were turned abruptly to the east.

Branch Basins

Those branch basins are laid among the highest spurs of the Hoffman range, and abound in small, bright lakes, set in the solid granite without the usual terminal moraine dam. The structure of those dividing spurs is exactly similar, all three appearing as if ruins of one mountain, or rather as perfect units hewn from one mountain rock during long ages of glacial activity. As their north sides are precipitous, and as they extend east and west, they were enabled to shelter and keep alive their hiding glaciers long after the death of the main trunk. Their basins are still dazzling bright, and their lakes have as yet accumulated but narrow rings of border meadow, because their feeding streams have had but little time to carry the sand of which they are made. The east bank of the main stream, all the way from the three forks to the mouth, is a continuous, regular wall, which also forms the west bank of Indian Canyon glacier basin. The tributaries of the west side of the main basin touched the east tributaries of the cascade, and the great Tuolumne glacier from Mount Dana, the mightiest ice river of this whole region, flowed past on the north. The declivity of the tributaries was great, especially those which flowed from the spurs of the Hoffman on the Tuolumne divide, but the main stream was rather level, and in approaching Yosemite was compelled to make a considerable ascent back of Eagle Cliff. To the concentrated currents of the central glaciers, and to the levelness and width of mouth of this one, we in a great measure owe the present height of the Yosemite Falls. Yosemite Creek lives the most tranquil life of all the large streams that leap into the valley, the others occupying the canyons of narrower and, consequently, of deeper glaciers, while yet far from the valley, abound in loud falls and snowy cascades, but Yosemite Creek flows straight on through smooth meadows and hollows,

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with only two or three gentle cascades, and now and then a row of soothing, rumbling rapids, biding its time, and hoarding up the best music and poetry of its life for the one anthem at Yosemite, as planned by the ice.

Yosemite Basin

When a bird's-eye view of Yosemite Basin is obtained from any of its upper domes, it is seen to possess a great number of dense patches of black forest, planted in abrupt contact with bare, gray rocks. Those forest plots mark the number and the size of all the entire and fragmentary moraines of the basin, as the later eroding agents have not yet had sufficient time to form a soil fit for the vigorous life of large trees.

Wherever a deep-wombed tributary was laid against a narrow ridge, and was also shielded from the sun by compassing rock shadows, there we invariably find one or more small terminal moraines, because when such tributaries were melted off from the trunk they retired to those upper strongholds of shade, and lived and worked in full independence, and the moraines which they built are left entire because the water-collecting basins behind them are too small to make streams large enough to wash them away; but in the basins of exposed tributaries there are no terminal moraines, because their glaciers died *with* the trunk. Medial and lateral moraines are common upon all the outside slopes, some of them nearly perfect in form; but down in the main basin there is not left one unaltered moraine of any kind, immense floods having washed down and leveled them into border meadows for the present stream, and into sandy flower beds and fields for forests.

Glacier History

Such was Yosemite glacier, and such is its basin, the magnificent work of its hands. There is sublimity in the life of a glacier. Water rivers work openly, and so do the rains and the gentle dews, and the great sea also grasping all the world; and even this universal ocean

of breath, though invisible, yet speaks aloud in a thousand voices and proclaims its modes of working and its power; but glaciers work apart from men, exerting their tremendous energies in silence and darkness, outspread, spirit-like, brooding above predestined rocks unknown to light, unborn, working on unwearied through unmeasured times, unhalting as the stars, until at length, their creations complete, their mountains brought forth, homes made for the meadows and the lakes, moraine banks for chosen flowers, and fields for waiting forests, earnest, calm as when they came in crystals from the sky, they depart.

The great valley itself, together with all of its various domes and walls, was brought forth and fashioned by a grand combination of glaciers, acting in certain directions against granite of peculiar physical structure. All of the rocks and mountains and lakes and meadows of the whole upper Merced basin received their specific forms and carvings almost entirely from this same agency of ice.

I have been drifting about among the rocks of this region for several years, anxious to spell out some of the mountain truths which are written here; and since the number, and magnitude, and significance of these ice rivers began to appear, I have become anxious for more exact knowledge regarding them; with this object, supplying myself with blankets and bread, I climbed out of Yosemite by Indian Canyon, and am now searching the upper rocks and moraines for readable glacier manuscript.

I meant to begin by exploring the main trunk glacier of Yosemite Creek, together with all of its rim tributaries one by one, gathering what data I could find regarding their depth, direction of flow, the kind and amount of work which each had done, etc., but when I was upon the El Capitan Mountain, seeking for the western shore of the main stream, I discovered that the Yosemite Creek glacier was not the lowest ice stream which flowed to the valley, but that the Ribbon Stream basin west of El Capitan had also been occupied by a glacier, which flowed nearly south, and united with the main central glaciers of the summits in the valley below El Capitan.

RIBBON STREAM BASIN

I spent two days in this new basin. It must have been one of the smallest ice streams that entered the valley being only about four miles in length by three in width. It received some small tributaries from the slopes of El Capitan ridge, which flowed south 35° west; but most of its ice was derived from a spur of the Hoffman group, running nearly southwest. The slope of its bed is steep and pretty regular, and it must have flowed with considerable velocity. I have not thus far discovered any of the original striated surfaces, though possibly some patches may still exist somewhere in the basin upon hard plates of quartz, or where a boulder of protecting form has settled upon a rounded surface. I found many such patches in the basin of Yosemite Glacier; one within half a mile of the top of the falls—about two feet square in extent of surface, very perfect in polish, and its striae distinct, although the surrounding unprotected rock is disintegrated to a depth of at least four inches. As this small glacier sloped fully with unsheltered bosom to the sun, it was one of the first to die, and of course its tablets have been longer exposed to blurring rains and dews, and all eroding agents; but notwithstanding the countless blotting, crumbling storms which have fallen upon the historic lithographs of its surface, the great truth of its former existence, printed in characters of moraine and meadow and valley groove, is still as clear as when every one of its pebbles and newborn rocks gleamed forth the full unshadowed poetry of its whole life. With the exception of a few castled piles and broken domes upon its east banks, its basin is rather smooth and lake-like, but it has charming meadows, most interesting in their present flora and glacier history, and noble forests of the two silver firs (*Picea amabilis* and *P. grandis*) planted upon moraines spread out and leveled by overflowing waters.

These researches in the basin of the Ribbon Creek recalled some observations made by me some time ago in the lower portions of the basins of the Cascade and Tamarac streams, and I now thought it probable that careful search would discover abundant traces of glacial action in those basins also. Accordingly, on reaching the

highest northern slope of the Ribbon, I obtained comprehensive views of both the Cascade and Tamarac basins, and amid their countless adornments could note many forms of lake and rock which appeared as genuine glacier characters unmarred and unaltered. Running down the bare slope of an icy-looking canyon, in less than half an hour I came upon a large patch of the old glacier bed, polished and striated, with the direction of the flow of the long dead stream clearly written—South 40° West. This proved to be the lowest, easternmost tributary of the Cascade glacier. I proceeded westward as far as the Cascade meadows on the Mono trail, then turning to the right, entered the mouth of the tributary at the head of the meadows. Here there is a well-defined terminal moraine, and the ends of both ridges which formed the banks of the ice are broken and precipitous, giving evidence of great pressure. I followed up this tributary to its source on the west bank of the Yosemite glacier about two miles north of the Mono trail, and throughout its entire length there is abundance of polished tablets with moraines, rock sculpture, etc., giving glacier testimony as clear and indisputable as can be found in the most recent glacier pathways of the Alps.

Vanished Glaciers

I would gladly have explored the main trunk of this beautiful basin, from its highest snows upon the divide of the Tuolumne, to its mouth in the Merced Canyon below Yosemite, but alas! I had not sufficient bread; besides, I felt sure that I should also have to explore the Tamarac basin, and, following westward among the fainter, most changed, and covered glacier pathways, I might probably be called as far as the end of the Pilot Peak Ridge. Therefore, I concluded to leave those lower chapters for future lessons, and go on with the easier Yosemite pages which I had already begun.

But before taking leave of those lower streams let me distinctly state that in my opinion future investigation will discover proofs of the existence in the earlier ages of Sierra Nevada ice, of vast glaciers which flowed to the very foot of the range. Already it is clear that all of the upper basins were filled with ice so deep and universal that but few of the highest crests and ridges were sufficiently great to

separate it into individual glaciers, many of the highest mountains having been flowed over and rounded like the boulders in a river. Glaciers poured into Yosemite by every one of its canyons, and at a comparatively recent period of its history, its northern wall, with perhaps the single exception of the crest of Eagle Cliff, was covered by one unbroken flow of ice, the several glaciers having united before they reached the wall.

SEPTEMBER 30—Last evening I was camped in a small round glacier meadow, at the head of the easternmost tributary of the cascade. The meadow was velvet with grass, and circled with the most beautiful of all the conifers, the Williamson spruce. I built a great fire, and the daisies of the sod rayed as if conscious of a sun. As I lay on my back, feeling the presence of the trees—gleaming upon the dark, and gushing with life—coming closer and closer about me, and saw the small round sky coming down with its stars to dome my trees, I said, "Never was mountain mansion more beautiful, more spiritual, never was mortal wanderer more blessedly homed." When the sun rose, my charmed walls were taken down, the trees returned to the common fund of the forest, and my little sky fused back into the measureless blue, I was left upon common ground to follow my glacier labor.

YOSEMITE RIVER BASINS

I followed the main Yosemite River northward, passing round the head of the second Yosemite tributary, which flowed about northeast until bent southward by the main current. About noon, I came to the basin of the third ice tributary of the west rim, a place of domes which had long engaged my attention, and as I was anxious to study their structure, and the various moraines, etc., of the little glacier which had issued from their midst, I camped here close to the foot of two of the most beautiful of the domes, in a sheltered hollow, the womb of the glacier. At the foot of these two domes are two lakes exactly alike in size and history, beautiful as any I ever beheld; first there is the crystal water center, then a yellowish fringe of *Carex*, which has long arching leaves that dip into the water, then a beveled bossy border of yellow *Sphagnum* moss,

exactly marking the limits of the lake, farther back is a narrow zone of dryer meadow, smooth and purple with grasses which grow in soft plushy sods, interrupted here and there by clumpy gatherings of blue berry bushes. The purple *Kalmia* grows here also, and the splendidly flowered *Phyllodoce*, but these are small and weave into the sod, spreading low in the grasses and glowing with them. Beside these flowering shrubs, the meadow is lightly sprinkled with daisies and *Dodecatheons* and white violets, most lovely meadows divinely adjusted to most lovely lakes.

In the afternoon I followed down the bed of the tributary to its junction with the main glacier; then, turning to the right, crossed the mouths of the first two tributaries, which I had passed in the morning; then, bearing east, examined a cross section of the main trunk, and reached camp by following up the north bank of the tributary. Between the three tributaries above-mentioned are well defined medial moraines, having been preserved from leveling floods by their position on the higher slopes, with but small water-collecting basins behind them. Down at their junctions, where they were swept round by the main stream, is a large, level field of moraine matter, which, like all the drift fields of this basin, is planted with heavy forests, composed mainly of a pine and fir (*Pinus contorta*, and *Picea amabilis*). This forest is now on fire. I wanted to pass through it, but feared the falling trees. As I stood watching the flapping flames and estimating chances, a tall blazing pine crashed across the gap which I wished to pass, and in a few minutes two more fell. This stirred a broken thought about special providences, and caused me to go around out of danger. *Pinus contorta* is very susceptible of fire, as it grows very close, in grovy thickets, and usually every tree is trickled and beaded with gum. The summit forests are almost entirely composed of this pine.

Deer in the Valley

Emerging from this wooded moraine I found a great quantity of loose separate boulders upon a polished hilltop, which had formed a part of the bottom of the main ice stream. They were of

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extraordinary size, some large as houses, and I started northward to seek the mountain from which they had been torn. I had gone but a little way when I discovered a deer quietly feeding upon a narrow strip of green meadow about sixty or seventy yards ahead of me. As the wind blew gently toward it, I thought the opportunity good for testing the truth of hunters' accounts of the deer's wonderful keenness of scent, and stood quite still, and as the deer continued to feed tranquilly, only casting round his head upon his shoulder occasionally to drive away the flies, I began to think that his nose was no better than my own, when suddenly, as if pierced by a bullet, he sprang up into the air and galloped confusedly off without turning to look; but in a few seconds, as if doubtful of the direction of the danger, he came bounding back, caught a glimpse of me, and ran off a second time in a settled direction.

The Yosemite basin is a favorite summer home of the deer. The leguminous vines and juicy grasses of the great moraines supply savory food, while the many high hidings of the Hoffman Mountains, accessible by narrow passes, afford favorite shelter. Grizzly and brown bears also love Yosemite Creek. Berries of the dwarf manzanita, and acorns of the dwarf live oak are abundant upon the dry hilltops; and these with some plants, and the larvae of black ants, are the favorite food of bears, if varied occasionally by a stolen sheep or a shepherd. The gorges of the Tuolumne Canyon, on the north end of the basin, are their principal hiding places in this region. Higher in the range their food is not plentiful, and lower they are molested by man.

On returning to camp I passed three of the domes of the north bank, and was struck with the exact similarity of their structure, the same concentric layers, with a perpendicular cleavage also, but less perfectly developed and more irregular. This little dome tributary, about two-and-a-half miles long by one-and-a-half wide, must have been one of the most beautiful of the basin; all of its upper circling rim is adorned with domes, some half born, sunk in the parent rock; some broken and torn upon the sides by the ice, and a few nearly perfect, from their greater strength of structure or more favorable position. The two lakes above described are the only ones of the tributary basin, both domes and lakes handiwork of the glacier.

A Glacier's Death

In the waning days of this mountain ice, when the main river began to shallow and break like a summer cloud, its crests and domes rising higher and higher, and island rocks coming to light far out in the main current, then many a tributary died, and this one, cut off from its trunk, moved slowly back amid the gurgling and gushing of its bleeding rills, until, crouching in the shadows of this half-mile hollow, it lived a feeble separate life. Here its days come and go, and the hiding glacier lives and works. It brings boulders and sand and fine dust polishings from its sheltering domes and canyons, building up a terminal moraine, which forms a dam for the waters which issue from it; and beneath, working in the dark, it scoops a shallow lake basin. Again the glacier retires, crouching under cooler shadows, and a cluster of steady years enables the dying glacier to make yet another moraine dam like the first; and, where the granite begins to rise in curves to form the upper dam, it scoops another lake. Its last work is done, and it dies. The twin lakes are full of pure green water, and floating masses of snow and broken ice. The domes, perfect in sculpture, gleam in newborn purity, lakes and domes reflecting each other bright as the ice which made them. God's seasons circle on, glad brooks born of the snow and the rain sing in the rocks, and carry sand to the naked lakes, and, in the fullness of time comes many a chosen plant; first a lowly *Carex* with dark brown spikes, then taller sedges and rushes, fixing a shallow soil, and now come many grasses, and daisies, and blooming shrubs, until lake and meadow growing throughout the season like a flower in summer, develop to the perfect beauty of today.

How softly comes night to the mountains. Shadows grow upon all the landscape; only the Hoffman Peaks are open to the sun. Down in this hollow it is twilight, and my two domes, more impressive than in broad day, seem to approach me. They are not vast and over-spiritual, like Yosemite Tissiack, but comprehensible and companionable, and susceptible of human affinities. The darkness grows, and all of their finer sculpture dims. Now the great arches and deep curves sink also, and the whole structure is massed in black against the starry sky.

I have set fire to two pine logs, and the neighboring trees are coming to my charmed circle of light. The two-leaved pine, with sprays and tassels innumerable, the silver fir, with magnificent frouded whorls of shining boughs, and the graceful nodding spruce, dripping with cones, and seeming yet more spiritual in this campfire light. Grandly do my logs give back their light, slow gleaned from suns of a hundred summers, garnered beautifully away in dotted cells and in beads of amber gum; and, together with this outgush of light, seems to flow all the other riches of their life, and their living companions are looking down as if to witness their perfect and beautiful death. But I am weary and must rest. Good night to my two logs and two lakes, and to my two domes high and black on the sky, with a cluster of stars between.