OUR COUNTRY·WEST·

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Pribilof Island Seals. See Page 49.

THE COMPANION SERIES.

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Our One American Castle.

Away up in Alaska, the northwesternmost part of our country, lies the strange old tumble-down, sleepy, little moss-grown town of Sitka, where stands our one American castle.

Crowning a rocky headland that rises precipitously from the water on three sides and descends with a steep slope to the town on the other, is the castle, with a small but somewhat formidable-looking battery at the foot of the terrace on the seaside.

The castle is one hundred and forty feet long and seventy wide, and is built of heavy cedar logs. Copper bolts, piercing the walls, rivet it to the rocks.

The Russian governors of the colony held residence in the castle, and traditions of the social splendor that reigned there still cling to the weather-beaten building.

With the Alaskans all things date back to the transfer of Alaska to the United States. Here, in the days before this transfer, princes and barons ruled. Something like regal splendor prevailed in Baranof Castle, as the palace was called in honor of the first governor.

Travellers in the early part of the present century give charming pictures of social life at Sitka. State dinners were given once a week, and a constant round of balls and festivities was kept up.

Baroness Kupreanof crossed Siberia on horseback to Bering Sea in 1835, in order to be with her husband at Sitka. There she made the castle a place of rendezvous for all classes of society, extending to each a charming and gracious hospitality.

A big brass samovar, or tea-urn, was always boiling in the dining-room, and by day or night a glass of the choicest caravan tea was served to every visitor. Beautifully wrought

samovars were brought out from Russia by the leading families. Specimens of these curious old urns may still be found in the curio shops, though they are rare.

The governors brought all their household goods from Russia, and in spite of the difficulties of transportation, surrounded themselves with many luxuries. The castle was richly furnished. The walls of the rooms were lined with mirrors and covered with Oriental hangings. On the waxed floors were buhl and ormolu chairs and couches, tables and cabinets. Such are the recollections of some who remember Sitka as it was before the transfer. In those days we called Alaska "Russian America."

October 18, 1867, was a beautiful, bright day, and the landlocked bay presented a brilliant panorama, with three United States vessels—the "Ossipee," the "Jamestown" and the "Resaca"—lying at anchor and flying their colors in the harbor. Farther out to sea were anchored the Russian fleet, gay with bunting. From every pole and roof in the town fluttered the Muscovite colors, in an almost unbroken line, from the castle to the pier.

At three o'clock in the afternoon the United States troops, the Russian soldiers and the state officials assembled on the castle terrace, at the foot of the tall flagstaff, from which floated the great Russian standard. The white inhabitants of the town gathered around the group, while a swarm of dusky aborigines formed the background.

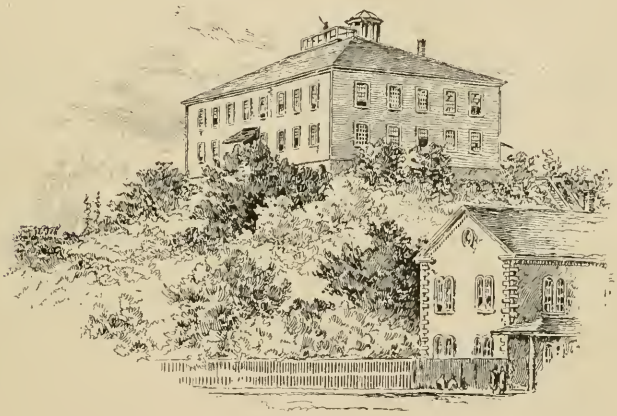
As the clock in the government building struck the half-hour, the signal was given to lower the Russian flag, and simultaneously the battery of the "Ossipee" boomed out the national salute to the descending colors.

Then, as the American flag ran up the line, and the Stars and Stripes floated out on the breeze, a prolonged cheer that rang over the waters came from our three ships, while the Russian water battery on the wharf returned the national salute to the American eagle. After a few more formal ceremonies, the reign of America had begun.

In 1869 Mr. Seward and an official party visited Sitka, and were entertained in state at the castle, where General Jefferson C. Davis held command. The festivities made the last gala season the place has known.

Secretary Seward carried away a large collection of Alaskan curiosities and souvenirs. By the etiquette of the country, the fur robes laid for him to sit on in the lodges of the chiefs were his forever after, and the interchange of gifts made his visit one long to be remembered among the natives.

Mr. Seward took with him a dance cloak, covered with



The Old Castle.

Chinese coins, which the Russians had probably obtained in their trade with China, and sold to the Indians for furs. When the Chinese Embassy visited Mr. Seward afterward at his home, they gave him the names of the coins. Some of these dated back to the fifth century, and others to the first century of the Christian era.

When the castle was turned over to the United States authorities as government property, it was magnificently furnished and in perfect condition; but in the period after the

troops were withdrawn and before the civil government was established it was neglected, like everything else, and has been completely stripped, spoiled and defaced.

Every portable thing has been carried off — the beautifully wrought chandelier, the queer knobs and massive hinges of the doors, even the huge old porcelain stoves from Russia. The great lantern, and even the reflector that sent its beams over the sea, have all disappeared, and the place is little more than a ruin.

The hall where the governor received and entertained the Indian chiefs is a rubbish heap. Of the quaintly carved railing that fenced off a little boudoir in the great drawing-room, nothing remains, and not a vestige is left of the grand billiard-room to show that it ever existed.

The signal officer has rescued two rooms on the ground floor for his own use, and some inferior law courts are held in two of the bare upper rooms.

The only other tenant of the castle is the ghost of a beautiful Russian princess, who is said to haunt the drawing-room, the northwest chamber, where she was murdered, and the governor's cabinet, where the swish of her trailing wedding gown "makes the bravest turn coward, and the blood of the listener run cold." So at least the superstitious of Sitka like to tell.

At Easter time the princess is supposed to wander from room to room, leaving a faint perfume of wild roses behind her as she passes. The superstitious tale gives the last touch of sentimental interest to the old, weather-beaten castle of the Russian governors.

LEIGH YOUNGE.

PUBLISHERS' NOTE. Since this article appeared in THE YOUTH'S COMPANION the old castle has been destroyed by fire.

Sitka and Its Inhabitants.

The scenery of the inland passage from Portland, Oregon, to Sitka is hardly surpassed by anything in Switzerland or the Tyrol. The mountains, it is true, are only four thousand feet high instead of fourteen thousand, but in place of the barren masses of the higher Alps, these are covered to their very summits with dense forests of rich dark-green firs very much like the famous old majestic Norway spruce.

This inland passage to Alaska is made by a chain of islands, which begins with Vancouver and extends to Cape Ommaney, sixty miles south of Sitka. There are some breaks in the chain, where for two or three hours the steamer passes through open sea; but for nine-tenths of the distance the water is as smooth as the Hudson River. Day after day the steamer glides through a grand canal, in many places barely a mile wide. The water looks black in the shadows of the almost perpendicular mountain walls, tipped with snow and glittering in the summer sun, while frequent cascades make slender ribbons of foam amid the rich masses of evergreen.

As our steamer entered the mouth of Sitka harbor, which begins soon after Cape Ommaney is passed, the sharp back-fins of innumerable porpoises rose as if by enchantment on every side. "They always wait here for the steamer," said the captain, "and keep her company to the wharf."

As the steamer made fast to the wharf, she was immediately surrounded by canoes filled with Indian natives. We were at once struck with the total unlikeness of these people to the Indians of the United States. The Siwash, as the Sitka tribes are called in their own language, are a short, thick-set, heavily-built race, whose traits much more resemble the Eskimos than the North American Indians.

Many of them had their faces blackened, which meant that they were in mourning for relatives. We learned

that the village contained two sub-tribes, and that when a death occurred all persons belonging to that tribe went into mourning.

We soon approached the Indian village. It is built on the edge of the water, like all the Alaska settlements; the natives are all maritime tribes. The houses were square, substantial huts of logs, covered with thin boards and arranged with some regularity.

If the first glimpse of the Indians was disappointing, the old Russian village of Sitka we found picturesque to a degree.

General View of Sitka.

For half a mile back from the shore the houses straggled in a rather graceful way, giving pretty curves to the one street, from which small alleys run in several directions. The level plain extends about a mile and a half farther back, to the foot of Verstovoi, a mountain about three thousand feet high, which, like all Alaskan mountains of moderate height, is densely wooded to the very top.

The bit of ground on which Sitka stands is probably the only level spot on the island. Behind Verstovoi, peak rises upon peak, forming a grand terrace that ends in an

immense table, almost level and of great height; for there, in July, glittered a great glacier, piled up thousands of feet.

In the centre of the village stands the cathedral of the Orthodox Greek Church, whose dome, in Russian fashion, was once bright green, but now is sere and yellow.

The population of the white town of Sitka, at the period of my stay, was about three hundred and fifty. It was of every shade and race, from the blond Scandinavian to the nearly pure Aleut, with broad, flat face, little, glittering, beady eyes and coarse, straight hair. There was a handful of Jews —the true pioneers of civilization — who drove good bargains, and made a living with pluck and patience.

The two villages, white and native, are separated by a high stockade, which is surmounted by a sentry-box, from which the Indian village can be overlooked. A gate in this stockade is opened at nine o'clock each morning and closed at three in the afternoon. Every day, as soon as the gate opens, a long procession of squaws and children, with a certain number of men, depending upon the season, file in. Nearly all the women have something to sell. They offer food, ornaments, bead work, wood-carvings, and baskets so closely woven as to hold water perfectly.

After disposing of their wares, the squaws spend the remainder of the day much as their civilized sisters might, in shopping —that is to say, they bargain for cheap calicoes, and sun themselves on the porches of the stores. Their lords and masters waddle, rather than stalk, about the village, showing as keen an interest in molasses as their wives do in bright calico. Molasses appears to be the thing most dear to the Siwash's heart. From it he makes one of the vilest and most intoxicating of drinks.

Just before three o'clock a non-commissioned officer of the guard, with a party of soldiers, marches through the town, gathering in the Indians; and the long procession, which has been steadily increasing during the day, files solemnly back through the big gate, which is then closed.

The government of the tribe was nominally in the hands of the hereditary chief, An-na-hootz, but the really influential men in the daily affairs of the Indian village appeared to be Sitka Jack, the politician, and Skin-ne-ah, the millionaire. Neither of these was a chief by descent, but they had gradually acquired the influence and assumed the rank.

Skin-ne-ah was the Vanderbilt of the tribe; he must have owned at least fifty blankets, which are a Siwash's chief wealth.

As Sitka was an Indian reservation, there was absolutely no law or authority in the territory except the will of the military commander, who was also Indian agent. As the laws in regard to furnishing liquor to Indians are stringent, no molasses was allowed to be sold except upon a written permit; for though the natives used it as an article of food, they would, if they could get enough, make liquor of it.

In spite of their rum-making and drinking, the Siwashes are probably the most peaceable Indians on the continent. They sometimes commit petty thefts, but we never saw any disposition on their part to make serious trouble. This was fortunate; for the position of a garrison of eighty men, separated by a stockade only from a village of certainly six hundred Indians, would be very critical if the Indians were hostile, or even of doubtful disposition.

Practically, the Indians' only weapon is the old Hudson Bay smoothbore musket. The Indians were not even good shots with this poor weapon, and rarely fired at anything farther away than fifty yards. Though they manage to kill more deer in a season, probably, than are killed in any other part of the United States, they are chiefly indebted to their dogs for their success. The dogs are curious fellows, resembling large coyotes, with coarse hair, erect ears and bushy tails.

When the Indians want venison, they paddle over in their canoes to one of the islands around Sitka, all of which swarm with deer. Here they put their dogs ashore, and then draw off a very short distance from the land.

The dogs find the deer, and drive them into the water at a point exactly opposite the place where the men are waiting; and the Indians shoot them at short range in the water.

The Indian River, which flows back of the village, is a favorite spawning-ground of the salmon; and on their way up the stream great numbers of the fish are speared, or rather hooked, by the Indians. They use a long, light pole, with a short piece set on at an acute angle and projecting back like a big triangular barb. This is armed with an old razor or knife-blade.

An Indian stealthily approaches one of the deep holes along the bank, and gently dips one end of his spear beneath the surface. Keeping as far back and as well concealed as possible, he stands motionless for an hour at a time. Suddenly, with a quick jerk, he raises a twenty-pound salmon struggling on the murderous blade.

We could not learn much concerning the Indians' religious belief. They do not seem to worship idols, although they hold certain animals in great reverence. The raven is regarded as peculiarly sacred; and this is not to be wondered at, for the Sitka raven seems the embodiment of wisdom and cunning.

During the Russian Christmas holidays, which last two weeks, all the people belonging to the Greek Church go about masked, and there is a ball almost every night.

Alaska has proved to be worth many times the seven million dollars which the United States government paid for it. Aside from the very valuable seal fisheries, the mineral wealth of the country promises to be prodigious; the timber is superb in quality, and practically exhaustless; and the salmon crowd its waters in countless numbers.

Edward Field, U. S. Army.

Indian Canoe-Building.

While the inland waters of the northwest Pacific coast swarm with Indian canoes, a white man rarely sees an Indian building one of these graceful craft. For this fact there may be several reasons.

First, as the canoes are made of cedar, and carefully protected from the weather when not in use, they are long-lived; hence it is not necessary for the same individual often to provide himself with a new one. Then the Indian much dislikes to let a white man see his canoe in the process of construction; this may be both from native shyness and a desire to keep secret the traditional modes of doing the work.

It was, however, once my good fortune to come suddenly upon a very aged Indian working upon a half-finished canoe. Among these people the canoe-builders are old men; probably because they become, from long experience, more skilful than the young men, and also because they are physically unfitted to engage in the more arduous labors of hunting and fishing.

On returning from a short hunting tour on a sultry day in June, I came from a dense thicket into a small opening, and took the little, withered old Indian artisan completely by surprise. His shipyard contained, perhaps, two or three square rods of pretty level ground overgrown with moss. He was sitting astride of a cedar log, which was supported by two skids ten or twelve feet apart. The log, or canoe that was to be, was about fifteen feet long, and two and a half feet in diameter.

The partially fashioned craft was bottom up, and the builder was chipping off the sides with a buckhorn adze. This primitive tool consisted of a curved piece of buckhorn, lashed by rawhide thongs to a wooden handle eighteen inches

long. The cutting edge of the adze was smooth and well-polished from use. It sank readily at each blow into the soft, corky wood. At intervals, in order to dislodge a tough chip or knot, the little carpenter used a buckhorn chisel and stone mallet.

The older Indians have a great reverence for the primitive implements of their fathers, and they work for days together with them, when the same amount of labor could be done in a few hours with modern edge tools, purchasable at the settlement for a small sum. In contemplating this curious scene, I was brought face to face with the stone and bone age of prehistoric times.

At first the old Indian did not seem disposed to be sociable, but I did not take offence, for I knew that few of the older men and women of his tribe are able to speak English. But no sooner did I fill his shrivelled hands with sandwiches from my capacious haversack, and address him in Chinook, than every wrinkle on his leathery face was a smile, and he readily answered all my questions.

From his quite lucid account, it seems that when the red man wants to make a canoe he fells a cedar-tree, or finds a prostrate trunk of the requisite dimensions. He then cuts out a section of the desired length, peels off the bark and hollows out the log, leaving a smooth surface upon the sides and bottom from end to end.

The log is next turned over, and the outside fashioned into the exquisite model so much admired by all those who have seen these beautiful specimens of Indian naval architecture.

The log is hollowed by burning and chopping. After the fire has been started on the top of the log, it is so carefully watched and skilfully directed that when the burning is finished, the big piece of timber is neatly hollowed with marvellous symmetry of form from bow to stern; and the whole concavity is left so evenly charred that when the surface is worked down to the sound timber by means of the buckhorn adze, little further alteration is necessary.

When the log is turned over, with the hollow side down, a slow fire is again brought into requisition for shaping the exterior, and again the surface is neatly worked down till the sound timber appears. Of course the buckhorn implements cut pretty easily through the charred wood.

Since the settlement of the country by whites, the Indians have felled trees for their canoes with axes; but previous to that time all this was done by burning and by stone implements, the fire being so directed as not to injure the portion from which the canoe was made. Hence, I may say that I

An Indian Canoe.

have seen many beautiful canoes, some capable of carrying a dozen persons, made from a standing tree, without being touched by a tool of steel or any other metal.

The inside and outside having been finished, the next thing to be done is the "stretching," without which the crude dugout would be wholly unseaworthy. To do this, the canoe is set level on a firm skid foundation and filled with water. A fire is then kindled and stones, heated red-hot, are thrown into the canoe till the water boils.

By taking out and reheating the stones the water is kept boiling till the walls of the canoe, which are not more than an

inch thick, become as pliable as sole leather, and capable of being stretched a foot or more beyond their normal width.

Nicely fitting sticks are now put in transversely along the gunwale, increasing in length from the ends to the middle. By means of these stretchers, a cedar log two feet and a half in diameter will make a canoe of three or four feet beam ; the width of the canoes varying, of course, according to length. When the sides have been brought to the required curvature, the water is emptied out and the elegant shell suffered to dry thoroughly but without cracking.

By way of finishing touches, the canoe is smeared inside and out with fish-oil, and then painted in bright colors.

It may not be generally known that the fine curves which distinguished the bows and sterns of the original speedy Baltimore clipper ships were suggested by the models of these Indian canoes. Such is the fact, however, and in later years the builders of ocean steamships have copied the same exquisite lines.

One of the characteristics of these canoes is that their motion causes very little disturbance of the water, whether light or heavily laden, and whether slowly or swiftly propelled. Thus their shape is consummate art in shipbuilding. How did rude, untutored Indians discover it? Of course not all at once.

For unknown ages these people were constructing canoes with slow increments of improvement from one generation to another until at last they worked up to a model which proved fast and yet best suited to their needs. As none of them could improve the model they adhere to it, and all their canoes are of that pattern.

L. Neven.

Cannery at Karluk Spit.

At a Salmon Pool.

We had stopped at a cannery near the head of Tongas Narrows, to take on board two thousand boxes of salmon, and so had an opportunity to land and see the place where the fish are taken. A walk of half a mile through the evergreen forest brought us to the little river near the foot of a cascade fifteen or twenty feet in height.

The stream foams down over rugged ledges of pale gray slate, overhung by enormous firs, while fallen tree-trunks cross and half-blockade it. At the foot of the rocks is a series of three or four picturesque pools of eddying water, about thirty feet in breadth and six or eight feet in depth.

The pools were full of restless, circling salmon, all pressing up to the foot of the falls. The foremost ones, bent crescent shape, were constantly leaping upward, some gaining the water above at the first spring, some falling back into the throng beneath to repeat their effort.

From the bay below thousands were pressing up into the pools, impelled by the instinct which leads every salmon to return, after its ocean wanderings, to deposit its spawn in the river in which it was hatched.

Such was the pressure of the throng in the pools that the top of the mass of fish was at intervals lifted nearly out of the water, so as to suggest the idea that one might run across the pool on their finny backs. Yet all were in constant motion. Through the limpid water their dark purple backs reflected the richest of tints, with here and there the white gleam of a fish capsized in the press.

No one could witness such a scene without becoming intensely interested in it. One watched the frantic leaping of the beautiful fish with the same kind of feeling which he has in watching a boat-race — as if he were trying to help the contestants by mental encouragement and muscular repression.

The more excitable spirits among us, men as well as women, shouted and screamed like school children. Crouching and bending over the rocky verge of the pools, they clapped their hands when one of the fish succeeded in making a good leap.

It was a scene to carry long in one's memory: the white, dashing waters, the huge, dark-green overhang of the firs, the wild thronging of the salmon in the clear, cold pools, the dead and dying fish, floating helplessly out in the eddies. Flapping ravens croaked overhead and bronzed dragon-flies whirred above the water's surface.

To all this spectacle of animated nature, annually repeated here through thousands of years, add the unusual element of a hundred tourists from the steamer rushing about the pools in the wildest excitement, hallooing, screaming, hastily rigging out rods, hooks and spears, and even cruelly firing into the poor fish with pocket-revolvers, and the reader may be able to picture to himself the scene presented on this August afternoon.

The business of canning salmon is now rapidly pushing its way northward from the Columbia. At present there are about a score of canneries in southern Alaska. They are generally situated in some deep bay, or arm of the sea, surrounded by dark green mountains, or gray cliffs, capped with mist, and near the mouth of some river, or large brook. All these streams are the old-time haunts of the salmon, and here they are easily captured in nets and weirs.

The canneries are rudely constructed, but commodious sheds, beneath which is placed all the apparatus for dressing, packing and testing. This includes steam-power machines for filling the cans, ovens for heating, a shop for making the cans from sheet tin, and a carpenter's shop.

At the very picturesquely located cannery which we visited we found two or three Americans in charge of the property. About twenty Chinese were doing all the work, including tinsmithing, and testing the filled cans by heat, prior to

sealing them. Indians are also employed, mainly to catch the fish and for chore-work. At some of the canneries the Indians are paid a stated price for catching, one cent a pound, or ten cents for each salmon caught. The salmon of these small rivers usually range, during the summer months, from four to ten pounds in weight. Almost every cannery either owns or hires a small tugboat, for a tender, to bring in the fish caught at different points.

After the cans are filled with fish, they are put in ovens

Salmon-Packing.

and raised to a temperature of two hundred and fifty degrees Fahrenheit, then tapped to let out the steam, and afterward soldered air-tight.

Five varieties of salmon ascend the rivers of Alaska, the largest of which not unfrequently attains a length of six feet and a weight of one hundred pounds. This giant is occasionally caught in the Columbia River, but its favorite haunts are the Yukon River and the rapid streams flowing into Cook's Inlet to the west of Mount St. Elias, where the Indians take it in great numbers.

The most northerly river of the globe which salmon are known to ascend is the Colville, in northern Alaska, which flows into the Arctic Ocean, in latitude 71° north. Kotzebue Sound, with the five or six rivers flowing into it, is the most northern place where salmon are taken in considerable numbers. Only one variety, the little hump-backed salmon, reaches this latitude.

Alaska is a true home of the salmon, and will undoubtedly be one of the great fishing-grounds of the world. Were these fisheries judiciously managed, no decrease in the enormous numbers of fish need be apprehended.

More fish now attempt to ascend the rivers during the spawning season than their waters will contain. In the tumultuous rush to reach the spawning beds, far up the rivers, countless thousands of salmon are pushed on shore, or left stranded in pools and small ponds, as the water lowers during the summer months.

Nature seems to have no pity for them. In heaps and rows, or scattered, one by one, they lie rotting along the river and creek banks, the shallows and gravel bars. This destruction is nature's method of repressing the too rapid multiplication of the fish. The few thousand Indians who inhabit these wild regions, and who largely subsist on salmon, occasion no perceptible reduction in their numbers.

Like the spring tides recurs every season the impetuous rush of eager, reckless, struggling fish, surging far up every bay, river and brook, from Cape Mendocino to Cape Lisburne. To utilize this excess, to save this waste of good fish and distribute it as food to all quarters of the earth, is the business which the Alaska salmon canneries have undertaken. It is an enterprise well deserving of success.

C. A. Stephens.

The Loneliest Place in the United States.

My party of five white men and some Yakutat Indians had landed, through the heavy surf of the great Pacific Ocean, in an open bight called Icy Bay on the Alaskan coast just off the snow-clad peak of Mount St. Elias, the highest mountain in North America. Here we left one man to look after our many supplies, for numerous bear tracks, most of them of the huge grizzly, showed us that we could not safely leave the supplies unguarded.

Then we started toward the great mountain. It was our main object to make explorations in the range of which St. Elias is the culminating peak, where it was known that no white men had ever been before, and where all observations of the range had been from ships coasting by.

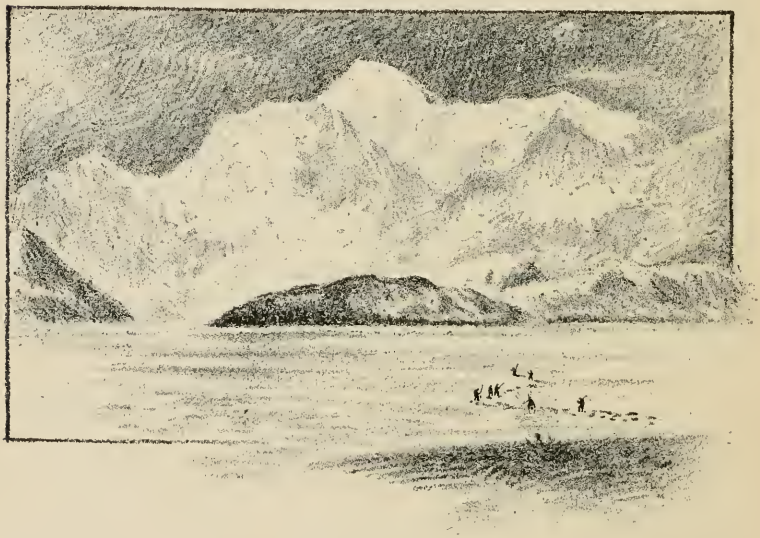
For some eight to ten miles the land was very flat, but for the most part covered with a dense growth of spruce and firs, and cut up by many small streams of the coldest ice-water from the great mountain's side and its glaciers.

This course brought us to a high ridge, some four hundred to five hundred feet from foot to crest, that looked not unlike the parapet of a fortification for giants, and much like the unbroken front of a rolling bluff facing the valley of a river. It was covered with earth, stones, and a growth of underbrush that made the casual observer suppose he was looking at an ordinary ridge of land.

But here and there a shining space of black, like a huge facet of polished jet or black glass, coupled with the proximity to the huge mountain covered with ice, plainly told the experienced observer that he was facing the front of a colossal glacier, or river of ice, and this rubbish was only the dirt, stones and soil it was shoving before it as it crept slowly toward the sea, or sought a lower level.

Once at the top of this ridge or crest that looked so much like an ordinary rocky ridge in the country, its true character is more plainly revealed, and one can easily see great banks of black ice where, from the front, only small patches peeped through, here and there. But we had to walk some six or seven miles before we really saw such ice as we are accustomed to see in our own latitude; and even then it was always of a bluish or blackish tinge.

The first day's travel of eight to ten miles across the



Mount St. Elias.

glacier, which I named the Agassiz Glacier, brought us in sight of a small island in this sea of ice, which we could plainly see was well wooded and beautifully grassed in rolling slopes, a most welcome relief from the long, dreary stretches of dirty ice in every other direction.

But a river and lake were between us and the beautiful island, and although the river was not hard to cross, so far as

any difficulties the stream itself presented were concerned, yet here the glacier showed perpendicular walls of ice so high that nothing less than a bird could have descended with safety.

Next day we reached the island after much difficulty, and encamped there two days. Thus far, as my Indians told me, one or two of the most daring hunters of their tribe had come, looking for mountain goats, the tracks of which we saw, but beyond it none of them had ever penetrated. They believed there was solid ice to the very top of the huge peak of Mount St. Elias, toward which we were then travelling, except where, in a few places, we could see great walls of perpendicular rock breaking through the covering of white snow and blue ice.

We advanced toward the base of Mount St. Elias, not expecting to see anything but ice and snow, or the worse bare rock, on which we were to sleep and camp until we returned to this island. This day's march covered ten or twelve miles to the northward over two distinct glaciers. To one of these I gave the name of Guyot, and to the other I gave the name of Tyndall.

Before the day's journey was over, however, we were surprised to see what appeared to be a great green spot just at the base of the mountain, which turned out to be another island of emerald hue in the white sea of ice. It was probably half a square mile to a square mile in extent, and well enough covered with grass to make a delightful camping ground, while brush was to be had anywhere with which to make a fine camp-fire, such as we soon had blazing before us. Beautiful rills and rivulets flowed through the greensward on which we spread our blankets; and to us, in our tired condition, it seemed as soft as any bed prepared by human hands.

Our Indians renewed their statements that this spot was unknown to any of their tribe and had no place in the traditions of their race; and this had been their country always, as they firmly believed.

In all my wanderings over the West or in Alaska I could never say, however desolate the place might be at the time of

my visit, that savage footsteps might not have been there before mine, until I stood on this little green island at the very base of solemn St. Elias, towering above us into the very skies.

There were a few tracks of the mountain goat, but none of these animals were seen while we were here. A huge grizzly was seen by a member of the party, but as our most formidable weapon was a penknife, we rather avoided than solicited a battle with him.

But the queerest life was seen in the ptarmigans, or Arctic grouse, which we encountered at different points. They had little chicks, about three to four weeks old, which had not yet got their wing feathers sufficiently developed to fly well, and of course had to escape by hiding in the grass and brush.

They were tame, both young and old, for they had never seen a human being before. The little ones made so few efforts to get away that we could pick up some of them with our hands, while the old ones pecked at our feet and flew angrily against us to drive us away. One of my men killed two or three with a stick. I bade him stop, as we had enough for a meal, and it was a very tough meal at that.

Green as the plants and grasses seemed to be, probably they would not have appeared so bright but for the contrast with the desert of ice. They must have been very hardy indeed, for I hardly think a week passes here without a severe frost, even in the warmest part of the summer.

The first night we spent here, July 25th, it froze so hard that when a pint tin cup three-fourths full of water was inverted, the ice on the surface held the contents firmly in the cup. The second night was not many degrees warmer. On both nights the earth was covered with a heavy hoar frost, seemingly severe enough to kill every known plant.

Lonely as this spot was, it was not without sounds to greet the ears of its few inhabitants; the rush of mighty avalanches down the sides of St. Elias. What thunders they created!

To represent them, take the greatest snow-slide of the Alps and multiply it by one hundred, and you will be under the truth. I have been in earthquakes, but I have never felt the ground tremble as it did on this little island when St. Elias sent a few square townships of ice and snow down its mighty sides. It felt as if the very earth were ripping open.

Mount St. Elias is the highest mountain in the world above the snow-line, which here hugs its very base, and of course there is no lack of material, nor lack of height to throw it, when it seems to wish to give an avalanche exhibition. When one of these snow-slides started from near the top, gathering force and material in its three or four miles of descent, it generally arrived at the base in a way that would fairly appall the stoutest heart, and make one imagine that the planets were bumping together in their orbits.

This, then, is the music, and such are the conditions under which live the few beasts and birds that exist at all in the loneliest place in the United States.

FREDERICK SCHWATKA.

Alaska Eskimo Houses.

It was on a dismal, drizzling, windy afternoon in September, when the rain froze as it fell and covered the rigging with a glare of ice, that we had our first sight of the Eskimo village at Cape Smyth, far up in the northwestern corner of Alaska. We were beating up the coast on our way to establish a station for observing the weather as near as possible to Point Barrow, the extreme northwestern point of the continent.

Perched on the top of the high gravel bank we saw a straggling line of rude, square stages mounted on poles ten or twelve feet high, planted among little irregular hillocks, interspersed with conical tents of white sailcloth ; but we soon found out that what we took for natural hillocks were the people's winter houses.

The villagers were not yet living in these habitations, for the underground passages were still full of the water which had run in during the open season. About a month later, when all the people of the village had come back from their summer wanderings, they came to borrow our pickaxes to clear out the ice from their houses, in order to get them ready for winter occupation.

These Eskimos of northwestern Alaska are more fortunate than their better-known cousins of Greenland and the regions north of Hudson Bay. Although the country they inhabit is entirely treeless, they find scattered along the beach plenty of driftwood, with which they build very comfortable wooden houses for the winter.

These houses are covered with a thick layer of turf, which serves to keep out the cold, but which also entirely hides the wooden building, and makes it look like a little rounded hillock. A lower mound, connected with the main building by a low ridge about thirty feet long, contains the door. To

enter the house you climb this little connected mound, in the top of which you find a hatchway, about a yard square, leading down by two or three clumsy steps into a long, dark passage, always icy on the floor, and just low enough to make you stoop to avoid striking your head.

As you grope your way along this passage, you see indistinctly that the walls are supported by props of whales' ribs, between which the frozen ground is hollowed out into little cupboards and store-rooms.

At the end of this passage a small, round trap-door admits you into the house. Standing in the trap-door, your head and shoulders are in the one room. There are no steps, and you must scramble up the best way you can. In the house at last you find yourself in a room nearly square, about ten feet by twelve, and about seven feet high under the ridge-pole. The two slopes of the roof are unequal, the longer running up from the side where the passage enters, and the house is shorter from gable to gable than it is the other way.

Under the shorter slope of the roof is the bed-place, or bench, stretching across the whole side of the room opposite the passage. This is about two feet and a half high in front, and slopes a little toward the wall. Here the men sit in the daytime, and at night the whole family range themselves upon it, side by side, under their deerskin blankets, with their feet to the wall.

The whole structure is made of thick planks of driftwood, neatly dressed out with the adze. The planks which form the walls are driven vertically into the ground, like the timbers of a stockade, and set closely together, edge to edge. The planks of the roof run up and down, from the stout ridge-pole to the low eaves.

Just above the trap-door is a space about two feet wide where short transverse planks take the place of the long ones, leaving a square opening for a window nearly in the middle of the roof. This window, and consequently the entrance of the house, always faces south in order that the most may be made

of the daylight, which for seventy days in the winter is only a faint sunset glow in the southern sky.

The window has no glass, but the Eskimos have in the translucent entrails of the seal a substitute for this which admits plenty of light, though nothing can be seen through it.

To light the room during the dark season, and at the same time warm it sufficiently to make an Eskimo comfortable, there stand on the floor, one at each end of the sleeping bench,

Eskimo Houses.

a pair of soapstone lamps of the sort which furnish light and heat in every Eskimo household, east and west. These are shallow dishes, neatly carved out of solid blocks of soft soapstone, somewhat like a half-moon in outline, and eighteen inches or two feet long. Along the front edge is arranged a wick made of fibres of moss, and the bowl is filled with seal or whale oil.

These lamps burn with a bright flame and very little smoke, and when the whole wick is lighted the flame often leaps a foot into the air. The lamps are the special charge of the women, who tend them carefully, trimming the wicks with little sticks, and keeping plenty of oil in the vessel. To feed the lamp, there is often a lump of solid blubber, as large as one's fist, held on a sharp stick projecting from the wall about a foot above the lamp. As the heat melts the blubber the oil drips into the vessel, and keeps it full.

As two families usually occupy one of these houses, each wife has her own lamp. Over the right-hand lamp hangs a wooden rack, shaped like a miniature ladder, upon which boots, mittens, and other articles are hung to dry. There is a similar rack over the left-hand lamp, and farther away from the bed, on the same side, a third rack, on which always stands a great cake of clean snow, dripping down into a wooden tub standing on the floor beneath. This is the family drinking-water.

This is all the furniture of the house. The household utensils consist of a few kettles, eight or ten tubs and buckets of various sizes, a few small drinking-cups made of whalebone, some wooden and horn or bone spoons and ladles, and several large trays and dishes carved out of blocks of soft wood.

With these simple appliances, the Eskimos live very comfortably. The lamps give sufficient light, and when both are burning well the temperature rises frequently to fifty or sixty degrees Fahrenheit, so that the Eskimos may sit, as they like to, naked to the waist.

Most of the cooking is done over a fire of driftwood in a little dark room with a smoke-hole in the roof, leading out from the left-hand side of the passage close to the door. The cleanliness of most of these houses is quite remarkable when the scarcity of water, even for drinking purposes, is taken into account. The floors are brushed and dry-rubbed with the greatest care, and the men are exceedingly nice about wiping their shoes and brushing frost and snow from their clothes before they enter the house.

At the back of the house stands an open staging, supported on poles of driftwood, upon which are kept the Eskimo's various utensils, and articles which it is desirable to keep out of the reach of hungry dogs.

A house like this is only fit to live in during cold weather, for as soon as there is a thaw the surface water runs down into the passage and fills it up. As soon as warmer weather comes, therefore, the household moves out, and each family sets up its own tent, first on the high ground near the village, and later in little encampments scattered along the shore, at spots where birds and seals are plenty.

Formerly the tent was always covered with sealskins sewed together with the hair outside. But nowadays there have been so many wrecks, and the ships have brought so much cloth for trade, that all the tents are covered with sailcloth or drilling. Drilling is preferred, as its lightness makes the tent much more easy to carry about. In winter, when the Eskimos go to the interior after game, they build snow-houses, but these are not the elegant and ingenious dome-shaped houses of snow which we usually associate with the Eskimos.

The most curious thing about them is the fireplace of snow, which is built out from the right-hand side of the entrance passage. It is simply a recess built of slabs of hard snow, open at the top, with a stick running across from side to side upon which to hang kettles. When we remember that at the season of the year when these fireplaces are used, the thermometer seldom gets as high as zero, and is oftener thirty, forty, or even fifty degrees below, we easily see that a moderate fire in a new snow fireplace would do little more than melt it on the surface.

In such dwellings as I have described, adapted to the different seasons of the year, the people of this far-off country manage to lead a comfortable and really a happy life.

JOHN MURDOCH.

Reindeer for Alaska.

A very interesting experiment for the propagation of reindeer in Alaska was begun a few years ago near Port Clarence, and now is in progress at several stations. From its beginning the enterprise, which is under the direction of Dr. Sheldon Jackson, Government Agent of Education for Alaska, has been a strictly benevolent one, largely supported by private contributions. Although the general government was asked for a comparatively small sum to begin the experiment, Congress was slow in making the needful appropriation.

The experiment aims to alleviate the hard lot of the Eskimo inhabitants of Alaska, who are, by the census estimate, not far from fifteen thousand in number. When the territory came into possession of the United States in the year 1867, by purchase from Russia, the native population was much greater. It is still diminishing steadily.

Three causes have led to the decrease: First, the slaughter of walrus, seals and whales on which the Eskimos subsist, by American and other whalemen; second, the extermination of the caribou by white hunters; third, the sale of intoxicants by traders. In short, the disheartening fact would seem to be that American occupancy, far from proving advantageous to the natives, has submitted them to so injurious a contact with our civilization that their ultimate extermination seems probable.

In marked contrast with the destitution and suffering of the Alaskan Eskimos is the condition of the similar tribes who inhabit the country on the other side of Bering's Straits in Siberia. These people no longer subsist on blubber and seal flesh, but like the Lapps, have large herds of reindeer from which they obtain their living almost wholly. For them the reindeer is food, clothing, house, furniture, implements and transportation.

Its milk and flesh are their ordinary diet. Its marrow, tongue and hams are cured and stored for winter use, and sometimes exported. Its intestines are stuffed as sausages. Its skin is tanned and made into garments, bedding, tents, harness, thongs and snow-shoes. Its sinews afford cords and thread. Its bones, soaked in oil, are burned as fuel. From its horns are fashioned household tools, sledge-runners and weapons.

Most valuable of all to them is the service of the living deer, which when trained to harness, furnish a speedy transportation. A well-trained deer is swifter than a horse, and has often been driven a hundred and fifty miles in a single day.

The moss-beds on the great northern tundras, or wastes, afford the proper food for these animals, in winter as well as summer; and great herds of them are bred with as little care and outlay as are the herds of cattle on the plains of Texas.

From observation of these conditions Doctor Jackson was led to hope that the reindeer might be brought to Alaska, and the Eskimos encouraged to breed and keep herds of them; for the plains and moss-beds of northern Alaska do not differ in any essential degree from those of northern Siberia. Bering Strait is but a narrow arm of the sea between the two countries; and it has been proved that the reindeer will thrive on both shores. The problem was simply to procure the deer from Siberia, and teach the Eskimos to breed and care for them.

So earnestly did Doctor Jackson urge the enterprise at Washington, during the winter of 1890–91, that the commander of the revenue vessel, "Bear," then cruising in Alaskan waters, was directed to coöperate with him in an effort to purchase reindeer from the Koraks, and transport the animals to American territory.

This proved a more difficult matter than would, at first thought, be supposed. The Koraks are a very primitive and superstitious people. It is not their custom to part with their

deer, and they have religious scruples about doing so. A great deal of kindly tact was required to bring them to entertain the proposition.

Certain ceremonies and rites are practised among them, even before a deer is slaughtered for food. The family of the owner seat themselves in a circle on the ground, as the sun is

Reindeer at the Central Station.

setting. The deer is then lassoed and led forward. The owner, facing eastward, now utters a kind of prayer; and when the animal has been knifed to the heart and has fallen, he takes a handful of the hair and casting it to the east, cries out, "Let there be plenty of deer!"

When finally prevailed upon to sell deer, the owners invariably cut off a handful of hair from each and cast it eastward, with a similar invocation.

In the summer of 1891, sixteen reindeer were purchased by barter, for goods worth one hundred and sixty-four dollars; successfully taken on board the "Bear," and brought to Unalaska Island, in American waters, where they wintered without loss, and with an increase of two.

During the following summer, 1892, one hundred and seventy-five deer were purchased, and the experimental station at Port Clarence founded. Four Siberian deermen were induced to go to Alaska with the animals, to act as instructors in the care of them.

From the landing of the first herd the reindeer seemed contented with their new home, and relished the food of the Alaska moss on which they have continued to thrive. The animals were easily managed through the winter. Several were broken to the harness, and gave valuable service in hauling to the station loads of driftwood for fuel.

Encouraged by the immediate success of the small herd, the government has imported other herds till, with the increase by birth, the number of reindeer in Alaska had become eleven hundred in the fall of 1896. From the Central Station at Port Clarence, where a large herd is kept, four other stations received about two hundred deer each, which were placed in charge of experienced herdsmen.

As it has been found that the best trained reindeer are in Lapland, several families of Lapps have been induced to come to Alaska to instruct both Eskimos and whites in herding and training the animals. These people have proved far more efficient than the Siberians.

Five years' experience seems to show that missionaries to that region can accomplish the best work by taking charge of church, school and reindeer together; hence, before many years every mission or school in northern Alaska may have its herd of reindeer.

Already the animals have been of marked service in their new home, though but few have furnished milk or flesh for human food, as the purpose has been to raise as many fawns as possible, and to kill deer for meat only in cases of necessity. But many have been trained to harness, and so become of great utility.

They have proved that in the coldest of winter weather long journeys may be taken which would be impossible with dog-teams, for after a hard day's march the reindeer readily finds his food by digging with his sharp hoof through the snow to the abundant moss.

Americans are beginning to look on the reindeer as their means of economical transportation to the rich, but hitherto almost inaccessible, gold-mines of the Yukon River, and so what was begun as a benevolent enterprise seems likely to result in a most profitable investment.

CHARLES ADAMS.

On the Way to the Mines.

On the Yukon.

On the left or southern bank of the Yukon River, almost on the Arctic Circle, lies Circle City, the first American Arctic town. It has grown up since 1894 out of the rush of miners to the gold-fields thereabout. Perhaps no town inhabited by civilized people was ever before built in so remote and seemingly inaccessible a spot, even in Siberia.

The miners who work the placer claims in the vicinity can reach it only by a most laborious and perilous journey, mostly on foot, in dog-sledges, and in canoes, of nearly nine hundred miles from Juneau ; for though in summer boats can go up the Yukon, the river opens so late that miners cannot arrive by water in time for the season's work, and must start over the land and inland-river route in March.

The nearest settlement to Circle City is one hundred and seventy miles away ; this is Forty-Mile Post, another American mining town. It is one thousand miles from any place of consequence. To transport freight to or from the mines, from Circle City, costs forty cents a pound.

However, in spite of its extraordinary situation, Circle City was at last accounts very prosperous. Its buildings are substantially constructed of logs, which cost from four to six dollars apiece. Rough, whipsawed lumber cost one hundred and fifty dollars a thousand. The unskilled laborer received ten dollars a day, and any kind of skilled labor was paid for at the rate of two dollars and a half an hour.

If prices are high at Circle City, they are low there compared with those which prevail up on Mastodon Creek, where the mining claims are located. At Circle City flour can be bought for sixteen dollars a hundred pounds ; but at Mastodon Creek it costs fifty-six dollars a hundred pounds. If gold-dust could be eaten it would almost seem better economy, under certain circumstances, to live on that than on flour.

However, the few men who strike it rich here find that they can afford to pay these prices. One man brought two hundred and eighty-six pounds of gold into San Francisco, for which he realized about $55,000. He had paid out to twenty working miners between $13,000 and $14,000 of the gold he had taken out of his claim in two months' time; but he had a fortune left.

Gold-mining of the sort that is carried on here was probably never before seen. Many of the claims are worked by burning; that is to say, a fire is built on the ground, which is forever frozen, and when a thin layer of the earth is thawed the mud is dug out, and the fire built again on the same spot. Little by little, in this painful manner, a shaft is sunk through the everlasting frost of the Arctic.

On Mastodon Creek, as a recent visitor has said, a glacier covers the pay streak for over half a mile. The glacier is from fifty to a hundred feet high and several hundred feet wide; yet all the ground underneath it has been located, and the glacier is being broken up by means of giant powder, so that men can get at the chance of finding gold beneath it on the claims they have bought there.

For this men separate themselves from the world and all chance of hearing from those who are dearest to them. For a long time every letter that any one in Circle City received, cost a dollar to bring up from the coast. Now the government brings the letters, but cannot bring newspapers, so that Circle City never sees a newspaper unless it is brought up by a new-comer.

All through the summer of 1896 the people of Circle City knew nothing at all about the presidential election, not even who were the candidates. However, business was good; the people, without any lawful government, made a government of their own, and lived peaceably, earning much money and paying much out, and eating canned and desiccated vegetables and moose meat in abundance.

Circle City itself is southern compared with mining

districts that are likely to come into existence in Alaska. Prospectors are scattering themselves all about the Arctic wastes. Rich gold has been found in a district called the Kuokuk, which is two hundred miles northeast of Circle City. If that district should be developed, the terrors of the gold-hunting journey would be increased.

This journey is already one of the most formidable ever undertaken in search of gold. The first hundred miles from Juneau, which is on salt water, is made by steamboat; then the canoe is used for six miles; and then a rugged mountain must be climbed on foot to the summit at Chilkoot Pass. This climb is one of great hardship; Indians are commonly employed to assist in carrying the miners' burdens. Blizzards rage here as late as April, and many lives have been lost.

Beyond the summit there is a steep descent; and hereabout dog-sledges are employed as far as the head waters of the Yukon River. From here the boats are resumed; and in the Lewes River, which flows into the Yukon, the terrible White Horse rapids, where many expeditions have been wrecked and many adventurers drowned, must be passed. Below these, again, are the Five Finger and Rink rapids; but the Yukon itself affords few difficulties, compared with the journey up to that point.

With all this toil and danger in reaching them, the Alaskan gold-fields certainly afford a good return. A great value in gold has been added, through them, to the wealth of our country; but fortunes, too, have been swept away in getting it.

J. E. CHAMBERLIN.

Volcania.

It gives one but a slight idea of the extent of Alaska to hear that it has an area of more than five hundred thousand square miles. We may, perhaps, illumine this bald numerical fact somewhat by stating that Alaska is as extensive as the entire Eastern, Middle and Central States east of the Mississippi, with Virginia and the two Carolinas thrown in.

As the great West fills with inhabitants, the grand fisheries of Alaska and its unrivalled resources of timber and the precious metals will eventually make it the residence of a considerable white population.

It is not to be supposed, however, that this vast extent of territory can be included within the limits of a single state. Nature, indeed, has indicated three divisions of Alaska, and we may amuse ourselves by naming somewhat in advance of history these three future states of the far Northwest.

First, Southern Alaska, embracing the thousand islands of the Sitkan or Alexander archipelago, and the mountainous coast south of the snow-clad Rocky Range as far west as Cook Inlet, may bear the name of Oceana, since nearly half of it is in the ocean.

Second, the territory north of the mountains, consisting of the valley of the Yukon, and the great northern plains, which stretch away to the Arctic Ocean, may well retain the name of Alaska, the "great land."

Third, the Aleutian Islands, including the large island of Kadiak and the isolated peninsula of Alaska west of Cook Inlet, may, from the great number and grandeur of their volcanoes, be very appropriately named Volcania.

Oceana, Alaska, Volcania, the three far Northwest States of the great Republic! There can be no harm, at least, in thus designating them for the moment.

It is of the wonders of Volcania that we wish now to speak. Nowhere in the world is there a region so favorable for studying volcanic phenomena as the Aleutian Islands and the Peninsula of Alaska. The mountains, almost submerged in the Pacific, stretch out from America toward Asia for a distance of over two thousand miles, till the last rocky peak finally disappears beneath the waves beyond Attu, six thousand miles west of Boston.

Our fancifully named State of Volcania is thus more than two thousand miles in length from east to west. Of how many islands it consists, or how many craters smoke along this vastly extended chain of islets, no one yet knows.

Unimak.

The first island of the chain, looking westward from the end of the Alaskan peninsula, bears the native name of Unimak, and may be represented as the rocky roof of a vast subterranean furnace out of which tower two grand chimney-cones, Shishaldin and Pogrumnoi Sopka, or the booming mountain.

Shishaldin, the loftier of the two, is by far the most beautiful and symmetrical volcanic cone in America. It is entirely of volcanic formation, and rises directly from sea level to a height of nearly nine thousand feet. A jet of white vapor rises constantly from its summit.

At times the white steam cloud darkens, in sympathy with its more unquiet partner, but it has not been in a state of eruption during the last century. The sides and flanks of the cone are marked by the blackened pathways of many old lava torrents, distinctly visible when the warm suns of July melt away the snow-fields that clothe the mountain above an altitude of three thousand feet for nearly the entire year.

Pogrumnoi has a rougher outline, and a broad, double-

peaked summit. Its altitude is estimated at five thousand five hundred feet. Its sides are strewn with enormous black boulders which lie embedded in glacial ice. Its cap remains black during the entire year, the heat of the crater melting the snows as they fall.

Smoke, inky black in color, is seen rising from its summit every few days, and sounds as of low, muffled thunder-peals are frequently audible over the whole island, accompanied by alarming tremors of the ground.

Westward a few leagues from Unimak, the smoking head of another seared and blackened cone is plainly visible, when the fog banks which lie heavy along the straits lift a little. It is four or five thousand feet in height, a great and constant smoker, but not recently eruptive.

The next island, looking westerly, is Unalaska, on which is located a trading hamlet, containing a population of less than five hundred Aleuts. There is another snow-clad volcano, an occasional mutterer, but generally a peaceful smoker

Unalaska.

The natives regard it with pride and veneration, and take pleasure in contrasting its model behavior with that of other more restless craters on neighboring islands. They fancy that seen from the north it resembles a gigantic human form, laid out for burial, with a white shroud thrown over the upper portion of the body.

Sailing westerly again, the next island reached is Umnak, in the interior of which smokes a lofty volcano. Twenty miles to the north of Umnak, the peak of Bogoslof towers above the pale-green waters of Bering Sea. This islet is remarkable for having risen out of the ocean within the memory of living men. It is the youngest island of the

Aleutian chain, and its fiery birth was attended by exceedingly grand volcanic and marine phenomena.

Beyond Umnak, islet succeeds islet for over six hundred miles, far over toward Asia; among these is Atka, where are hot springs, mud volcanoes and paint-pots fully equal to those in the Yellowstone Park.

Attu, the most westerly point of land where the American flag flies, is an island fifteen or twenty miles in extent, and of volcanic origin, like all the others of this long chain. It is inhabited by about a hundred hardy, honest-hearted Aleuts, and half-breeds of mixed native and Russian parentage, who subsist by seal-hunting, fishing, and the propagation of foxes and domestic geese.

They are so honest and kind that no explorer or visitor need have the least fear of going among them, alone and unarmed. They engage in seal and whale fisheries to some extent as a means of livelihood, but their principal business is the pursuit and capture of the sea otter. An expert Aleutian hunter sometimes clears two thousand dollars a year from this industry alone.

Aside from fish and the flesh of young seals, their food supply comes to them mainly by way of the traders to whom they sell their furs. Their houses are warmed by American cast-iron stoves; they use American breech-loading carbines and cartridges; they send their children to school, when it keeps, and to Sunday school, and they would vote at the presidential election if they could.

In short, there seems to be no good reason why Volcania should not be admitted as a state, as soon as the population reaches the necessary figure. But that will be a good many years hence.

C. A. Stephens.

Sod House and Skin Boat.

The Hermits of Western Alaska.

At the present time it is unusual to find men living alone, cut off from communication with the world by land and sea. We think of hermits and waste places as things of the past. Yet on the coast of western Alaska there are men who live as much apart from their fellows as did the famous hero of Defoe.

Many of the small islands situated near the large island of Kadiak have been leased for a term of years from the United States government by various fur companies, who have stocked them with silver-gray foxes. It is customary to keep a man on each of the small islands to prevent the foxes from being molested by hunters. In the course of a trip along the Alaskan coast I had an opportunity to visit several of these hired hermits.

Ugak Island, like most of those selected for the breeding of foxes, is small. It contains only about sixteen square miles. Like the main island of Kadiak, it consists of high mountains barren of trees, but covered with a dense growth of grass. The long twilight of the northern summer day was beginning when the little salmon-cannery tugboat on which I was a passenger steamed along the extremely bold and precipitous east shore of Kadiak, approaching Ugak Island.

The huge grass-covered, snow-topped mountains which rise in endless succession toward the interior of Kadiak are broken off at the coast in magnificent sharp cliffs, which often rise abruptly to the height of a thousand feet.

Long, broken lines of jagged rocks jut out into the sea from all the cliffs and promontories, and their distorted masses take on all manner of grotesque shapes, often forming natural rock arches. The approach to Ugak Island from the north is through a labyrinth of these rocks, and a minute knowledge of the wild coast is necessary in order to navigate with safety even a small vessel.

A strong wind from the north drove the long swells down the coast, causing the spray to flash among the black rocks, while the white lines far ahead showed where the sea broke on the cliffs of Ugak. Taken altogether, the gigantic, black-looking mountains, the dark, open sea, and the heavy, low-rolling clouds, made a grand scene of solitude and desolation.

As our little steamer came to anchor about a half-mile off the shore, and just outside an immense bank of kelp, it seemed hardly probable that the island possessed any inhabitants. A field-glass, however, showed a small boat drawn up some distance on the beach. Toward this, after some moments, the figures of a man and dog were seen moving slowly. The visit of the steamer to Ugak was for the purpose of furnishing provisions to this solitary man, who did duty as watchman on the island.

Silver-Gray Fox.

As we watched the man shoving his boat toward the water, the dog could be seen rushing here and there, apparently very much excited, and after the boatman had begun rowing out to us, the animal continued to run up and down the beach, and from the edge of the grass to the water. With quick, vigorous strokes the man pulled his dory to the steamer's side. As he stepped aboard, we saw a man of powerful build, somewhat past the middle age, and carrying with him a hopeless, despondent air. He greeted us pleasantly, showing by his broken speech a foreign origin, probably Norwegian.

He told us that before our coming no boat had approached the island in nine months. The only person he had seen during that time was a man who lived alone, like himself, on another island, five miles distant. In times of pleasant weather, when the sea was calm, and the surf not too great for landing on the beach, these two men could exchange visits by means of their small boats.

The man's manner of speech partook of the same air of discouragement which marked his whole bearing. Having received from the captain a few newspapers of the latest date that we had, and a single letter bearing a European postmark, he commenced loading the boat with his stores for the winter.

In silence he took the supplies of flour, coffee, rice, sugar, tobacco and ammunition which were handed down to him, and stowed them under an old piece of sail-canvas in the little boat which monotonously jarred and rubbed against the vessel's side. When he was ready to depart, he offered to take us ashore in his boat. We gladly availed ourselves of the opportunity to see his hermit abode.

When we touched the shore, the dog, whose wild barking we had heard for some time, and who proved to be a tremendous fellow, rushed upon us, frantic with joy at the sight of a group of human beings.

As we followed our guide toward the strip of meadow which skirted the foot of the mountain, we looked for his dwelling, but even at close range it was difficult to make out the hut amidst the tall, coarse grass which commenced almost at the water's edge. Like all the sod huts which I have seen along the western shore of Alaska, this one was chiefly distinguishable as a dwelling by the glass windows which could be seen half-hidden in the green turf covering the sides. A bit of stovepipe was also visible, projecting amidst the grass of the low, rounded roof.

On looking in at the door, nothing could at first be seen on account of the failing daylight. When a candle had been lighted, however, the furnishings of the single apartment became apparent.

A small stove occupied one corner, and by it were a few sticks of driftwood. Part of an old ship's bunk served as a bed, and opposite to it stood a large, bare table. On this was a dismantled oil lamp, evidently in disuse; a bottle holding a lighted candle; a few books, pipes and tobacco, and old copies of San Francisco newspapers. Chairs, benches, a seaman's

chest, and shelves with cooking-utensils made up the rest of the furnishings. Provisions were kept in a small hut behind the living house.

In course of conversation the islander informed us that driftwood was always to be had in plenty along the beach, so that he never lacked for fuel. Great numbers of ptarmigan were on the island, and furnished him with many a meal. He said, however, that although fish, both cod and halibut, could be had in abundance near the island, he caught them only for his dog, who liked fish. Thus the seaman's dislike for fish was strong enough in this man to prevent him from making use of a copious store of food.

All interest in the outside world appeared to have died in him. I do not remember that he asked a single question in regard to affairs which did not directly concern him or his needs.

When the steamer's boat came for us we bade good-by to the hermit, and left him standing on the shore with the great north wind dashing spray over him from the beach surf. Forcing our way through the kelp-bank to the steamer, we looked back along the gray beach, but as if by enchantment, the man, his house, his dog and his boat had disappeared, and nothing was visible but the sea, and the dark, towering mountains with ragged shreds of mist driven around their barren heights.

C. W. PURINGTON.

Seal Islands of Alaska.

Far away in the northwest of the United States, in Bering Sea, are four islands of volcanic origin thrown up from the bottom of the ocean in comparatively modern times, and which are known as the Pribilof group. The two larger islands are named St. Paul and St. George, and the two smaller ones Otter Island, which is six miles south of St. Paul, and Walrus Island, about the same distance to the eastward.

St. Paul is thirteen miles long by four broad; St. George is ten miles long and nearly five broad. The two large islands are situated thirty miles from each other. Since neither one has a harbor, vessels are obliged to anchor half a mile or more offshore, and freight is taken on board or is landed by means of lighters.

These are the Alaska seal islands of which we hear so much, and whence come some four-fifths of all the sealskins used in the markets of the world. This assertion may seem an extravagant estimate, but it is quite correct.

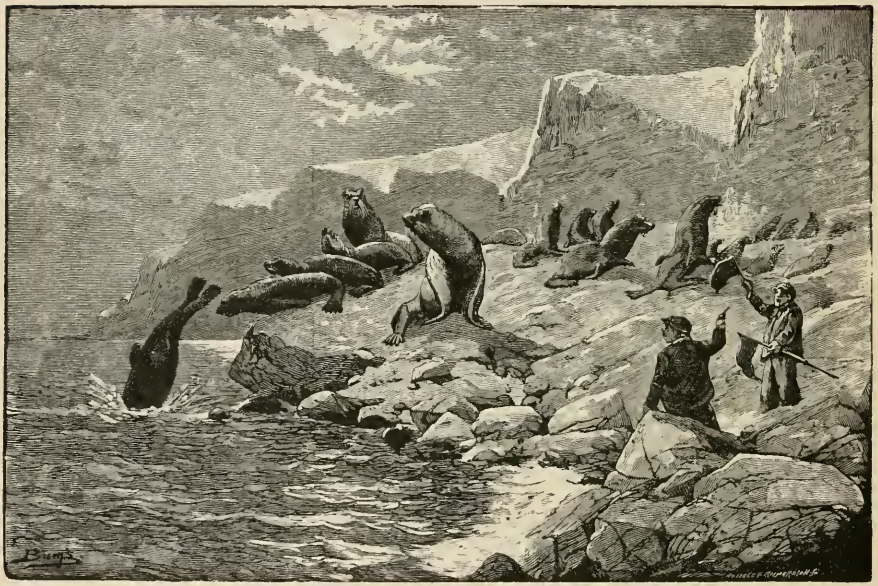
At the time of their discovery the islands were uninhabited, but natives from the mainland and large islands of the Aleutian group were brought hither by the Russian Fur Company. Since Alaska was transferred by purchase to our government, these people and their descendants have worked for the San Francisco Commercial Company, which is an American organization.

It is curious that only these islands and a few small spots on the Asiatic shore of Bering Sea should possess the peculiar conditions of landing-ground and climate combined, which are necessary for the perfect life and reproduction of the fur-seal. These islands are enveloped in dense fog banks during a large portion of the breeding season, and as neither the islanders nor seals can bear for any great length of time the intense

glare and heat of the summer sun, there is no complaint against this prevailing screen between them and the sky.

The seals move in herds, coming to the breeding grounds in countless numbers at regular seasons of the year, that is, during the latter part of May and early in June. The males are large, bold and aggressive; the females are small, peaceful and gentle; and both are models of symmetry and physical strength.

The young are born blind and remain so for a couple of



Starting Inland.

weeks, the mother rarely giving birth to more than one at a time. When they have arrived at the age of six weeks, the mothers take them into the water and teach them to swim. At first they seem to fear the water and require some coaxing to enter it, but soon develop a natural affinity for it. Occasionally a young one is found domesticated among the natives

of the more populous islands, and when they are thus brought up among human beings they are easily taught to perform many amusing tricks, seeming to possess intelligence closely resembling that of the dog.

It is common to speak of the seal fisheries, but there is no fishing about the capture of these animals. In securing them the employés of the company get between the seals and the water, driving such as are selected inland like a flock of sheep. A seal is thought to yield the best fur at four years of age, when it is considered to be at its prime. The males of this age are the ones selected for slaughter. When driven on land toward the factory they move slowly, pulling themselves along by their flippers, as a dog might do with his hind legs broken, but they get over the ground at the rate of a mile or more in an hour.

The old males weigh from two to three hundred pounds each when they first land, and when full grown measure from six to seven feet in length. The females rarely exceed five feet in length, and weigh about a hundred pounds each. The killing season lasts six weeks, from early in June to late in July.

The animals are deprived of life by a single blow upon the head from a club, which fractures the skull and produces instant death. The natives are so skilful in dealing this blow that a second one is rarely required, and the seal cannot be supposed to suffer any pain. One gang of men goes first, killing the seals by a single blow as described, another follows with sharp knives, cutting the animals' throats to make sure of death, while a third with great skill and rapidity skins the still warm bodies.

The hides, or pelts as they are called, are packed in salt and stored preparatory to being shipped to London, England, where the business of properly curing and dyeing them is done before they are put upon the market and sold for personal wear. The flesh of the young seals is eaten both by the whites and the natives, while the blubber of the older ones serves for fuel under certain circumstances. A good quality

of oil was formerly extracted from the carcasses of the seals, but the business no longer pays since the discovery of petroleum oils.

So numerous are the seals that the shores of the islands during the season are black with them for miles. It has been officially estimated that over a million seals are born annually upon the two islands of St. George and St. Paul.

Man is not the only enemy which the fur-seal has to encounter. When the young ones leave the shore for their deep-sea life, many become the prey of voracious marine animals, among which the shark is said to be the most active. This tiger of the ocean does not attack the full-grown seals; they are too wary and active for him, but the young ones often fill his capacious mouth.

The strange instinct of the fur-seal which causes it to return annually in such untold numbers to be slaughtered by the hand of man, is a mystery difficult to understand. Persistent persecution for more than a century has not lessened their affection for this chosen breeding-place of their ancestors in Bering Sea.

No one can say where they go after leaving these islands, as no large number of seals are met by navigators in any part of the Pacific or South Seas. The author has seen a few in the month of May among the waters of the Samoan group of islands, and in the month of December on the coast of Cochin China. Occasionally one will show its glossy head above the waves of the Indian Ocean, but these instances only serve to show how widely they are dispersed.

M. M. Ballou.

Sea-Lions.

The huge sea-elephant of the Antarctic seas is the largest animal allied to the seal which has existed within the memory of man.

Next to this animal in size is the sea-lion, which is found chiefly on the islands of the Bering Sea. This creature is not fur-bearing. Its hair, generally of a reddish-brown color, but sometimes spotted like that of a leopard, is about an inch and a half long. The animal is slaughtered for materials of value which its carcass contains.

Seventy years ago sea-lions abounded on St. George Island, but they were hunted with so little mercy that comparatively few are seen there at present. St. Paul, the larger island of the group, is now the chief hunting-ground.

They are, however, occasionally met as far south as San Francisco and even southern California.

The old males are powerful creatures. Sometimes they are ten feet long, and have a girth around the shoulders of nine feet, and a weight of fifteen hundred pounds. Only the largest horses of our cities weigh as much as that.

Like the lion, they have grizzly manes of a tawny color. Like the bulldog, their eyes are partially concealed beneath very heavy brows. This gives them a fierce appearance.

If let alone, they are harmless, but if attacked they are ugly customers. Their great teeth are pearly white, and the canine teeth are very long and sharp.

The female or cow, as she is called, is less than half as heavy as the bull, although nearly as long. She is, therefore, much more slender and graceful.

By the tenth of August the sea-lions begin to shed their coats. By November they usually leave Bering Sea, although a few sometimes remain there during the winter months.

On land they travel with difficulty. They do not drag

their hind-flippers, as seals do, but keep them under their bodies, after the manner of the sea-bear.

When in the water, they propel themselves by their powerful fore-flippers, and show great speed. Usually they swim at the rate of six or seven miles an hour, but sometimes they show a rate of fourteen or fifteen miles. They must come to

A Sea-Lion Hunt.

the surface to breathe, though, if they choose, they can remain below the surface ten minutes at a time.

They are happiest when a heavy sea is running, for they take great delight in the dashing surf. A fierce gale, with its crested breakers, gives occasion for a rare frolic. They are as fond of play as young puppies. Their singular antics at

Seal Rocks, near San Francisco, are a familiar sight to residents and sojourners. Their roar is terrific. When the old bulls are engaged in a deadly conflict, and when once their powerful jaws are closed upon the throat of a fierce antagonist, there is no letting go until the teeth are torn out in the struggle.

It is estimated that ten thousand sea-lions resort yearly to the Pribilof Islands. Near the northeastern point of St. Paul Island is a place called Sea-Lion Neck, where these creatures congregate in especially large numbers. When the taking of fur-seals is over for the season, twenty of the best men are sent to capture these lions.

The best time to hunt the animals is a night when the moon is partially obscured by clouds and the wind favorable. At low water, the hunters creep, upon all fours, between the herd and the water. When all the men are ready, they rush upon the sea-lions with unearthly yells, the noise of pistol-shots, and any other clamorous devices which they can invent.

The lions, in terror, immediately waddle off in the direction toward which they chance to be headed. Those which go toward the sea escape, while those which take an inland direction are pursued with shouts.

They soon become exhausted, and lie panting and helpless upon the ground. When they are sufficiently rested to move, they are driven by short stages to headquarters. Perhaps twenty-five or thirty, or even forty, are thus secured on a single night. They are collected in a circular cage or pen, where they remain roaring and writhing, without any attempt to break through the flimsy enclosure, until three or four hundred are secured.

They are then compelled to freight their own bodies eleven miles to the village of St. Paul, on the southern shore of the island. The lubberly procession is from six to twenty days on the journey, the time being determined largely by the condition of the atmosphere. The animals can travel only so fast as their lungs will permit.

To keep them in line and moving, the men wave flags, fire guns and keep up their shouting, but nothing is so effective in bringing to terms a refractory old bull as a blue cotton umbrella, opened and shut in his face.

The younger ones and those which are less fat take the lead, while the old fat fellows, gasping for breath, bring up the rear.

Not far from the starting point is a lake. Across this, about two miles, the herd is made to swim. This saves much time, since for the sea-lion it is much easier to paddle than to waddle.

The slaughter begins when the village is reached. It is deemed prudent to shoot the old bulls in the head with rifle-balls; they are too dangerous to kill with lances, as is done in the case of the females and the young males. The females are surrounded, driven nearer and nearer together, and lanced.

When the whole herd is despatched, the bodies are dressed and nearly all parts are put to some use. The flesh of the young ones is considered good to eat. The stomachs are used for oil-jars. The intestines are stretched and dried, and then cut into strips, from which most durable waterproof garments are manufactured. Boots are also made from the skin, that of the neck being used for uppers, and that of the flippers for soles. The boats of the Aleuts are made from skins, which, after the hair has been taken off, are stretched over wooden frames.

While the white man sets a great value upon the seal on account of its beautiful fur, the simple native prizes most highly the sea-lion, upon which he so much depends for the necessities of his rude life.

GRANVILLE B. PUTNAM.

Hunting the Sea-Otter

If our boys want to understand and fully appreciate an undertaking which is perhaps the most dangerous and uncertain known to any hunter of the human race, they must follow me to Alaska, and there behold and note the Aleutian sea-otter hunter.

The long, far-extended chain of islands which reaches almost across from the Peninsula of Alaska to Kamchatka, and that stretch of wild, desolate coast which lies at the foot of the Mount St. Elias Alps and borders the islands south of the peninsula is the sole resort and refuge of the sea-otter to-day; it is the region which alone shelters that animal from extermination by eager hunters, both white and dusky.

It protects them by its violent tempests that beat the sea into foam on its bold cliffs and sunken rocky reefs, by its chill, dense fogs which shroud everything in darkness for weeks at a time, and by the swift running of ocean currents, and dangerous tide rips.

Here, in the open waters of the North Pacific Ocean, never many miles from the shore of land or island, and on a few rocky island reefs and islets north of Japan are the last resorts of the sea-otter in its struggle for existence.

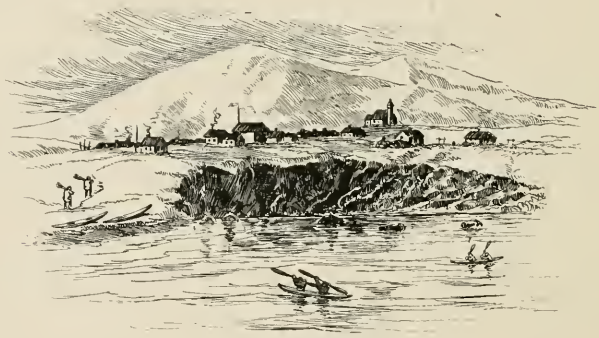
The sea-otter resembles the beaver very closely in size and shape; its head is rounder, however, and more catlike, while its tail is shorter and covered with dense fur. Like the beaver again, it has broad, webbed hind feet, and small, inferior fore hands; but unlike that animal, it is a meat, fish and shell-fish eater, and seldom tastes a vegetable substance.

The hunting of the sea-otter calls for hardship and risk of life which the chase of no other fur-bearing animal known to man demands. It is so alert and shy, so cunning and strong, that its capture involves the keenest tact and utmost endurance on the part of its human captor.

The men who make this chase of the sea-otter their sole business are mostly natives of the Aleutian Islands, and of the Alaskan Peninsula. In general terms they have a striking resemblance to the Japanese in stature, in physiognomy and disposition, being of a calm and docile nature. They are short and muscular, and the most thorough watermen in the world.

Some of the most successful hunters reside now in neat frame cottages, but a majority of them are still dwelling in primitive earthen dug-out huts.

The richest hamlet of these people, owing to its close proximity to the most favored resorts of the sea-otter, is



Morzhovoi.

Morzhovoi, situated on the extreme end of the Peninsula of Alaska. Forty miles directly south of its site are the celebrated Sannak sea-otter hunting grounds, where more than half the entire annual Alaskan catch is taken every year.

Sannak Island, islets and reefs, embracing an area of less than twenty miles square, is the chief sea-otter resort of all this vast wild region. It has a coast circuit of about eighteen miles. Spots of sand beach are found here and there, but the greater portion of its sea margin is composed of enormous water-worn boulders piled up by the surf.

To the southward and westward of the island, stretching directly out to sea, is a succession of small islets and reefs, which are bare only at low tide, rocky shoals and heavy beds of kelp or sea-cabbage surrounding them; then again, about thirty miles to the eastward are islets and reefs, very similar to those of Sannak, and next in favor with the sea-otter as its feeding and refuge ground.

To these islands hunting parties of Aleuts come and simply camp upon the island. They do not live upon it, because the smell of fires and refuse of a village or villages would alarm and drive every otter from the whole extent of the region now so favored by them.

It may be imagined to what sufferings the hardy native hunters subject themselves every winter here. For weeks at a time, though the temperature is often below zero, they dare not light a fire, even for cooking.

Before a young Aleut is considered hardy and expert enough to join a sea-otter hunting party, he must prove his courage and skill by launching and landing safely in heavy rollers and foaming surf his light skin boat. He must be able to paddle on his course undeterred by thickest fog or fiercest wind. He must make himself well nigh insensible to extremes of cold and dearth of food.

When at last he becomes proficient, can paddle with safety in the wildest storms at sea, and can handle his bird and sea-otter spears with precision and effect, he at once joins the select circle of tried and trusty hunters belonging to the village of his birth.

A sea-otter hunting party contains anywhere from ten to fifty members, or even more, according to the size of the settlement from which it sets out. The parties relieve each other in rapid succession, and thus a continual search is maintained. Stimulated by the traders, this warfare is rendered still more deadly to the sea-otter, since the best improved breech-loading rifles are now being used in addition to the weapons and artifices of the natives themselves.

The fur of the otter is the costliest and the finest known to man and the skins range in value from sixty dollars to one hundred and fifty dollars each. Some exceptionally fine skins bring the enormous sums of between four hundred dollars and six hundred dollars each at the London sales.

Extravagant as such a sum seems, yet when one of these perfect sea-otter skins is spread out before your eyes, and passed under your fingers, the rich shimmer of its ebony fur, deep, dense, soft and glossy, appears so strongly, that the first objection of excessive cost is voted down.

When the sea-otter is searched for in the open waters which surround and, at times, cover the reefs and rocky shoals, the natives go for it in canoes, those queer little cigar-shaped, skin-covered boats in which they travel.

In olden times the fleets were obliged to make long and dangerous journeys to and from the hunting grounds of the sea-otter, but nowadays these native hunters are carried from their home settlements in little sloops and schooners which are owned by the white traders who have stores and warehouses in those villages. The traders take the hunters and their canoes down on sailing vessels, so as to save time, and to gain the favor of the successful and most daring hunters.

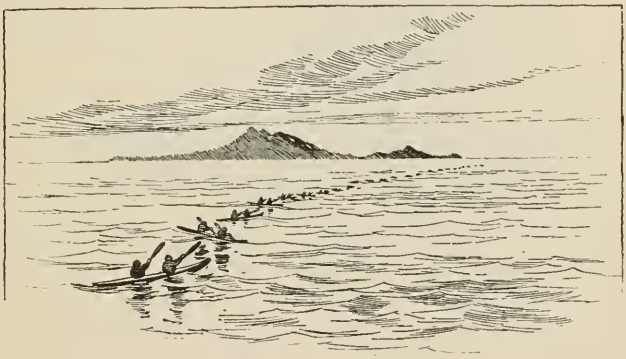
In a day or two, the desolate islets, the rocky reefs and treacherous shoals of the favored resorts of the sea-otter are reached. The landmarks are carefully noted, and if the weather will permit, the canoes are dropped in a harbor or the roadstead, where the trader is to return in due course of time to pick the party up and convey it home.

This desolate landing-spot being the common rendezvous of the party, a few tents of cotton cloth are set up, and a man or two, the oldest or the youngest of the party, put in charge of it. The scanty supplies of flour, tea, tobacco and dried fish, which each man has brought for support during the hunting trip, are carefully husbanded here. The closest attention is given to the fishing gear, the sea-castings on the surf-beaten beaches, and the indigenous water-fowl, for upon

these natural resources the party has to live substantially for the next six weeks or three months, as the case of agreement with the trader happens to be.

Parties are usually made up of forty or fifty natives, with fifteen or twenty canoes. Some one of them is recognized by common consent as chief, and he orders their movements. Under his direction they launch their canoes early in the dawning, and range themselves out over the sea in a long line, moving forward and abreast over the water with intervals of separation between the canoes as wide as the weather will permit sight and sound to establish communications.

In this method a fleet of twenty canoes will range abreast over a line on the water of nearly a mile and a half in length.



Each man is able instantly to flash a signal to his neighbor, so that if an otter's head is discovered by any one man in this long reach of inspection, the knowledge of such a discovery is at once known to every one of the hunters in the party.

The man who makes the announcement of seeing an otter at once urges his canoe toward the exact spot where, in the rolling, tumbling water, its black head and glittering eye were seen during the instant it appeared. Upon the bubbling wake of its disappearance the natives stop their canoe, and hold

their paddles up high in air, and every other canoe in the line now hastens to take its position in a large circle around them.

The point where the otter dove down is the centre of the circle. The otter when it comes up for breath must now rise, in fifteen minutes, at the most, somewhere within the range of one of the hunters' spears. As it rises, that native nearest to its popping eyes and wide expanded nostrils at once yells and throws his spear. If he does not strike it, he succeeds in causing it instantly to dive again before it has had time to draw its breath fully for the usual stay under water.

Again the hunting circle is formed around this second wake of the otter's disappearance, again it is forced above the water to respire, and again it is driven below the surface as before. This action is repeated until the otter becomes so weak by loss of breath that it cannot force itself down quick enough to avoid the finishing stroke from the deadly spear of its human enemies.

The native who has been fortunate enough to strike the otter draws in its struggling body by the line attached to the toggle-headed spear point. When it reaches the canoe, he hits its vicious head with a small but heavy wooden club, and thus safely beats out what life remains in the otter. Then lifting its limp form from the water, with both hands firmly clasped around its neck and head, the Aleutian hunter bites off the extreme tip of its black nostrils, a superstitious propitiation, after which he safely stows the valuable carcass away under the cover of his canoe.

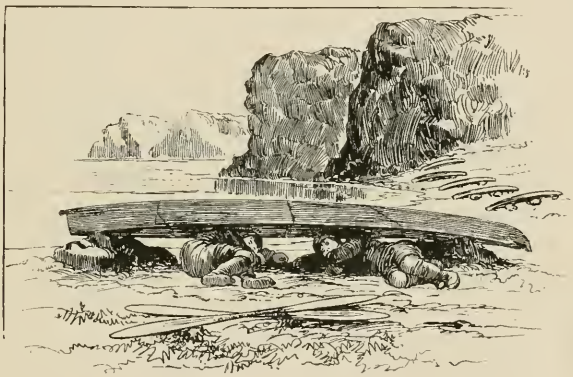
The signal for forming the line of search anew is now given, the canoes fall back into position, and the hunt is resumed again as it began, and as long as daylight lasts the chase is kept up.

When evening shadows warn the hunters that they can no longer keep their bearings, they put ashore on the nearest beach or rocky islet. Drawing their canoes out from the water, and turning these little vessels keel up, they crawl partly under, so as to shelter head and shoulders, as they

sleep on the sand or rocks, after a brief and scant repast composed chiefly of dried fish.

If the wind is stirring in the right direction, a fire is made; a little tea and a flour-thickened stew make a royal supper for these hardy men. Most of the time, however, it is not considered safe to make a fire, and then every physical comfort is sacrificed cheerfully by them for the sake of success in their quest of the otter.

When the weather is settled, the hunting fleets often cruise out into the ocean forty and sixty miles from the nearest land,



searching for the otter as it is found sleeping or sporting on the immense rafts of seaweed, which are drifting at the beck of currents and force of winds. Upon such floating masses the sea-otters love to sleep and the young ones to frolic when the sea is not tempest-tossed. Taking advantage of this disposition of the otter, the natives of several Aleutian islands spread gill-nets over beds of seaweed, which are anchored in the channels or passages between the islands. They retire and watch from the high bluffs adjacent.

The otters, if they chance to climb over such a net-spread mass of seaweed, speedily become entangled in the meshes,

and seeming to be utterly paralyzed by fear, make no serious effort to escape, and thus fall easily into the hands of their human captors.

A strange fact in connection with the use of nets is that, although they are made of light twine or sinews, and a sea-otter having poked its head or thrust its feet into the meshes might easily bite and tear itself free, it seems to be suddenly crushed by fear and makes no such attempt.

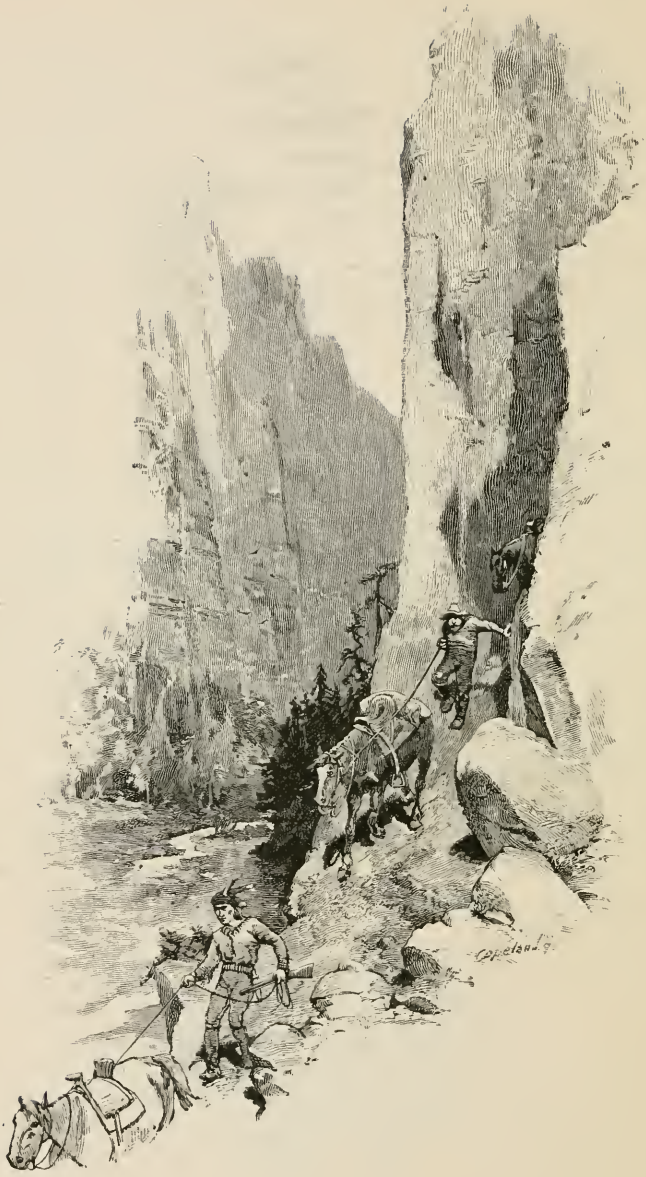
The natives also watch for particular surf-holes or water-worn caves in the bluffs to which the otter repairs, and when one is located they set a net at the entrance and often capture the animal.

Since Alaska became American territory the practice of shooting sea-otter has become very general. It was prohibited by the Russians because it is sure to result, if not so checked, in exterminating this curious, rare and valuable animal. The young natives to-day, however, have nearly all been supplied with breech-loading weapons, or plain rifles, with which they patrol the shores of the islands and islets, and whenever a sea-otter's black head is seen in the surf, a thousand yards at sea, they fire at it.

The great distance and the noise of the breakers prevent this animal from taking alarm until it is hit; and nine times out of ten, when it is shot, it is hit in the head, and that is fatal; then the hunter waits for the toss of the surf to bring his prize in, if it be too rough for him to venture out in his canoe.

HENRY W. ELLIOTT.

AMONG THE ROCKIES.



The Bighorn Canon.

The Bighorn Cañon.

Though the Bighorn Canon is located within sixty miles of Fort Custer, in Montana, where I am writing, I can find no one who has ever been through it. Some men have been in it, but did not stay long, and only a few have traversed it for as much as twenty miles.

The only man I ever met on these plains who could give a good account of the great canon was Lieut. George P. Belden, the celebrated trapper, guide and scout, who died some years ago. Even old and thoroughly travelled scouts and hunters have had to acknowledge that they knew nothing about the Bighorn Canon.

Belden often told me about it, and said he had been from its mouth to the top, and once had spent a portion of the winter beneath the friendly shelter of its mighty walls. Belden left some notes in a book giving a partial account of the sunken plain, as he called it.

"We had been toiling up, up, all day long," says Belden in these notes, "and at night looked far back and below us to the Chetish or Wolf Mountains. They were to the north, and fully forty miles distant. They loomed up from the plain, low, broad, black and flat, and we could see that they had no connection at any point with the giant Bighorn Range. West of us was the Bighorn Valley proper.

"Wishing to strike the Bighorn Canon at its mouth and go up it to its head, I told our Indian guide so to lead as to bring us to the canon at its junction with the river.

"Early the next morning we set out nearly due westward. Our Indian guide, although a Crow, and born in the country, had great difficulty in locating the canon, so broken and uneven was the land. At last he pointed to some pines on a distant hilltop, and calling out, 'There! there!' rode smartly forward.

"At the foot of the mountain below the pines we found an old trail, almost obliterated from long disuse. Taking this the guide galloped swiftly forward.

"In about an hour he stopped on the brink of a deep ravine, and told us that this was the great canon. Dismounting, and going forward on foot, I looked over a wall of rock hundreds of feet high. The Indian said that a mile below was a trail leading down into the canon, and that we could descend if we wished. He said it was twenty miles or more to the mouth of the canon, and the descent was more difficult there than by the trail just below us.

"I told him to go ahead, and we would enter the valley at once.

"After rolling, jerking, sliding and tumbling, as it were, down the side of the canon we suddenly found ourselves in a little valley, from which the light was almost excluded by the black walls of rock.

"There was a bright streak of sunshine along the centre of the valley, and a stream rippled by. The tall pines sighed mournfully in the light breeze. Not even the tops of the tallest trees ascended as high as the top of the canon. They were extremely tall, for they had been sheltered from the storms that had twisted and dwarfed their less fortunate neighbors on the prairie above.

"The little stream was filled with mountain trout. They were of the mountain brook species, and we could see their golden bars flash as they darted through the crystal waters.

"Up the stream was a herd of a dozen elk, and below, almost within rifle-shot, two black-tailed deer browsed. There were many kinds of birds, and the cawing of hundreds of crows could be heard up the stream where the timber was thickest.

"When the sounds of the birds, the brook and the trees ceased, the silence was intense. The valley seemed cut off from the rest of the world.

"One has strange feelings in such a place; and I was not

sorry when the Indian, who had been creeping down the valley toward the deer, fired a shot and killed the buck. The noise of his gun seemed almost as loud as a cannon, and as the echoes reverberated far up and down the valley, the birds rose screaming in the air, and circled far above us.

"Supping on trout and deer meat, we passed the night by the side of the stream.

"Next morning, wishing to hunt, I set out with a companion, our rifles on our shoulders, leaving the guide and scout to pack and follow with the camp at their leisure.

"As we trudged along, many prairie-hens flew up. The whirring of their wings and the loud call of the old cocks attracted the attention of a fine buck. On seeing us, he stooped low, and creeping away, hid in the nearest bunch of pines. He seemed to suppose that we had not seen him; and Dan, my companion, laughed outright to see him tiptoe into the wood.

"A mile farther up, as we turned a sharp angle of the high wall on our right, we saw a band of over one hundred elk grazing within easy rifle-range. The leader threw up his head, whistled danger, and started up the valley.

"The excitement was too much for old Dan. Bringing his gun to his shoulder he fired, and the leader fell, shot through both fore-shoulders.

"The herd halted when the leader fell and gathered about him. None except the wounded buck had yet seen us. They looked everywhere about in a frightened way, but we had hidden among the rocks. Finally they started up the valley again. It was a beautiful sight. Nothing but a mass of horns, tips of ears and flying feet could be seen as they moved in a compact mass. The noise of their hoofs and the glint of their red necks reminded us of a flight of birds more than of animals.

"The Indian guide said the true name of this canon was Elk Canon, and that elk were always to be found there in great numbers, not only on account of the fine shelter it

afforded, but of the warmth and good grass and water. After looking at the buck, now quite dead, and taking his hump and tongue, we pushed on up the valley in the rear of the elk.

"We soon began to notice that both the canon and the stream were becoming narrower rapidly. The stream was a mere rivulet, but still well stocked with red speckled trout. The valley was so narrow that no animal could pass up or down without coming in close rifle-range. The wall rock on either hand became higher and higher. Little springs from the side flowed in and bubbled up from the base of the high walls. Pockets, meadows, thickets and ravines increased in numbers, and the great hanging walls above our heads closed until the daylight was almost excluded. Deer were very abundant, but all other game had disappeared.

The Narrow Valley.

"Selecting one of the widest of the little pockets or side valleys, we began to climb a deer trail leading up the mountainside.

"Since we left camp we had travelled due east, and now we went up the south side of the wall, and soon found ourselves in the wildest of scenery.

"On our right was the snow range, with glistening tops flashing like polished silver. The valley had been very warm, but the change to a colder temperature was perceptible at an elevation of five hundred feet. We were going out of summer into winter, and all within a mile or two.

"The air became so thin that one could not run at all, and every few hundred steps our breath gave out, and a

short rest was necessary. We were entering the confines of perpetual winter.

"Working forward over the snow line, we found the stunted old pine-trees becoming more and more gnarled, and most of them dead or dying. Here and there, in the crevice of a rock, we found a bush growing which bore brown berries that were sweet to the taste and not unpleasant eating.

"Here and there little red and striped chipmunks frisked about, and shot in and out of the rocks. They seemed larger than the chipmunks of the East, but were evidently the same animal. We also saw several large rock-rats, or mountain squirrels, which inhabit these high regions. Some of them were as large as small prairie-dogs, and were like them except in their movements.

"These animals are sluggish, and shooting at them does not seem to alarm them in the least. They drag themselves lazily in and out of their holes and act as if they were deaf.

"Above the ground-vines rise ranges of granite rock, gray, pink and brown, with veins of delicate purple and blue running through them. There is a rose-colored granite on these mountains that takes a high polish and is very beautiful. I saw an almost jet black marble, the finest stone I had ever seen, and there is much white marble.

"From the top of these granite walls the snow extended over the mountain, hiding everything above from view.

"Standing at the foot of the great granite walls, our feet pressing the snows of many winters, our teeth chattering in the cold mountain air, we looked far down below us to see the Black Canon with its green trees, grassy valley and sparkling stream, which looked like a tiny thread of silver.

"With my glass I could see wild sheep on the opposite hills, and far down the canon a band of deer playing at hide-and-seek as they dashed in and out of the little thickets.

"I had been at the snow-line before, but never at so

interesting a place as the Black Canon. Finding the night coming on we began our downward course.

"About half-way down the mountainside, as we came out from among a group of pines, we noticed a large mound, upon which sparkled millions of bright little objects, having the appearance of bits of broken window-glass. The mound, we found upon approaching it, was a bed of gypsum; the thin scales and large slabs gave it the appearance of a huge jewel set in the mountainside.

"Down, down we went, almost an hour and a half, and then we came out into the little valley once more, and found our escort awaiting us. The sun was still shining on the hills, and we determined to go up the canon a little way and camp for the night.

"An hour's march brought us to the head of the stream and some fine springs. Here, the guide informed us, we must stop or go a long way to water. We accordingly encamped, and after a good supper went out and gathered bearberry leaves, to mix with our tobacco.

"We found many curious colored pebbles, some agates and several other stones of value.

"We had explored only twenty miles of the middle portion of the great canon, and in the morning determined to climb out and go over to Bear Canon of the Bighorn to hunt for grizzlies."

This is the only description of the Black Canon of the Bighorn that I have ever seen. It is meagre and unsatisfactory, but I hope to explore, map and photograph the entire region.

Gen. James S. Brisbin.

Hunting Elk on Skees.

Of all the pleasures which have fallen to the lot of an amateur photographer with a taste for wild life and the making of pictures of big game in its native state, probably the keenest befell a young amateur whom we may call James Brackett, for want of authority to use his real name.

Being in the Flathead country, in Montana, he was invited to join a party of hunters who were going out into the Rocky Mountains to take live elk with lasso and skees. He accepted the invitation; he had been accustomed to travel on skees in taking winter views. But instead of a lasso he himself carried his camera and a large revolver for emergencies.

At Columbia Falls, Montana, north of Flathead Lake, young Brackett joined the two hunters. They camped in the hills and started out before daybreak up the mountain. There was to be a long ascent before the sport began, for the skee-hunters can take their game in this way only when they have the advantage of descent upon them.

The skees used by the party were made of birch, and were eight feet long, four inches wide, and about half an inch thick. They were strapped to the feet, and the front ends were slightly curved upward.

The two hunters carried no rifles. Each had at his belt a strong lasso, sixty feet long, and a hand-axe, or large and very sharp hatchet. Their hunting was to include no slaughter, and they needed no weapons except revolvers and knives, for use in case of chance unsought encounters with pumas or bears. They carried also a liberal lunch.

Though he knew how to walk on skees, Brackett found the ascent of the mountain on them, over the deep snow, an extremely hard task, especially when he had to keep pace with these practised and hardened hunters. Two or three times he was on the point of giving it up, but the hunters

good-naturedly paused to let him get his breath, though they had no time to lose.

Toward noon the hunters declared that they had ascended far enough. They had already found signs of elk, and knew where to look for them on their descent. Here they lunched, saving some of their food for the unlucky emergency of a failure to get back to camp for the night. Then the rapid descent was begun. The hunters' eyes commanded a great sweep of the mountainside, nor did they neglect the details of thickets and ledges. It was a wild and craggy spot—precisely the ground which the Rocky Mountain elk seems to enjoy.

Skees.

As the three men were swiftly but watchfully descending on their skees, Brackett finding it quite easy now to keep up with the hunters, the latter paused, put their fingers to their hips and loosened their lassos. It was evident that they had caught sight or wind of game. Brackett saw no living creature, but he nevertheless unlimbered his camera. Before them lay a sharp and smooth declivity, glittering under the midday sun.

Here and there rocks cropped up, but for the most part the space was clear. All at once, far below, Brackett saw an animal shoot out into view from behind a crag, apparently, though the creature had all the time been in front of the crag. The unpractised eye of the photographer had not made him out, so closely did the yellowish-brown of the elk's body

and the white of his rump approximate the color of the rock and snow.

"Goodness!" Brackett could not help exclaiming, "you're not going to try to get game so far away as that?"

For answer the two hunters shot down the mountain, their lasso coils held in their left hands, the noose in their right — both hands in front of them, their knees and bodies gracefully bent. They presented so fine a sight that Brackett took a shot at them on the spot; and by the time he had closed his camera and was ready to start after them, they seemed to be half a mile down the mountain! He gave up all attempt to overtake them or to get a shot at their operations with the elk, but contented himself with the picture he had already taken of their seeming drop into space, and with keeping them in view.

Elk.

Meantime the elk was off in a series of tremendous bounds; but his course lay almost laterally along the side of the mountain, while the two hunters, going at a speed which could hardly be less than his, were heading him off by a flanking movement. Every second brought them nearer together. At last the elk, which Brackett thought was the largest horned animal he had ever seen, seemed to realize that he was being headed off.

He turned sharply and plunged straight down the mountainside. Brackett heard the two hunters shout to each other; they swerved apart in such a way that the plunging animal appeared between them in Brackett's line of vision. Then he dropped quite out of sight over a ledge, beyond which Brackett saw nothing but blue sky.

The two hunters plunged straight on, and the young

photographer gasped, for it seemed to him that they were whirling to certain death over a precipice. But meantime he was himself advancing at an extremely swift rate of speed; and his path presently brought into view a bench of the mountain below the ledge.

Over it the two men went. The elk came into view again, plunging heavily in deep snow. The hunters, one on each side, came up with him. Without a word or sound, the man on the right cast his lasso; it fell over the great animal's horns, and was instantly drawn taut.

And now began a strange chase, comparable to that of a whale at sea into which a harpoon has been thrown. The

Capturing an Elk.

second man could have thrown a lasso from the other side, but both men could not possibly have held the elk on this descent, which presented neither tree nor jutting crag, and where now the creature seemed to have found firmer foothold. Away he went, still down the mountain; the man who had roped him clung to the line, allowing himself to be drawn, the snow flying from his skees. The other man made his best speed, but was being left behind.

The elk was plainly headed for a thicket of pines some distance below. He followed his instinct in this, and he also did the worst possible thing for himself. It was what the two

hunters most desired. On he went, and in less than a minute had plunged among the trees, and in an instant more was struggling in the snow, for the hunter had snubbed his line around a tree and had the creature fast. He might, however, have inflicted some injury upon himself if the other hunter, coming up, had not thrown his lasso from the other side and snubbed him to another tree. He was now completely at the mercy of the men.

Brackett came up and with his camera took a shot at the elk, which had given up its struggles. The hunt was over for the day, for it was necessary to go down to the camp and bring up the dog-sledge, on which to transport the captured elk to Columbia Falls. Brackett and one of the hunters remained on guard to protect the elk, now bound firmly with one of the ropes, from the visits of unscrupulous wolves and pumas, which would not have hesitated to take advantage of his situation if he had been left alone. The elk turned out to weigh nine hundred pounds, and was the most magnificent specimen taken for several years.

Brackett remained two weeks with the hunters. In that time they took but two more elk — for they had had remarkably good luck to come upon their game so soon and so successfully on the first day. All of their captives were taken to the ranch of a gentleman farther down the mountain, who has fenced in a considerable space for the purpose of testing the question whether the elk cannot be domesticated and made to draw loads, as the reindeer does. This gentleman already has a well-broken elk team, which he has driven about quite freely.

The animals in his possession appear perfectly tame and gentle. Whether or not the American elk has any value for draught purposes remains, however, still to be proved.

SHERWOOD DAVIS.

Visiting the Yellowstone Park.

The Yellowstone Park, larger than the State of Connecticut, contains, perhaps, more natural wonders than any other tract of equal area: the exquisite deposits of the boiling springs; the geysers, spouting water two hundred feet in the air; the canon, most beautiful and grand; the many waterfalls of rare loveliness; the immense lake of unfathomed depth, eight thousand feet above the sea, surrounded by mountain-peaks covered with perpetual snow. But one should not suppose, as some people do, that it is wholly a land of marvels, for it presents many spaces of the most quiet and lovely scenery.

It is seldom possible to enter the park before the first of June. In 1893 the lake ice did not break up until the nineteenth of that month, and wheeled vehicles could not pass from the Upper Basin to the lake until the twenty-second. This was a very late season, but such may occur again.

In July there are flies, gnats and mosquitoes,—great nuisances, to be sure,—but the nights are cold and the insects vanish early in the evening, while many other conditions are favorable. The earth is then covered with lovely wild flowers; the watercourses are running full, and their falls are at their best; the fishing is then extraordinarily good.

In August the mosquitoes and their kin have disappeared, and there are no troublesome rains; but the lovely flowers are then no longer at their best; dust has replaced mud, and the fish are not so eager to take the fly.

September presents a constantly lessening list of attractions; fewer flowers, less water in the streams, fewer fish, less chance of seeing large game, more dust and colder nights. Moreover, the summer travellers have then littered the favored camping spots with their unsightly leavings.

July, then, is the best month, but a start the last of June

would be advantageous, particularly if the season opened early.

A proper outfit of clothing is highly important. As the days are generally hot and the nights very cold, thick underflannels are recommended. No overcoat is needed except a mackintosh, which is very desirable. Brown or drab clothing is most satisfactory.

As to the length of time and the amount of money required for the visit, that depends on whether the party means to glance at the tract or see it thoroughly. Cinnabar, the terminus of a branch of the National Park Railroad, is the point of entrance to the park.

Regular tourists who put up at the park hotels spend six days in the tour. A camping trip might be made in that time, but a month can be profitably devoted to it. The regular circuit could be made slowly and on horseback in about twelve days ; then there would be side trips off the main roads, fishing excursions and numerous desirable delays that would well occupy the entire month.

The details of the trip must of course depend on the time allotted to it. A week used in going down to Jackson's Lake, and a week or ten days in a visit to the wonderful hoodoo country, would amply repay for the time and money spent.

Hunting trips are often outfitted here, but all the hunting must be done outside the park. The thorough protection of the game within the park has made it a reservoir from which all the surrounding country has been fed, so that now this region is the best hunting-ground in America.

George S. Anderson, U. S. A.

In the Yellowstone Park.

When you go to the Yellowstone Park, certain notices giving forcible hints as to your conduct will present themselves to your eye from sign-boards nailed to the trees. They are of this sort:

EXTINGUISH YOUR FIRES.

NO SHOOTING.

GATHER NO SPECIMENS.

DO NOT DEFACE THE FORMATIONS.

These are all very proper and necessary; and the penalty for disobedience may be a dusty walk out of the park, with a soldier behind you. It may involve the confiscation of your luggage, or even heavy fines and imprisonment if the offence is a grave one. No shooting is allowed, except in defence of one's life, and as a consequence of this wise restriction game in the National Park is becoming not only delightfully plenty, but unusually tame.

The ducks sit, quacking quietly, in the little lakes, as the stage-coaches rattle close past them. Squirrels actually have been known to run up men's trousers' legs, and deer are increasing in numbers. It is said that the herd of two hundred buffalo about the Yellowstone Lake show signs of increased confidence in man.

Unusual vigilance will be practised by the park superintendent to protect this bison herd, and if nature would but kindly endow the poor beasts with instinct to remain in the park, this last remnant of a once mighty race might survive here for centuries, to remind future generations of the countless herds which once roamed over the entire West.

Another and less pleasing result of prohibition of shooting is the multiplication of bears. Black bears, silver-tip bears, cinnamon bears and roach-back bears are found in the park

in greatly increased numbers, and some shooting may have to be done to keep these creatures within proper limits.

This wise protection of life makes the park a paradise for the smaller birds which naturally inhabit such regions. The beautiful valley of the Yellowstone may become the happy

The Yellowstone Valley.

refuge of the songsters which the ruthless fowlers have driven to the companionship of the bison.

One privilege is granted to the sportsman. He may find as satisfactory fishing in the park as in any other region frequented by tourists. A hundred pounds of trout a day is no unusual catch for a single rod. That unusual fish, the grayling, is also found in the park, in the Madison River.

But another prohibition is necessary, and tourists may some time find a strange notice like this:

DO NOT SOAP THE GEYSERS.

To soap a geyser is a very naughty act; and for that reason, perhaps, many tourists seem strongly tempted to transgress in this manner.

An alkali dropped into the bowl of a geyser will frequently cause it to act at once, and in a particularly frantic manner; and as certain of the geysers are somewhat tardy in exhibiting their spouting powers, it is a temptation to many young people, and to a few older ones, to drop a cake of soap into the steaming bowl. Geysers, like human beings, have a certain quite definitely limited lifetime. They do not go on forever by any means. The pipe, or tube through which the hot water and steam are ejected, the bowl, the caldron, and the steam-chambers deep underground, have a well-marked period of growth and decline.

The apparatus, by means of deposits from the hot water, first increases in symmetry, form and efficiency as a spouter; then it gradually falls out of order and subsides into an inactive hot spring. It can be said that a geyser is good for only a limited number of spouting performances, through a certain number of years, or decades.

The geysers of the National Park vary much in their hours for spouting. Old Faithful spouts every hour, with great regularity, and will probably be a short-lived geyser compared with the Beehive, which discharges once in twenty-four hours; the Giant, which is in action once in four days; the Giantess, which only favors the public with a performance once a fortnight; the Lion, which rouses into activity and roars after long, uncertain intervals; or even the Splendid, which sends up its beautiful column of steaming water and spray to a height of two hundred feet once in three hours.

Manifestly it is in the interest of the general public to have these grand and wonderful exhibitions of subterranean energy

endure as long as possible. It should not be beneath the dignity of any tourist to wait patiently the normal time of their grand displays. To cause a geyser to burst forth suddenly by artificial means is to shorten its life, and hence to prevent future tourists from enjoying it.

But many inconsiderate tourists go to the geysers with cakes of soap in their pockets. Hence the government has found it necessary to station a squad of soldiers in close proximity to the geysers, to protect them from the saponaceously inclined sightseers.

The Beehive Geyser is one of those which appear to be especially sensitive to soap. The rogue who drops soap into the Beehive barely has time to retire to a safe distance before the performance begins, and it really seems as if the spouting, foaming, frothing geyser would turn itself wrong side out in its efforts to be rid of the obnoxious alkali.

Our party of eight was a very law-abiding one. We had often said to one another that it was an exceedingly mean trick to put soap into a geyser, or to attempt, as some previous visitors had evidently done, to stir up the way-down stomachs of the fountains — particularly the old, retired ones — with long poles. Such vandalism we all denounced as disgraceful.

Nevertheless a strange thing happened. On the front seat of our stage-coach rode two youths, fresh from college.

On our arrival at the Upper Basin we learned that the Beehive, so called from the shape of its cone, would not spout until the following morning, and the Splendid not much before nightfall. But after watching a grand performance by Old Faithful, we all went out to see the bowls of the other geysers.

In the course of our walk, we crossed the little Fire-Hole River, and after examining the pretty, hollow cone of the Beehive, went up to the Lion and Cubs.

Presently, missing our two young friends, we looked back and saw them still hanging over the Beehive cone, apparently gazing into the funnel of the fountain.

SOAPING THE BEEHIVE

Within less than a minute afterward we heard a shout, and saw our young fellow-tourists running away; and immediately the Beehive went off, favoring us with a tremendous display.

Jets of water played to a height of two hundred and fifty feet. The roaring and frothing were frightful. The earth far around pulsated and trembled.

It seemed to me that the geyser would burst and go to pieces. Its extraordinary upheaval continued for some minutes.

Meantime a considerable crowd collected, and two soldiers came hurrying to the spot. As soon as the eruption had subsided the soldiers examined the steaming ground about the cone, and picked up several pieces of pink soap. This circumstance, joined with the fact that the Beehive had spouted out of season, aroused the suspicions of the military.

They made inquiries regarding us, and ascertained at the hotel that five or six cakes of pink soap had disappeared from as many rooms since the arrival of our coach.

For a law-abiding party we felt extremely uncomfortable. There was no direct or positive evidence against any of our number, but none the less the sergeant in charge telegraphed the matter back to Mammoth Hot Springs. He appears to have mentioned specially our two friends; for on our return, three days later, they were waited on very early by the young lieutenant in command, who put to them many polite but pointed questions as to their knowledge of the chemical action and reaction of alkalies.

They seemed to be extremely ignorant upon the subject. The lieutenant marvelled, but as there was no positive evidence against the young men, they were advised to read up in chemistry, so as to be able to pass a better examination the next time they came to the park.

C. A. Stephens.

Rocky Mountain Burros.

Stupid, sleepy and slow-moving as he is, the Rocky Mountain donkey, or burro, has been an important factor in the development and growth of many mountainous districts in the West.

He has anticipated the service of the railroad train and the stage-coach in the transportation of freight and supplies to the most remote mountain camps. He is one of the most patient and faithful of all beasts of burden, although he is seldom promoted above the position of a common drudge.

His slowness and sureness of movement enable him to go up and over the loftiest mountain summits, around the sharpest, rockiest curves, on the narrowest of trails. He plods sleepily along at the very edge of the most frightful precipices without once losing his head, or making a single misstep. He goes fearlessly along where his bigger brother, the mule, could not go, and where his other relative, the horse, would not go if he could.

He is never skittish, his temperament is too phlegmatic for that. He is serenely indifferent to the things that affright the soberest horse.

At his very first sight of a locomotive under full headway, the donkey might prick up his ears slightly, and the sleepy look in his eyes might give way to one of mild curiosity ; but all the puffing and screeching it could do would not make him run away.

But this calm indifference is, I fear, more the result of stupidity than of courage.

The traveller to the remote mining camps of the West is likely to meet many burro trains going up long, steep and winding trails, heavily laden with merchandise of every kind, or coming down with bags of ore strapped to the animals' backs.

It is surprising to see under what heavy burdens these little creatures can plod along. I have seen a family moving from one town or camp to another with all of their household goods on the back of a single burro, and these effects included a small cook-stove, a bedstead and bedding, two chairs, a grindstone and frame, and many pots, kettles, pans and

The Stubborn Burro.

dishes. At the top of this prodigious pile was a baby, snugly and securely fastened to the mattress of the bed.

Thus heavily and clumsily burdened, the patient little donkey stepped meekly along, seemingly indifferent to the lowliness of his estate, or quite satisfied with it.

Nothing but actual necessity ever induces the traveller, or any one else, to ride the burro from one place to another. The little animal's usefulness in this direction is greatly impaired by his diminutive size, and his unalterable determination never to go faster than a slow walk.

Indifferent alike to blows, kicks, threats and pleadings, he plods slowly along, even on the best of roads. His gait is so tedious that the man who mounts him is soon glad to dismount and go farther and faster on his own legs.

A tall man makes himself especially an object of ridicule when astride a burro. His feet barely escape the ground, and he is likely to hear many amusing but mortifying comparisons and remarks.

"How do you find the walking to-day?" is the ordinary satirical salutation to a long-legged man thus mounted.

Children, however, do not seem at all out of place on burro-back; and some of the Rocky Mountain boys and girls, with plenty of time for such modes of locomotion and childhood's capacity for enjoying it, find great pleasure in riding over mountain roads or the streets of mountain towns on the backs of these queer, stupidly submissive little animals.

"Shaggy" was the name given to a very small burro which was something of an anomaly among his kind. He was very black, with rough, shaggy hair like a bear. He was fleet of foot, tricky, treacherous and unwilling to work.

Shaggy belonged to a train of burros used in carrying freight to a mining camp fifty miles from a railroad. He did not have the sleepy eye of his mates; he had a sly, comical way of looking out of the corners of his eyes, and his driver declared that there were times when Shaggy "laughed right out loud."

He was always biting or kicking some of his mates, shying from the road, racing madly on ahead, or lagging lazily behind, or doing something else to bring upon himself the lash and the reproaches of his master.

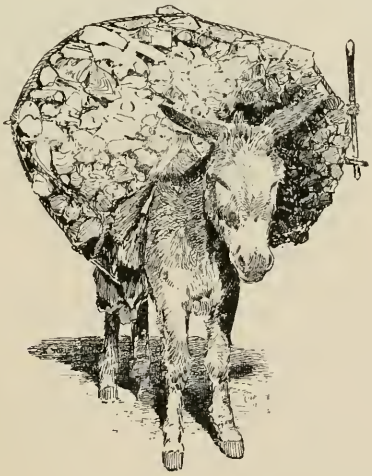
He made so much trouble, and his influence on the rest of the train was so demoralizing, that Shaggy was finally disowned by his master, and turned out to shift for himself in one of the gulches through which the train was passing.

The children of a miner living in the gulch adopted this incorrigible animal, and it is to be hoped that, under their gentler influences, he reformed at last.

Docile and sluggish as he commonly is, the burro rises to great heights of wrath and activity when engaged in battle with one of his own kind. Then his dull eyes flame, his ears lie back, all his shining teeth are revealed, his hoofs fly out and he fights valiantly.

These combats do not often occur, however. At other times the burro is one of the meekest and most faithful little burden-bearers in the world.

J. H. Lewis.



Chinese Railway Laborers.

During the years 1880–84 the activity in railway-building in the northern part of the Pacific Slope was very great. Besides some lesser operations in Arizona, the Oregon Short Line, the Northern Pacific, the Oregon California, the Columbia Division of the Oregon Railway and Navigation Company's roads and the Canadian Pacific were all under construction.

There was great lack of laborers, and resort was had to the Chinese, without whom, indeed, those roads could never have been completed in the time and with the cheapness that they were built. Not only were coolies picked up all along the coast, but they came in immense ship-loads from Canton, being hurried into Portland in anticipation of a prohibition by Congress of their further coming.

Most of these coolies were spoken for before their arrival, and were at once sent to the front of the advancing railways far in the interior. They had scarcely time to recover from their seasickness before their bewildered hands were grasping the strange shovel and were flinging gravel, without any idea what it all meant.

They were not hired, man by man, by their real employers, but through agents of their own race, generally prosperous merchants in the seaports. These merchants would agree to furnish a railway-builder with say five hundred men, at so much a day for a certain number of months. The men were paid by the agent the whole wages offered, about twenty-six dollars a month, in 1882, about one-half the wages white men of the same grade were getting. This agent made his profit in the transaction wholly out of the supplies his clients were compelled to buy of him alone.

This system divided the coolies into gangs of forty, to each of which were attached two cooks and one English-speaking

Chinese as spokesman and leader. By this arrangement the coolie completely lost his individuality, and formed one of so many units to be furnished by a merchant, so many members in a gang to be kept track of by the timekeeper. He was a nonentity, and the most isolated and friendless being in the world.

But though declined as associates, and held in a contempt too good-natured to be scornful, the Chinese were not at that time ill-treated by the Irishmen and other white laborers with

The Strange Shovel.

whom they worked. There were no demagogues in the camps to stir up feuds, and the managers, who were not accustomed to handling affairs with gloves, took care that there should not be meddlers in their way. If a man didn't choose to mind his own business there, he was compelled to do it.

Every man starting inland slung over his shoulders, from the ends of a long stick, in baskets of split bamboo or bundles of grass matting, all of the personal baggage he could get

through the custom-house, and took it into the woods with him.

On arriving at the scene of work, the coolies would set up the small tents given them by the railway people, or make themselves ingenious "hoodoos" out of ties, brush, bales of hay, or anything that came handy. These might be picturesque in their setting, but sometimes, in a desolate region, they only added to the natural ugliness of their surroundings.

John Chinaman's camp-bed consisted of a board or heap of boughs and the rush-mat in which his blankets had been rolled, together with a more or less ornamental section of bamboo for a pillow, which was also utilized as a box for small valuables. The cook built a half-shed, half-tent sort of kitchen, where he constructed two or three furnace-like stoves out of stones and mud by walling in a square hole in the earthen floor, and contrived a stovepipe out of castaway tin cans.

John's breakfast is early and simple: dried fish, rice and tea as a rule. He has an hour at noon for luncheon (rice), and between meals consumes great draughts of weak, cold tea, carried about, two cans at a time, on a pole balanced across the shoulders, by youngsters not strong enough to do heavy work; for a great many of the later immigrants were merely boys.

Along with his favorite rice and tea John brings from the old country a custom of personal cleanliness which white navvies can never be brought to emulate. Each coolie has his little wooden foot-tub, and his first move at the end of his day's work is to get it full of the hot water which it is the cook's duty to have ready, and then to take a complete bath.

Then follows supper, all sitting about on the ground and chattering like schoolgirls to the rattle of chop-sticks and the banging of tin cups. After supper appear the queer little pipes for tobacco; or perhaps a surreptitious whiff of much-adulterated opium will be indulged in. Many may

then be seen reading or ciphering or playing native games with their queer little cards.

The Northern Pacific in Idaho and Montana had some six thousand of these Orientals in service during all of 1882, besides many hundreds of white people and a few Indians. Other Pacific coast roads employed similar numbers, the total reaching about thirty thousand; and it became a matter of

New Work.

anxiety to the leading Chinese in San Francisco and Portland as to how this influx should be provided for when the railways were completed.

Certain kinds of work considered not fit for a white man, chiefly because they required patience, were relegated wholly

to the meek foreigners; but in general their work was shovelling and rock excavation, always under white bosses, toward whom they sometimes exhibited great animosity, often with good reason.

White bosses were necessary on account of the dishonesty of the Chinese in reporting hours of labor; but they would bribe so unblushingly and successfully that a special set of independent watchmen, called time-takers, was necessary.

In many cases the foremen were inexperienced, so that the older coolies knew better than they how things should be done, particularly in regard to blasting. Hence gangs frequently struck, under conviction that their foreman's directions were wrong and dangerous. Through this, or some other cause, the inferior bosses had a hard time, and were in constant danger of open attack or secret harm.

Not being able to speak the language and constantly irritated, they frequently clubbed the workmen, and on one or two occasions even killed men in the way of discipline. Yet it was not often that the Chinese, born with slavish instincts and accustomed to oppression, turned in revolt or self-defence.

The Chinese proved themselves very skilful in the management of explosives, which were employed extensively all the way through the mountains, and they had great respect for expertness in this direction. I knew of one case where a gang, one of whose number had been killed by its boss, petitioned for his retention because "he heap sabe (know) powder — no kill whole gang o' Chinamans!"

Though they were not able to get through as much work in a day as white men, they were very valuable to the railway contractor, not only because of their docility and handiness, but because they could be relied upon to stay at work. Very few of them knew of any alternative, and were never restlessly inclined to quit and go somewhere else, which is the ruling disposition in the white workmen of that region. Moreover, they were not inclined to break away on sprees, and

thus incapacitate themselves for labor for several days at a time.

Near the growing end of every new railroad was an itinerant town of liquor-sellers and all sorts of bad characters, which continually bred delay, waste and riot among the laborers. To these places the Chinese gave no patronage. They had their own vices, the worst of which was gambling among themselves. This was doubtless bad for them, but it did no harm to the general progress of the work. This disposition was a great comfort to the managers, and in fact, was the salvation of the work.

Upon the completion of the railways in 1883 and 1884, great numbers of Chinese, both old settlers and raw emigrants, made their way to the large towns, whereupon alarmists cried out lustily at the frightful evils to follow; but they were absorbed or went back to China, and the evils have not occurred. A good many were retained as section-men along all the lines, and since that time thousands of Chinese have annually found employment in new railway construction and in coal-mining.

ERNEST INGERSOLL.

Some Rocky Mountain Animals.

There is a peculiar charm and interest in Colorado mountains when, after climbing a high peak, we emerge from the forest. The desolate vanguard of skeleton trees, with bleached limbs, which have perished in the forefront of the battle with the elements, gives place to a soft turf that completely clothes the upper part of the mountains from timber-line to summit.

This turf is covered with dwarf Alpine flowers of exquisite beauty. Here are soft cushions of tiny azure-blue stars, there tufts of blue gentian; and by the side of a rivulet whose icy waters cut the rich moss rise the bright, majestic flowers of Parry's primrose and the mauve bells of the Jacob's-ladder.

To botanist, zoölogist and naturalist this ethereal zone between timber-line and peak has peculiar interest, for here he will find Arctic flowers, birds, insects and animals without risking his life on an Arctic expedition. For climate, rather than distance, makes these changes in natural life. Hence our eagerness as we step forward.

What shall we find? What birds, butterflies, plants and quadrupeds live in this region all to themselves, so far above the rest of earth and its inhabitants? We were not long left in doubt, for our appearance was the signal for a series of shrill whistles, which were answered by a chorus of sharp little barks coming from numerous unknown places among the rocks.

After a careful reconnaissance, we caught sight of a yellowish-brown animal like a woodchuck, with long, brown, bushy tail. It lay flat upon a slab of rock like a squatting lizard, repeating at intervals the sentinel whistles we had heard, which were echoed by a chorus of teasing little barks, cheep! cheep! from many invisible throats.

By closely watching the spot from which the sounds

appeared to come, we were rewarded by seeing a little animal very like a young rabbit mount a rock, stand erect on his haunches and pipe out his sentinel note, which was immediately answered by the cries of others, whom we now saw peeping out from under the stones.

The shrill whistler is the Rocky Mountain marmot, and is very like that cousin of his in the Eastern States which is

Rocky Mountain Animals.

known as the woodchuck, but is larger, yellower and with longer tail. He lives under the rocks in holes, and is often seen basking in the sunshine on the top of a flat rock or alertly keeping sentinel watch. He lives on the succulent herbage, and lays in a store for winter.

The other little animal that resembles a very young rabbit is not so well known. Naturalists call him the pika, and hunters have named him the coney. As a matter of fact,

he is identical with or closely related to the conies mentioned in the Bible, and is found on the tops of the mountains of Syria, as well as on the Himalayas. His resemblance to a young rabbit is close, only he has no tail, and his ears are not so large. There is also a difference in his rodent teeth.

The conies live in colonies among the loose rocks, and always have sentinels posted while they are out feeding. The shadow of a hawk or the bark of the sentinel sends them speedily to their hiding-places, from which, almost with equal speed, they emerge to see who the intruder is, and keep up a perpetual barking. They are rodents, and feed, like the marmots, on the roots and stunted herbage, laying up a store of grasses, like little hayricks, against the long winter, when they may be snowed under ten feet deep.

As we walked down among the chaos of loose rock left by an ancient glacier in its melting and retreat, a flock of birds about the size of partridges rose with a whir that startled us, and alighting again a few yards off, suddenly became invisible.

These were the Rocky Mountain ptarmigan; and their invisibility is due to the close resemblance of their plumage to the stones on which they stand. Either because their foes and visitors are very few, or because they trust to their colors for concealment, they are very tame.

These birds change their plumage according to the season of the year. In summer they are gray like the granite, and in winter, snow-white. Their nests are composed of leaves, grass and feathers, lying on the ground. They feed on leaves and seeds of mountain plants.

At the extreme top of the mountain, fourteen thousand feet above the sea, the only living creature we could find was a very active spider, living under the stones and apparently doing well. Under the same stones, too, were the dead, frozen bodies of hundreds of thousands of locusts, which had doubtless been beaten down by a storm on to the peak, and had perished from cold.

Butterflies, especially little blue and brown ones, were plentiful. In one of singular delicacy and beauty, with large, transparent white wings on which were purple spots, I recognized an old friend which I had first met in the Alps of Switzerland, the Parnassus or Apollo butterfly.

A little gray-crowned finch, with purplish wings, is another frequenter of the peak. It is often seen in flocks about the miner's cabin, picking up a precarious livelihood. When a big storm is coming on, these birds betake themselves to the valley and prairie, and so warn people of its approach.

Ptarmigan.

An eagle may occasionally soar over the peak and alight, and a bear may find the mountain-top a convenient short cut to some place he is bound for on his travels. But neither of these animals is, like the rest, a true denizen of the mountain-top, both in summer and in winter.

One of the most singular creatures in this region is the Rocky Mountain rat. Not that anything is very peculiar in his appearance, since he differs but little from a rather large ordinary rat, except that his ears are larger, while his fur is soft and brown, like that of the chinchilla, and his tail more bushy. But "for ways that are dark and tricks that are vain" the mountain rat is decidedly "peculiar."

When wandering among the rocks and canons, you may often observe, in crevices high up the cliff, an accumulation of sticks and rubbish, which you might suppose to be the nest of an eagle, or even the couch of a Rocky Mountain bear, for which it is frequently large enough. But it is neither of these.

It is the nest and home of a rat, or a colony of rats, which, like a few other animals, have an extraordinary mania for general accumulation, and in particular for collecting certain things of a bright and shining appearance, seemingly of no

possible use to them. They are instigated by a veritable spirit of thieving.

Nothing seems to come amiss to them, from watches, tin plates and silver spoons, down to the bones and horns of wild animals, and even pieces of stone and slate.

These precious trophies are dragged with infinite pains up to the monstrous nest in the clefts of the rock, which is composed of twigs, rubbish, and the flotsam, jetsam and bric-à-brac of mountain, forest, stream and valley. As a naturalist, I have found a mountain rat's nest as instructive about the natural history of a neighborhood as a local museum in a small town.

The rats do not confine their stealing to their natural surroundings among the rocks. They are much given to taking up their abode in the lofts and roofs of log cabins. In the night they are heard from, by certain mysterious ghostly rappings and tappings, and in the morning, perhaps, by the absence of some bright article from the breakfast table, laid overnight. When anything of this kind is missing from certain cabins, the first place to be searched is the mountain rat's nest.

The rats' industry is as remarkable as their thieving. They spare no pains to convey away their booty, and the size and weight of things they carry off, and even drag up a steep hillside, are astonishing. In many cases the robbery must involve the labor of a whole confederate band. When we were engaged in geological explorations in Wyoming we had an example of this.

We were digging out, at the time, the fossilized remains of a gigantic lizard, and were in the habit of leaving our tools — geological hammers, butcher-knives, brooms, etc.—in the quarry or on the dump, when we went home to camp for the night. One morning, returning as usual to our work, we found that everything was gone, with the single exceptions of a heavy spade and pickaxe.

Our first impression was that the quarry had been raided

by tramps, but on looking around a little we espied our long-handled broom lying on the side of a steep hill, some fifty yards away. Not far from it were the geological hammers. The marks of sharp little teeth on the handles showed who the thieves were.

By following in the direction in which the articles had been travelling, we came on a large mountain rats' nest, sheltered in a wide crevice in a sandstone ledge. We revenged ourselves on the little marauders by drawing daily from their nest materials to build our noonday fire. Yet after many such reprisals, the nest still held out.

I took a rough inventory of some of the materials composing it. It consisted mainly of sticks, leaves and twigs, and mingled with them were the bones of various wild animals, the skull of a coyote, the feathers of an eagle, spores of prickly pear, thorny branches of prickly greasewood, and here and there, on the outside, pieces of slate, as if laid on for a finishing touch.

In the heart of this rough mass were the cozy sleeping apartments of the rats, made of soft moss. The motive of all this accumulation seemed to me to provide warmth and protection against the intrusion of other wild animals.

A mountain rat finds a large crevice. He makes up his mind that this, no matter how big, must be filled, to keep out wind, snow and other animals, and for this purpose he makes use of any sort of material that comes to hand.

As regards his choice of shining and gay materials, it may be that he has an eye for decoration and the beautiful, like the bower-bird of the tropics.

PROF. ARTHUR LAKES.

Where Railroads Go.

The railroads of the Rocky Mountains present some of the most wonderful examples of skilful engineering in the world, and they carry passengers past scenery unsurpassed anywhere in grandeur.

Even those who have gone through the Grand Cañon of the Arkansas in Colorado, on the Denver & Rio Grande Railroad, and have been awed by its silent and gloomy splendor, may not know that before the railroad was built the narrow river filled the space between the rocky walls so that neither man nor beast could enter. There was not even a footpath by the river's brink, and no boat could navigate its shallow but turbulent waters.

The construction of the Denver & Rio Grande Railroad was begun in 1870. It was a mighty undertaking. Entering the canon from the little town of Canon City, at its mouth, one is almost immediately shut in by two nearly perpendicular walls, rising now and then more than two thousand feet.

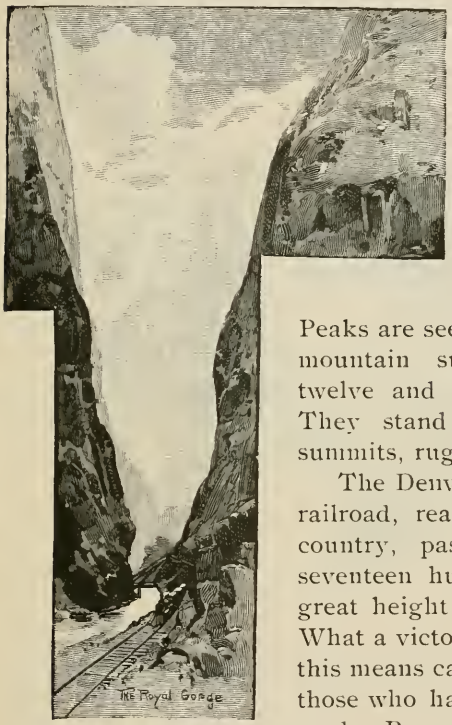
The road-bed in some places is cut out of the solid rock; in others it lies on rocky grades made in the river-bed. At times the laborers were lowered by ropes from the high walls above to drill and quarry and blast out a line for the road, and in the entire cañon, which is about eight miles in length, hardly forty feet of the track lie in a straight line.

The road winds around sharp curves under great overhanging rocks; it crosses and re-crosses the noisy little stream, made narrower and noisier by the road-bed which has encroached on a right of way that was never before disputed.

Out and in the train goes among the deep shadows and the tumbled rock piles, grim and red, of the Royal Gorge, a part of the canon about two miles long, where the culmination of rugged mountain grandeur and magnificence is reached. One wonders if there are any limitations to the achievements

of modern railroad engineering when trains go easily and speedily through places once inaccessible to man or beast.

Another line of mountain railroad of great interest is the La Veta Pass line, that runs over the Sangre de Christo mountain range. Here an elevation of nearly twenty-four hundred feet is reached in thirteen miles, and at one point the grade is more than two hundred feet to the mile for a distance of three miles.



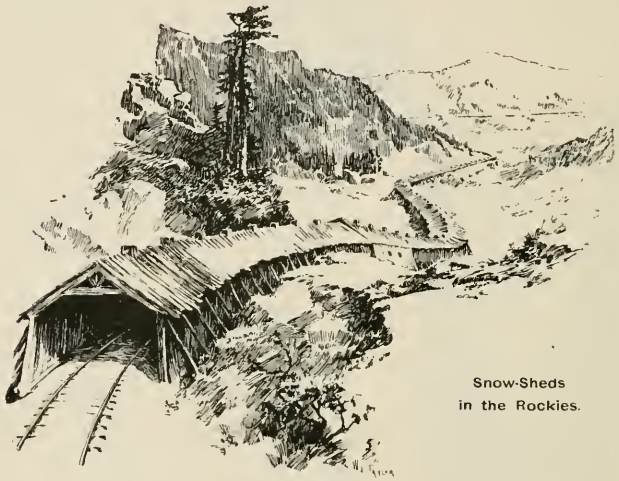
Before the pass is reached the Spanish Peaks are seen rising above the other mountain summits to heights of twelve and thirteen thousand feet. They stand apart from the other summits, rugged and majestic.

The Denver & South Park line of railroad, reaching to the Gunnison country, passes through a tunnel seventeen hundred feet long, at the great height of eleven thousand feet. What a victory over natural obstacles this means can only be understood by those who have gone over this line of road. Passengers glancing out of the car windows hold their breath in places where the train seems clinging to the mountain wall, thousands of feet above the dark and gloomy canons below. One cannot help thinking of the frightful result if a wheel should leave the track, or one of the overhanging rocks should come crashing down.

One may ride many miles on these wonderful railroads without seeing a house, and the stations are often many miles

apart. The towns and cities, when reached, often consist of a single house.

I remember one such city, away up on the summit of a mountain ten thousand feet high. The engine behind which I rode went panting and puffing up to it one bright day in June several years ago. The last mile of the ascent was a noble pull up the steep and flinty side of the mountain.

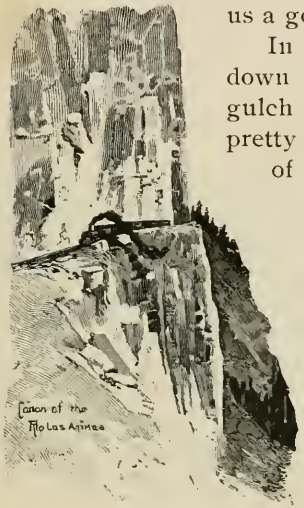


Snow-Sheds in the Rockies.

Whirling suddenly around a curve, the ascent became less abrupt, and we stopped before a tiny station, painted bright blue, standing on a bit of level ground a few feet square. There were bright red calico curtains with white lace borders at the windows, in which were plants in bloom. Through the open door one caught a glimpse of a tidy little room, with a bright rag carpet on the floor, and with walls covered with gay picture-cards.

A tidy little woman, with the whitest of aprons and the starchiest of calico dresses, came to the door, on the step

of which a splendid old Maltese cat lay asleep in the sunshine. A canary sang shrilly within, and just before we went on our way a curly-headed baby came creeping across the floor and was caught up in its mother's arms to wave us a good-by with one of its chubby hands.



In another moment we were rushing down the mountain-side to the gloomy gulch below, leaving far behind us that pretty picture of home life in the sunshine of the heights. Perhaps railroads go to more remarkable places in Colorado than in any other State in the Union; but in California there are railroad wonders scarcely less noteworthy.

The passenger who, for the first time, climbs the Tehachapi Summit Pass on the Southern Pacific Railroad is astonished, after he has left behind him the level lands of the San Joaquin valley, and is scaling veritable mountain heights, to find the train crossing another railroad track, though at a height considerably above it. "Can it be possible," the passenger asks, "that there is another railroad running along the top of this lonesome mountain in the wilderness?"

Then he is told by some fellow-passenger, probably with a smile, that he is crossing the track that he himself has just ridden over. The road has made a loop upon itself; and while the train, in making the circuit of this loop, has not progressed at all toward its destination, it has risen a good many feet higher toward the summit which it must climb before it starts on its descent.

J. L. Harbour.

Digging Up a Fossil Monster.

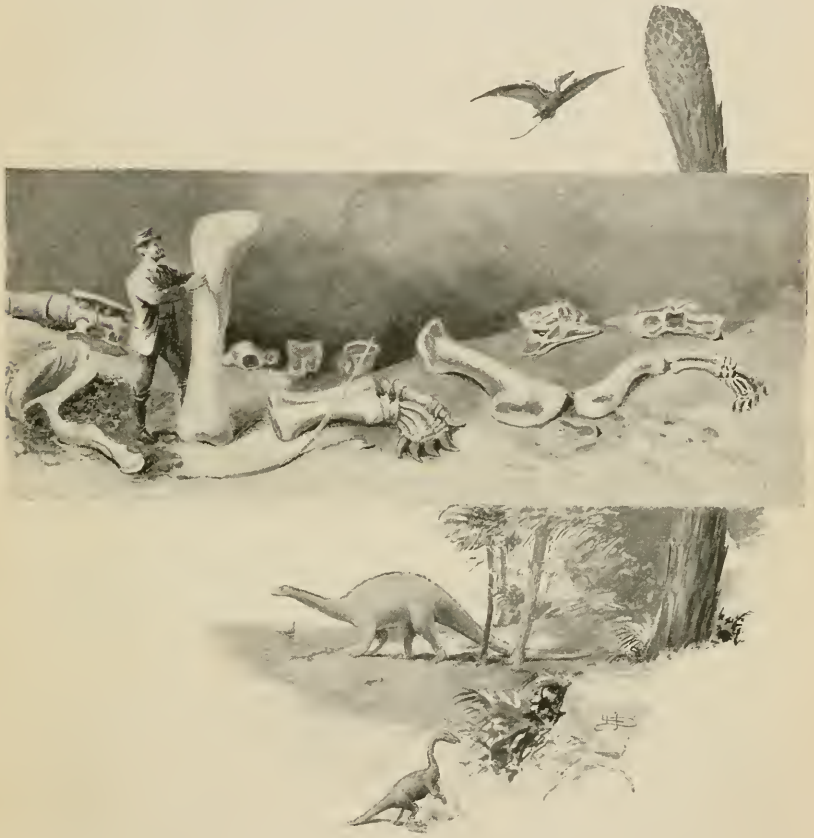
The Rocky Mountain region is a treasure-house of curiosities, of minerals, crystals and fossils. Fossil shells, fossil leaves, fossil reptiles and mammals abound.

The great upheaval of the Rockies has brought these wonders to light from their sepulchres deep in the earth. The upheaval of the granite core has tilted up and exposed the deeply buried strata along its flanks in such a manner that any one can study a thickness of a mile or so of them in an afternoon's walk by passing along their upturned edges. Thus he can see, as it were, a mile or more into the material composing the bowels of the earth without accompanying Jules Verne on an imaginary trip to the centre, or boring a well a mile or more deep.

I was spending an evening at a country resort in a picturesque locality among the upturned rocks of the foot-hills. At the request of the guests of the hotel, I gave them a brief lecture or sketch of geology, and whilst describing the succession of periods and rocks composing the earth's crust, and the succession also of the different animals that had lived on those rocks, I happened to say that the rocks on which the hotel was built belonged to those of the Reptilian period, and that possibly strange reptiles might be sleeping in their tombs beneath its foundations.

The next day the guests, fired with an interest in geology, proposed an excursion among the rocks. After we had climbed over ridge after ridge of red sandstone, limestone and marls of the Triassic period, we reached the foot of a very prominent hogback, or ridge, composed of variegated marls, clays and sandstones, when one of the party in advance called out that he had found the impression of a fossil tree-trunk on a fallen slab of sandstone. As such a fossil is not uncommon in this region, I was not surprised.

On reaching the spot I saw that the impression on the slab was far too smooth to have been made by the rough bark of a fossilized tree. It was more like the impression a stovepipe



The Atlantosaurus, as found and in life.

would have made on a soft bed of clay. In one corner were little porous, pinked fragments adhering to the rock, which I recognized as fossil bone.

"This," I said, "is no tree, but the impression of the bone of some prodigious monster."

Forthwith we clambered up the cliff to the spot whence the slab of rock had evidently fallen from its parent ledge; and there at our feet lay three huge vertebræ, partially imbedded in stone, each about a foot in diameter, and all united to form the massive sacrum of the monster, to which the tail is attached. Hunting among the bushes below the ledge, we found the broken ends of limb bones, like Hercules war-clubs, while other fragments could be seen still imbedded in the sandstone of the ledge.

We sent to the village and procured a quarryman, tools and blasting powder, and began opening up the rocks with wedges and powder. This resulted in the discovery of many other bones and some spoon-shaped teeth.

We watched for the results of the blasts with great interest. Once when the smoke had cleared off, and an overlying slab had been blown to pieces, there lay beneath it a perfect limb bone, black as ebony, and five feet in length.

At another time the perfect skull of a crocodile, with teeth complete in the sockets, was uncovered. It was doubtless the skull of a creature which lived in the same swamp with the larger animal. Bones and shells of turtles and fish-bones were found with the remains, showing that the animal, whatever it was, must have lived and died in the vicinity of lakes, or rivers, or fresh-water swamps.

Large vertebræ were quite common, especially those belonging to the neck and tail. These, which looked like buffets when lying on the dump, varied in size from fifteen inches in diameter down to three or four inches. Some belonged to the neck and back, and others to the tail. Sharp, black, scimitar-like teeth, belonging to some carnivorous species, were occasionally found, mingled with the other remains.

The largest bone found was a gigantic femur, or thigh-bone, which, from the enormous proportions of the butt ends,

was as first estimated to be nine feet in length, making allowance for a portion of it missing; but it turns out to have been only six feet four inches.

Curious to know the nature of this prodigious creature, we sent off a car-load of bones to Professor Marsh of Yale College, a great authority on fossil animals. He informed us that the bones were those of a gigantic land-lizard, or Dinosaur, and he declared, from the size of the bones, that it was far greater than any that had hitherto been discovered. He named it forthwith the *Atlantosaurus immanis*, or the huge Atlas lizard, as a compliment to Atlas, who is supposed to have carried the world on his shoulders.

This is the greatest land animal that has ever been discovered, and in all probability the greatest that ever walked this earth. The only bones at all comparable to it are those of the whale.

The length of the animal is computed at between sixty and eighty feet, or possibly even more. Its height, as it strode along on its four stout legs, was between twenty and twenty-five feet.

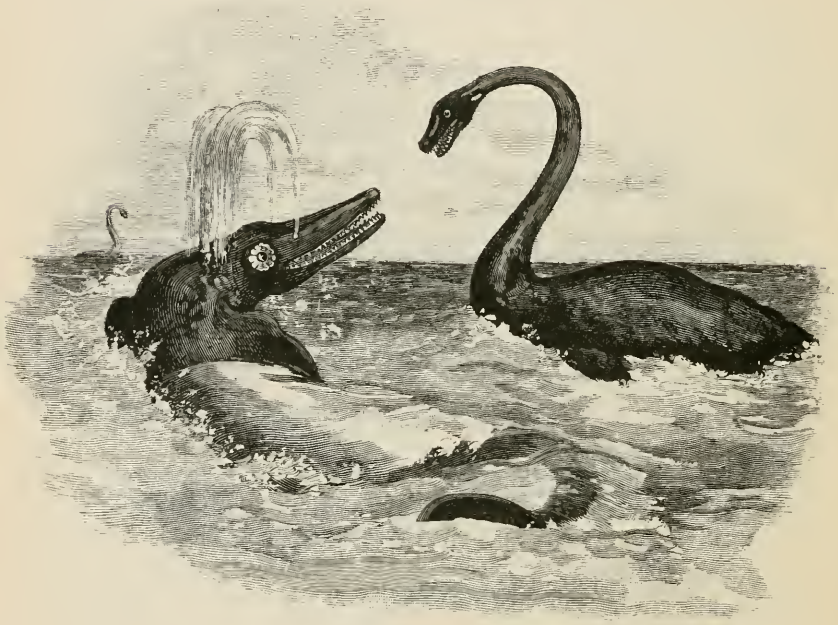
As the bones of the creature were not all found, or complete, the length might be estimated by the size and number of the vertebræ as compared with those of the modern crocodile. As for height, perfect legs were found whose length was upward of fifteen feet. Allowing five feet or a little more for the space between the top of the limb and the ridge of the back, twenty feet is a very moderate estimate.

It would be difficult to compare it to any living animal. It was a gigantic lizard, mounted on tall, stout, elephantine legs, with a long, thick, powerful tail, and a longish, thick neck, tapering to a small, almost serpent-like head, far smaller than one would expect for so huge a monster. The skin may have been covered with shining scales.

The atlantosaurus appears to have been quiet and harmless in habit, and dependent mainly upon his vast size for protection against other more formidable kinds. The character

of the teeth imply that he was herbivorous, and his habits may have been somewhat like those of the hippopotamus.

As a land animal, he walked proudly among the forests of the Jurassic period, or baked and wallowed in the marshes that then surrounded the young, low-lying Rocky Mountain region, and stretched down to the sea, where sea-serpents



Ichthyosaur and Dinosaur.

and many strange reptiles held sway in the waters, while reptilian-like bats and birds flew in the air.

On land there were many species of these dinosaurs, some of which we discovered later in Wyoming. Some were herbivorous and some carnivorous; some walked upon all fours, others hopped along on their long hind legs like kangaroos, and others were very bird-like in appearance

and gait. They were of all sizes, from that of the great atlantosauri down to lizards no larger than a cat.

With these remains we found in Wyoming those of tiny mammals, probably the first known, resembling kangaroo rats.

The question is sometimes asked, "How long ago did these monsters live?" To this we can give no definite answer, further than that it was very long ago — thousands, perhaps millions, of years ago. Some idea of their great age may be obtained by considering the thickness of rocks that lie above them.

These rocks were slowly and gradually laid down, as sea, river and lake are slowly laying down their beds of mud and sand to-day, to become in time solidified into shale and sandstone. There has lain above the tombs of these animals as much as ten thousand feet of rock, all of which was formed, of course, after they were dead and buried.

Much of this rock is a fine shale or clay, which must have formed very slowly at the bottom of a deep sea. The rest is sandstone, which may have formed a little faster. Some geologists estimate the thickness of rock to have been formed at the rate of from one foot in one thousand to five thousand years. Multiply, then, your ten thousand feet by either of these numerals, and you will see how very long, even at the lowest estimate, it must have been since these bones were first buried in the mud of the ancient Jurassic marsh.

These bones were quickly covered up and sealed from the influence of the atmosphere. In this state they were soaked through and through with water carrying minute particles of quartz and mineral matter, and as the tissues of the bones decayed, they were microscopically replaced by this quartz matter, which in some of the larger bones is a beautiful agate and carnelian.

Prof. Arthur Lakes.

A Petrified Big Tree.

In a little meadow-park called Florissant, nine thousand feet above the sea and in the heart of the mountains in the state of Colorado, we came across half a dozen stumps of trees from ten to fifteen feet in diameter, turned into solid, hard stone.

One of the largest of these stumps had been partially excavated from its bed by some enterprising people who had intended to carry it to the World's Fair at Chicago.

It stood about twenty feet above its base, and was fifteen feet in diameter. As it was too huge and heavy to transport bodily, they tried to saw it up into sections; but fortunately for Colorado, its flinty hardness was more than a match for thin stone-saws of soft iron, which are still sticking in the tree as monuments of their discomfiture.

So wonderfully has the stony material replaced the texture and grain of the original tree, and even in some parts simulated its color, that but for its unusual size any one might have passed it by as an old dead pine stump felled by some early settler.

It was easily recognized as a fossil representative of redwood. Not only is the rough texture of portions of the thick bark preserved, but even the minutest wood-cells and rings of yearly growth are retained. Sometimes a faint tinge of iron-rust nearly restores portions of the wood to its redwood color, but the prevailing tint is an ashen-gray, like that of an old dead stump.

As you pick up one of the chips scattered around by the hammers of tourists, its weight and hardness alone convince you that it is really stone and not an old cedar chip left by the axe of an early wood-chopper. To complete the resemblance to certain parts of the living tree, sap-vessels and veins are here and there filled with what appears to

be gum, but it is really semi-transparent agate, opal or chalcedony.

When we make fine, thin sections of the fossil wood and put them under the microscope, we find a peculiar pattern of the wood cells which is the same as that of the modern sequoia, showing that these lone trees, over a thousand miles

A Petrified Tree-Stump.

from the Pacific coast, are the stony representatives of the great living sequoias.

How was this tree so wonderfully changed into stone, and how comes it here, almost alone in the Rockies? Stone it certainly is; moreover, there is not a particle of the original tree in it, any more than there is flesh and blood in a marble statue or a plaster cast. It is a stone statue or restoration of a once living tree, far more perfect than that of any statue by the greatest sculptors.

It is not an uncommon notion that certain substances or bodies have, after life is extinct, some mysterious power in themselves of turning themselves into stone ; but such is not the case. A buffalo dies on the prairie ; his flesh rots and passes away into various gases ; his skeleton lasts a few years longer and then passes into dust and soil. Similarly a tree dies, rots, falls to the ground and makes soil for other trees to grow on. Neither buffalo nor tree has any elements in itself that can transform any part of it into stone.

Suppose, on the other hand, a tree like our sequoia to grow near a marsh or lake. The waters of the lake encroach on its roots, kill the tree, and bury its stump in mud while the upper portion, falling into the lake, becomes water-logged, sinks to the bottom and is entombed in mud, which arrests rapid decay. In this condition petrifaction may gradually take place.

Nearly all waters contain mineral matter, such as iron, soda or lime. If the waters are acid and heated, as they are apt to be in the neighborhood of volcanic action, they generally contain quartz or silica in a dissolved state, which they deposit in a gelatinous condition, like gum arabic. This afterward hardens into agate or chalcedony as hard as glass. If clayey matter is added to it it may form some kind of hard stone like jasper.

Suppose a tree, then, in the bed of a lake to be saturated through and through with such mineral-bearing water. The larger pores and veins are quickly filled with agate, opal or chalcedony, so like pine gum. Then a long protracted, minute work goes on. As each tiny particle or wood-cell rots away, it is replaced by a minute particle of quartz or stony matter, till, when at last every living element of the tree has vanished, a microscopically perfect restoration of the tree, both externally and internally, is left behind in stone — a monument for all time, of the tree that lived and died ages and ages ago.

All trees that have fallen into lakes and rivers have

not been so preserved. Peculiar circumstances have been necessary for such petrifaction. The most favorable circumstances are often the presence of acid and hot springs in a volcanic neighborhood, such as we see in the geysers of the Yellowstone, where there are whole forests of petrified trees.

The surroundings of these fossil trees are no less interesting than the trees themselves. The roots are imbedded in shale and sandstone, the solidified mud of a primeval lake. This is composed of grains and fragments of volcanic lava, often as fine as the finest dust.

Opening the thin layers of this petrified mud with our knives, we find numerous impressions of fossil insects, such as ants, dragon-flies and tropical lantern-flies. A fossil butterfly impression has also been found, one of the very few ever discovered ; so perfect that the color-pattern on its wings can be distinctly made out, and the species identified.

Mingled with these are equally perfect impressions of fossil leaves of a semi-tropical character, such as those of a palmetto. A fossil bird and fossil fishes have been found. All the remains indicate the existence at the time of the lake of a semi-tropical climate, very different from that of this neighborhood to-day.

From such remains and other discoveries we can get some idea of the history of the lake and its fossil trees.

Some thousands of years ago a small mountain lake nestled among these hills. Its banks were surrounded by luxuriant semi-tropical vegetation, among which, close to the edge of the lake, towered the great sequoia. Volcanic eruptions took place along the shore of the lake, and by violent explosions filled the air with lava dust and ashes, which fell in showers into the lake and formed its mud.

Leaves of trees that had been blown into the lake, and insects that perished on its muddy flats or in its waters, together with the water-logged stumps of trees, were periodically buried beneath these eruptions of volcanic mud.

Hot, acid springs accompanying or following the eruptions assisted in the process of petrifaction.

The eruptions in time ceased, the lake dried up or was drained off, glaciers and floods cut ravines in the old lake beds and exposed their fossil treasures.

The sequoias are probably the oldest, as well as the largest trees, now growing on this planet. They are survivals of an age long past. They were, geologists believe, among the earliest genuine forest trees to appear on this planet.

Before that time there were but seaweeds and gigantic ferns, rushes and mosses, till about the middle of the earth's history, at the time when the great lizards appeared. With them came the great sequoia-tree. Around it were strange, gigantic forms of animal and vegetable life ; and its survival among us to-day seems almost as strange as it would be to see one of those terrible, gigantic lizards walking among the trees of Central Park and passing from branch to branch.

The sequoia saw the age of great reptiles fade away and give place to that of almost as great and formidable mammals. The sequoia, or rather its descendants, saw man arrive upon the earth, and doubtless witnessed what, if we knew it, would clear up the mystery of the missing link. To-day it sees the railway train fly through what is left of its forests, and has the telegraph wire pinned to its thick bark.

In the present age there are but two varieties of sequoia, and these are confined to the Pacific coast. In geological times there were twenty-six varieties, scattered over the world from the extreme Arctic Circle to Australia. This wide distribution accounts for our finding the fossil stumps in Colorado.

Prof. Arthur Lakes.

The Holy Cross and Twin Lakes.

The progress made by railroads during late years has rendered accessible many points of interest and beauty in the Rocky Mountains that could be reached before only by long and wearisome journeys on horseback and in wagons.

One of the most remarkable points in northwestern Colorado is the Mount of the Holy Cross, about which little has been written. This mountain is nearly three miles high, very rugged and barren.

Away up above the great gray rocks, above the lofty pines, amid the barren boulders, the Holy Cross lies outlined, on summer days, beneath the blue sky.

The mountain derives its name from this cross, which is formed by the deep snow lying in two depressions nearly at the summit of the mountain ; these depressions, or ravines, are so formed by nature that they cross each other at right angles.

They are very deep, and become filled with snow during the winter months. In the summer the snow melts from around the ravines, and leaves the great white cross distinctly revealed against the gray rocks.

Under the light of a full moon, in which all the splendors of the mountain are enhanced, the Holy Cross lies gleaming in its snowy purity, and awakens in the beholder's heart thoughts of the sacred cross on Mount Calvary upon which our Saviour died. Even the rough class of men found in this newly settled part of Colorado regard the Holy Cross with a kind of awe.

The cross is not visible in the winter, when the whole summit of the mountain lies buried under many feet of snow. It is, indeed, a singular work of nature, and well worth the long ride you must take to either of the points from which the finest views of the cross are to be had.

THE MOUNT OF
THE HOLY CROSS.

The most impressive view of the Cross is by night at the time of the full moon.

With the present railroad facilities the journey from the Mount of the Holy Cross to the Twin Lakes can be made in a day. You go through the picturesque little mining town of Red Cliff, over Tennessee Pass, and across Tennessee Park to Leadville.

The lakes are fifteen miles southwest of Leadville, and lie in an elevation of over nine thousand feet above the sea-level.

They cover an area of about four miles in length by one and one-fourth miles in width, and are separated by only a narrow strip of land. They are surrounded on three sides by lofty mountain heights that slope down to the very water's edge.

On the other side is the wide valley of the Arkansas, beyond which rises another lofty range of mountain-peaks, clearly defined against the sky, although they are many miles distant. On their summits the snow lies during all the bright summer days.

The lakes contain great numbers of the pretty speckled mountain trout that are so great a luxury in their season.

Fishermen are generally very lucky, although the water is so perfectly clear that the fish in the depths below can see the human monster at the other end of the line.

The speckled beauties can be seen darting here and there far below you as you glide in the gaily-painted little boats over the ever placid water. In some places the water is very deep; it has been sounded to a depth of eight hundred feet, and it is probable that the lakes are not deeper than that in any place.

Boys who take delight in thinking what a good time they would have swimming in these beautiful, tempting lakes, would be very likely to jump out of the clear waters more quickly than they jumped into them, for in this altitude the water is several degrees too cold for bathing, even in the warmest August days.

In summer the air is delightfully clear, bright and cool. Persons accustomed to languish in the terrible heat of the

East would at the lakes enjoy the novelty of snuggling up under several blankets during the warmest summer nights.

Here is found a sure and safe retreat from Old Sol's fiercest rays. It is one of the highest summer resorts in America, if not in the world.

Since Leadville came into existence the lakes have become a very popular place of resort, and a number of good hotels have been erected.

Tourist and camping-out parties come here during the summer months, and add to the picturesqueness of the surroundings by pitching tents all along the shores, and roughing it in a healthful, if not entirely comfortable, manner.

Students with a fondness for geological investigations could not find a better locality in which to gratify their inclinations. Some of the formations are very singular and interesting to study.

Mining is carried on to some extent near the lakes. The adjacent gulches and ravines are well worth a visit, which rarely fails to reward the explorer by the discovery of some strange and wonderful freak of nature. Here it is a remarkable formation of rock, there a rare mineral, and again the visitor sees how even the trees and the shrubs adapt themselves to the situation in which they are placed.

A short distance above the upper lake is a beautiful waterfall, where the clear water comes roaring and foaming down over a bed of boulders.

J. L. HARBOUR.

Signal Station on Pike's Peak.

When the United States signal service, which most people call the weather bureau, although there is no warrant for so doing, was first established in November, 1870, it was a very small affair, and even so late as 1873 it had not grown to very large proportions. In the summer of that year it was determined to establish stations on the summits of one or more of the peaks of the Rocky Mountains, and Pike's Peak was selected for the site of the first station.

There were several reasons for this choice. Along the eastern fringe of the mountains in Wyoming and Colorado there are at least a dozen isolated peaks, each about fourteen thousand feet in height, and as far as the climatic conditions were concerned, any one of them might have been chosen. But several of these peaks are almost inaccessible except to daring climbers, and others, although accessible even to horses, were too far from any inhabited point.

Pike's Peak was found, on examination, to be the most eligible, possessing peculiar advantages over all others. It is on the end of a spur of the range and overtops any peak within fifty miles. It is very easy of access, pack-mules and equestrians easily reaching the extreme summit.

The object of establishing the station on the summit of the peak was to study the constitution of the upper stratum of the atmosphere. A great many observations at heights varying from one to three miles above the sea have been made at different times and at different places by means of balloons, but such observations, although furnishing very interesting data, are of very little practical value.

Now Pike's Peak is two and three-quarters miles above the level of the sea, and observations taken there would be many and continuous.

It has been known for many years that there are upper

Pike's Peak from the Garden of the Gods, Manitou.

currents in the atmosphere moving generally from the West. This was determined by the balloon observations before alluded to, and by occasional observations taken on the tops of mountains, but more particularly by noting the drift of clouds, such as the cirrus variety, which prevail only in the upper regions. It was believed that the summit of the peak was high enough to be in this current.

Of course there were also many other problems, interesting and important, which it was hoped this station would solve.

The first step was to look at the ground, and in July two observers of the signal service were sent from Washington to Colorado Springs. Mr. George Boehmer, later of the Smithsonian Institute, was one, and I was the other. When we arrived at Colorado Springs we rented an office, and prepared for a trip to the summit.

There were two routes to the top of the peak. One steep and tiresome trail about nine miles in length led from Manitou, the celebrated watering-place, from which a railway to the top of the peak was completed in 1891. The other trail was much longer, across the foot-hills from Colorado Springs, up the Bear Creek Canon for eight or nine miles to Mystic Lake, thence through the timber and, above it, along the bare and rocky ground to the summit.

Boehmer and I started to walk up to the peak, taking with us a burro to carry our coats and some necessary camping supplies. It was a beautiful day, with such fresh and pure air as one meets with nowhere but in mountain regions, and we felt that we could walk to the summit with the greatest of ease.

That was our first mistake. Colorado Springs, our starting-point, is about six thousand feet above the sea, or nearly as high as the summit of Mount Washington, the highest of the White Mountains, and you know that the air is more and more rarefied as you ascend above sea-level.

Our lungs were not used to this air, and we had hardly started before we were compelled to stop and rest. Indeed,

the journey was a constant succession of rests, and it was high noon before we reached the mouth of Bear Creek Canon, where the real ascent begins.

From this point the way is up, up, without cessation. The trail was a mere foot-path, crossing and recrossing the shallow creek twenty-one times in eight miles, and for the entire distance hemmed in by lofty mountains from one to five thousand feet in height. It is a beautiful stretch of scenery.

It was quite dark before we reached the lake, which we afterwards called Mystic Lake, and camped for the night. This little sheet of water is only a few acres in area, and is as placid as glass, having no visible inlet or outlet. By a simple calculation with an aneroid barometer, we found the elevation of this lake to be about ten thousand feet above sea-level. That meant that we had over four thousand feet more to climb, and nearly five miles more to walk.

I shall certainly never forget this night, the first I had ever spent in the open air of the wilderness, although I had had some experience on Mount Washington in the spring. It seemed so far away from the rest of the world, the silence was so profound, the starry sky so sparkling, and the lowering mountains which surrounded the lake so massive and gloomy.

After awhile I fell asleep, and it seemed only about an hour before I was awakened by Boehmer and informed that it was two o'clock in the morning, and that if we wanted to see the sunrise from the peak we must lose no time. I was in favor of postponing the trip, but Boehmer, more enthusiastic, dragged me upon my feet, and away we went, stumbling up the steep path in the darkness. It was a toilsome journey.

Although it was in the month of July, it was excessively cold and raw, and we shivered and shook as we stood on the bleak summit and looked out toward the east, in which the day was beginning to break.

Above our heads the sky was clear and starlit; but beneath our feet, stretching out for a hundred miles, lay a bank of snowy clouds looking like a frozen ocean. Away

off in the east a narrow rim of gold appeared, and when a handbreadth of the sun arose the ocean began to move. The billowy clouds gently rose and fell while athwart them the sun shot long arrows of gold and silver light. It was a gorgeous and impressive sight, but it did not last more than five minutes. The mass of clouds dissipated as the sun rose higher, and in an incredibly short space of time the sky was entirely clear.

The view was magnificent. In the west the great main range of the Rockies, two hundred miles away, loomed up with snowy heads; in the north lay Denver, seventy-five miles distant, while away beyond was a white speck which we knew to be Cheyenne, in Wyoming. In the south Pueblo lay on the plain, and almost at our feet Colorado Springs, in which it seemed as if we might have cast a stone, while away beyond stretched the great Colorado plains, with the Platte River winding through them like a silver thread.

The trip down to the Springs was made in a very short time, and by noon we were safe in our office, and completely prostrated. The report which we sent to the chief signal officer was truthful, but dispiriting. We were perfectly willing to go up on the peak and take observations, but how? A house was necessary, and where was the house to come from? The chief signal officer, who knew nothing about the difficulties in the way, replied to the report by sending out three men, with directions for us five to build the house ourselves!

Fancy our predicament! Five men, not one of whom knew anything about building, all from the East, expected to go up into an altitude of fourteen thousand feet and build a house! It was a preposterous idea, but Boehmer, who was the observer-in-charge of the party, prepared to obey orders.

We purchased for each man one pick, one shovel, one trowel, one axe, one hammer, and then laid in a full camping outfit for the party, including a large A tent. The supplies and provisions loaded down five pack animals, and as each

man was mounted we made quite a cavalcade as we started out on our foolish venture.

We travelled up the Bear Creek trail and pitched our camp in a canon just below timber-line, and about two miles from the peak, and the next day we lugged our tent up to the summit, and that was as near as we ever came to building the house. The chief signal officer had a vague sort of an idea that we might build a log house of some kind, not knowing that the timber was two miles away. We did build a log house, but it was in the canon where we had our camp, and it was a very substantial affair, but would not have answered at all for winter quarters.

Here we lived for a month or so, while Boehmer was explaining to the chief signal officer that it was an impossibility for us to build a log house, or indeed a house of any kind, on the summit in any time less than a year or two.

Finally, Lieutenant Jackson, the disbursing officer of the service, came out from Washington to see what the trouble was. He went up on the peak, looked at it about five minutes, and decided that the project was absurd. If the house was built at all, it must be by skilled mechanics. So a contract was given out to a builder in Denver, and the house was built inside of four or five weeks.

The daily routine of observations in the signal service at that time included seven observations of the instruments. The first observation had to be taken at about half-past five in the morning, and the last at nine o'clock in the evening. In addition to the observations, there was, of course, the usual amount of office work, but not more than enough to keep one man steadily employed.

The telegraph line was, however, our greatest trouble. It extended from Colorado Springs to the summit, following the trail to the timber-line, and then made a bee-line for the peak.

This line, erected by private contract, was of thin and inferior wire, and very poorly constructed. Trees were used for supports for the greatest part of the route, and they were

continually falling down. Above the timber-line, the wire, being exposed to the air, would become encrusted with frost until it was fully six inches in diameter.

When the wind blew strongly, which was nearly an every-day occurrence, the wire would sway backward and forward until it snapped. The only way to obviate these breaks was to thoroughly insulate the wire and lay it on the ground. When the line broke some one had to go out and repair it, and the task generally fell to me. It was not only disagreeable, but dangerous.

The most disagreeable portion of our life was, of course, the monotony. No words can describe the loneliness of such a life; with the exception of ourselves, there was not a living thing in sight. Of plant life, even in summer, there was none, not a shrub or a speck of moss, and in the winter, when the entire mountain range was covered with snow, the scene was desolation itself.

Winter set in with the utmost rigor about the first of November, although even summer on the peak would have been called winter in other localities. Snow-storms were of almost daily occurrence, and the temperature fell steadily. By the tenth of November the thermometer touched zero, and from that time it was intensely cold. The wind began to blow with great velocity, fifty, sixty and seventy miles an hour. The cold and the snow were not so much to be dreaded, had it not been for the wind. When it was calm and clear, no matter how cold, we thought nothing of taking a stroll in our shirt-sleeves; but when the wind blew we could not put on enough wraps to keep out the cold.

Christmas week was very stormy, but we managed to celebrate the holidays by gorging ourselves rather more than usual. On New Year's day there began a storm of seven days' duration, and on the sixth day the telegraph line broke somewhere — where, we had no means of judging. After breakfast I started out to find the break, and repair it.

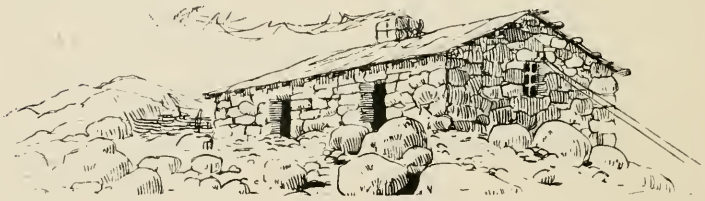
It was about ten degrees below zero when I started, a light

snow falling and a brisk wind of twenty miles an hour blowing from the west. The temperature soon began to fall and the wind to blow a perfect gale. In mending the break, which occurred near the timber-line, I was obliged to remove my thick lamb's wool gloves, and when I replaced them I was painfully conscious that both hands were frozen.

On my way back to the peak I had a terrible struggle against the gale, and was nearly exhausted when I came in sight of the station. There the trail was very steep, and I went up literally on all fours. Staggering to the door, I fell into the room at full length in a swoon.

I did not lose my fingers, but my sphere of usefulness was over there, and in a short time I bade farewell to the peak. As a souvenir of my experience I carried one of my hands in a sling for more than a year, the fingers of which tingle even now with each recurring winter.

JAMES H. SMITH.



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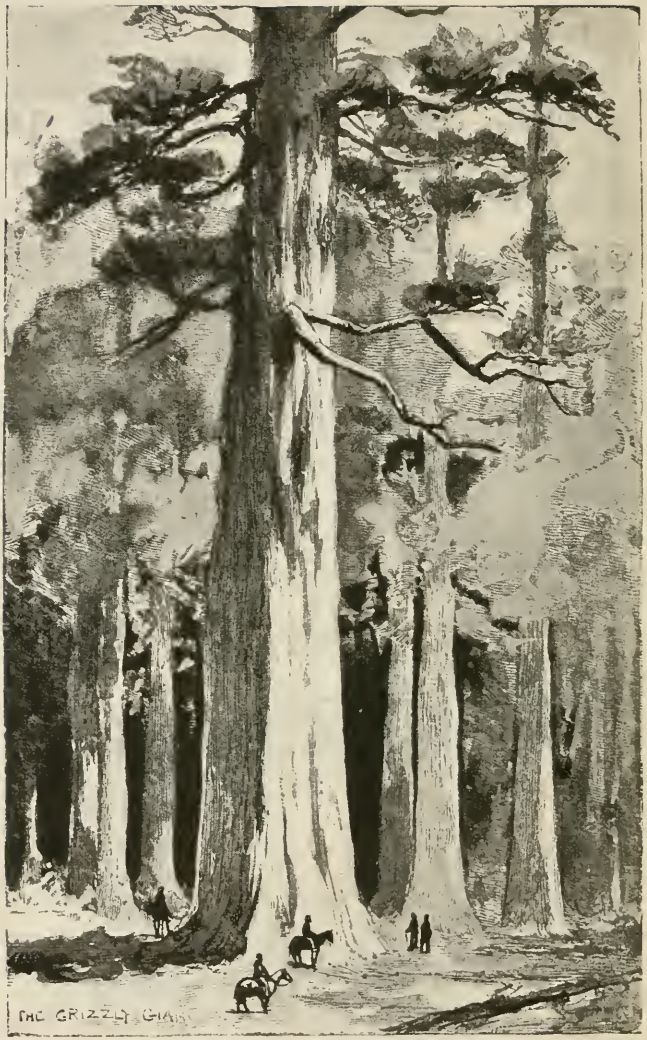


The Mariposa Grove.

The Big Trees of California.

The Big Trees of California represent the largest growth known in the vegetable kingdom of the world, with the exception of a species of the Eucalyptus of Australia.

The Grizzly Giant, one of the most famous of the trees in the Mariposa Grove, has its first limb one hundred feet from the roots. This limb is six and one-half feet in diameter. Nine feet from the ground the tree is twenty-seven feet in diameter, and below that height its thickness increases. The tree stands grim and grizzly, far apart from any of its companions, in sublime and solitary grandeur.

All the largest and most prominent of the Big Trees have their distinguishing titles. Each of the states has its representative among the names; and many of America's most famous men are honored in the appellations. General Grant has a namesake, as grim and stolid as the great general, who was present, I believe, at the christening of the tree.

One of the greatest of the trees lies fallen on the earth, and is called the Fallen Monarch. It is estimated that the Fallen Monarch was about four hundred feet high, and nearly forty feet in diameter. The bark and sap are now gone, but the tree still measures nearly thirty feet in diameter as it lies prone on the earth. A long ladder is used in mounting to its crest.

The very largest of the Big Trees of California are in what is known as the Calaveras Grove, which is owned by private parties. Among these there is a dead and fallen tree, which is supposed to have been forty feet in diameter, and four hundred and fifty feet high. It is estimated that it has been prostrate a thousand years. The sap and bark of this tree are gone, but the diameter of its trunk still measures thirty-four feet.

The tallest tree standing is called the New York tree;

it is thirty feet in diameter, and three hundred and sixty-six feet high. There is another tree, not so tall, which is thirty-seven feet in diameter, and the bark alone measures thirty-one inches in thickness.

In the Mariposa Grove there is a tree known as the Telescope. The trunk is a hollow cylinder, open at the top, about one hundred feet away. The cavity at the base is large enough to shelter half a dozen men on horseback. One of the largest of the fallen trees is also hollow. One may ride in at the lower end, and go out at a knot-hole one hundred feet up the trunk.

One of the most remarkable of these gigantic trees stands directly over the broad roadway which has been constructed through the grove. There is an archway for the drive, cut through the base of the very tree itself. This archway, which was bored and burned through, is some ten feet in diameter and twelve feet high, and on each side there yet remains ten feet of solid wall of wood which supports the tree. Into the archway, under the vertical trunk of the tree, a stage-coach drawn by four horses may be driven, and can find there secure shelter from rain or storm above.

There are in all some six hundred of these Big Trees in the Mariposa Grove. Twenty-five hundred acres of land have been withdrawn from sale by the general government, and they are now kept as a National and World's Park, held in trust forever by the state of California for the people of the world. The reservations include the Yosemite Valley.

The park is usually inaccessible during the winter and spring, in consequence of the deep snowfall there, but it is visited during the summer and autumn by tourists from all parts of the world, and especially by people of the Old World, who find these trees of very great interest.

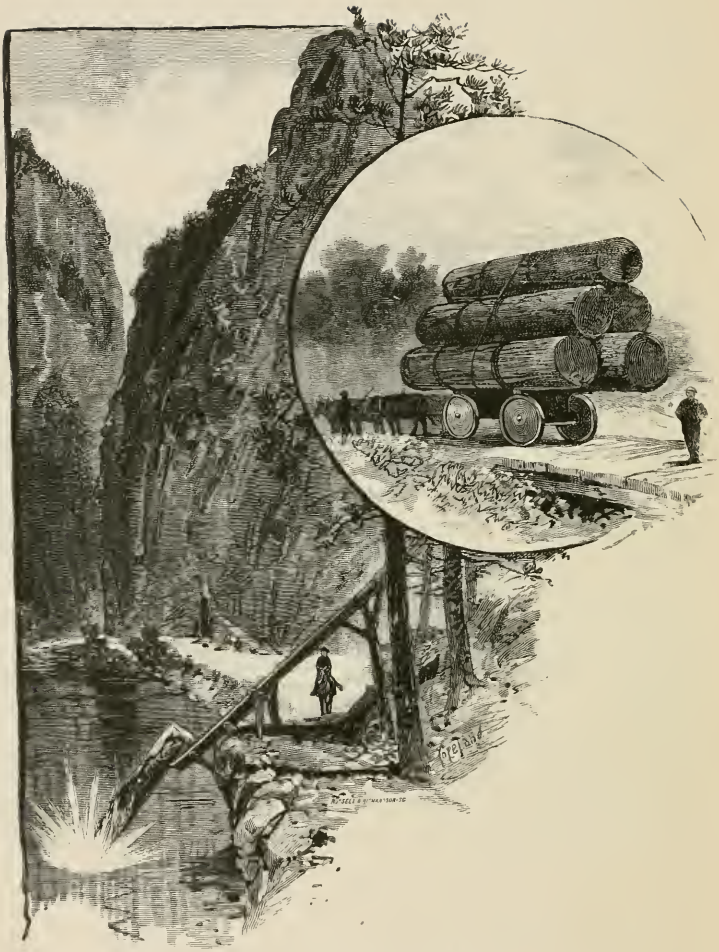
The wood of these big trees is a variety of the cedar. The Redwood of the Pacific is of the same family. Some of the trees standing in California are estimated to be between two and three thousand years old.

The heart of the tree is thought to be indestructible by the decay that is usual in other woods exposed to atmospheric influences. This certainly does not rot under ordinary climatic action. Furthermore, the wood does not shrink like other timbers, since it contracts from the ends and not from the sides or edges, as is usual with other varieties.

Specimens of these trees are not allowed to be taken by tourists from the National Reservations. Not even a twig, or shrub, or flower is permitted to be plucked. Policemen and guards are stationed throughout the parks to prevent spoliation by tourists. There live, however, upon the reservation licensed parties who have for sale the seeds of this species of wonder-wood. Foreigners are usually the heaviest purchasers.

Many young trees of the Big Tree species have been started in various parts of California, and are now growing thriftily. They are found in the streets of Los Angeles, San Bernardino and other southern California cities. Though it might be supposed that a tree whose age is reckoned so great would be of very slow growth, the young Sequoias are found to grow quite rapidly. The Californians of one thousand years hence may see them in their full prime.

M. V. Moore.



The Lumbermen of the Sierras.

The Lumbermen of the Sierras.

Travelling northward among the mountains from Glenbrook on Lake Tahoe, we were appalled by the desolation which the lumbermen have left in their wake. Clearing a tract of every sound tree, they remove to another locality, only to leave behind them again the hastily-built shanty which has sheltered them, and a litter of chips and decaying boughs.

We rode for days through regions stripped bare, and strewn with fragments, where broad forests once existed. Here and there a pine or fir, that has been rejected on account of its infirmity, stands alone, and seems to grieve for its lost companions.

As often as they move, the lumbermen build a new house and furniture, taking only the cooking utensils and bedding with them. The old house is left open to be blown down by the wind, crushed by the heavy winter snows, or occupied by anybody who comes along. Both the house and furniture are frail, and the latter consists in most cases of nothing more than two or three benches and a table made of rough timber. The house and its occupants are collectively called a camp.

We put up one night at Marlette's camp, which is under Prospect Peak. The men had not come home when we arrived, but the cook was busy preparing supper. He was a white man; most cooks in the Sierras are Chinese.

We had pitched our tents, and were waiting for our own ration of bacon and bread, when a great clatter of hoofs and voices seemed to shake the mountains. There was a break in a neighboring wood, and out of this sprang a score of men, some mounted and some unmounted, who came toward us with the wildest yells, and at the greatest speed. A parcel of schoolboys let out on a brisk autumn evening could not

have been gladder than these big, rough lumbermen were at the end of their day's labor.

After dark, we went into the cabin in which the men were eating. The long table was covered with dishes, and around it gathered as hungry a crew as ever relished unlimited beefsteak, potatoes and onions. It was an excellent supper. Beside the more substantial things, there were pickles, fresh butter, hot bread, cake and tea. There were candles, too, and a good deal of them must have got into the food, as one was stuck into the spout of a coffee-pot, another into the neck of a syrup-bottle, and another into a crack of the table. Nobody minded this, however, and everybody ate with the appetite of a giant.

When supper was over and the table cleared, a fiddle was brought out, a very old and tuneless fiddle indeed, but its squeaking afforded the company vast satisfaction, and stirred them to some extraordinary antics, which, as a matter of courtesy rather than of fact, were called a dance. Some of the quieter men retired into corners, and read, or wrote letters home.

Home seemed to be very far away as we left the cabin and saw its little windows shining ruddily in the dark night. The snowy peaks were all around, looking terribly lonely and massive under the starlit California sky; the pines were densely black; our own camp-fire cast off mysterious wreaths of smoke; but the little settlement of men took some of the sadness away from the scene.

The lumbermen work in the mountains until winter drives them to the lowlands. Their wages are about fifty dollars and board a month. Many Chinamen are also employed, but they are not treated so well as the whites. They live in camps by themselves, and rude as the cabins of the Americans are, theirs are ruder. Four or five logs laid on top of one another make the walls of John Chinaman's mountain house, and three holes answer for door, chimney and window.

Various devices are used in transporting the wood from

the mountains to the sawmills. I was riding through the Truckee Cañon one day, when a cloud of spray rose from the river above the shrubs on the brink, and I was in some perplexity as to the cause of it before I discovered a sign-board cautioning passers-by to look out for the logs. A trough or slide extended down the cañon-wall, which was almost perpendicular; it was bound with iron bands that shone like burnished silver, and down this the logs were shot with great velocity into the water, which floated them to Truckee town. The fact that the trough crossed the road, and that a traveller might be much startled by the sight of a pine-tree, four or five feet in diameter, suddenly rushing under his horse's nose, made no difference to the lumbermen, who by this simple contrivance were saved the trouble of hauling the wood.

When a wagon is used for conveying logs it is of the peculiar kind shown in our illustration, which represents a load of some seventeen thousand cubic feet, the largest ever transported in California. The wheels of the wagon are circular sections of the pine, convex in shape and bound with broad iron tires. The draught animals are oxen.

The flumes through which the wood from the sawmills is floated to the plains are V shaped troughs. Sometimes they are laid down the mountainside, and then they are bridged over deep chasms on trestle-work supports. One of them is over forty miles long, and cost nearly three hundred thousand dollars to build. The current of the water is considerable, and takes the wood from the summit to the railway at the rate of thirty-five miles an hour.

The large number of men, the enormous capital and the ingenious appliances used make the lumber business of the Sierras very interesting; but no one can help regretting the havoc it is causing in the lovely country around Lake Tahoe.

William H. Rideing.

Echo Mountain.

A Road of the Sierras.

We looked doubtfully at the strange, white chariot, and then at the apparently perpendicular line up Echo Mountain, in southern California, where the cable slid over its succession of wheels. Should we venture on the ascent? The cable looked small and the mountain large, and the end of cable, track and journey was hidden in the clouds.

But for the fear of ridicule some of us would have refused to go higher; we could so easily have returned to the valley below in the same electric cars that brought us up to the foot of the cable road! But the driver or conductor of the white chariot was waiting; so we shut our eyes and stepped into one of the seats.

The conductor gave a signal, and suddenly the bottom began to drop out of everything, and we to rise over the tops of things in general. Awful cañons, big mountains and mighty plains rolled out beneath us; there seemed no reason why we should not continue to rise forever.

Up and up and up! Weights seemed on my eyelids; that horrible cable incline appeared to run from my eyes to my heart; I secretly longed to lie down on the floor, and I am sure the others felt similar sensations.

"We are now approaching the steepest part of the grade, a rise of sixty-two feet in a hundred," came soothingly to our ears; and the dreadful slant seemed to become truly perpendicular. Yet we held to our pretence of decent tranquillity, and were pulled steadily and gently over the crest of the mountain to the level top. There our chariot stopped, as noiselessly as it had started, and we stepped out and looked straight down from Echo Mountain to the world below.

I have seen some of the most famous and beautiful valleys of the world, but they all seem tame compared with the

great, glowing plain of tender green and soft purple which stretched its groves of southern fruit out to a golden, shimmering, distant something which was, we knew, the Pacific Ocean. Santa Catalina Island, sixty-five miles away, shone bright and clear in purple.

After we visited the menagerie on the top of the mountain, we gave ourselves up to gazing on the beautiful scenery, and to watching the white chariots skim swiftly up to the summit, or drop noiselessly over the verge.

Though this Echo Mountain cable road is said to be the steepest, it is considered the safest mountain railway of the world. The contrivance is practically a great elevator. Its ascending and descending coaches, welded to the cable itself, precisely balance, and pass each other at a given point by automatic switches.

As the cable has been tested to a hundred tons' strain, the white chariots when loaded to their utmost capacity are small weights for it. Should anything go wrong with the machinery the chariots would simply stop, and the occupants be enabled to dismount at their leisure. Though the structure looks quite unsafe, it is really perfectly guarded against disaster.

In the power-house the big wheels and revolving cable turn slowly, governed by the dynamo, but the primary force or motor of the cable road is water. Running through a six-inch pipe, and finally through an inch-and-a-half nozzle upon a wheel, it transmits a pressure so enormous that one might better go down the incline without a cable than stand in front of that harmless-looking nozzle. That inch and a half of water is capable of going through the body of a man.

We watched the light go out of the landscape and fade over the Pacific as we sat on the piazza of the pretty hotel, which, with all its refinements of modern luxury, must have travelled up piecemeal in the white chariots. It now sits perched on the very verge of space, a kind of stationary white chariot, itself. Round on the other side were softly

flying the echoes which give the mountain its name, but on our side it was very still.

A little higher up, on a rounded knoll, gleamed the metallic walls of the observatory, which we meant to visit after we had seen the great search-light, on the platform just below us. That long finger of light had come reaching through our windows down in the valley many a night. Its beam makes bright the streets of Los Angeles, twenty-five miles away, and carries a ray to distant Redondo, on the Pacific itself.

Now its ray of light went sweeping across the plain below, resting here and there where a red light signalled for a visit. Down below, that beam had almost dazed us with its brightness; here we could stare into the very eye of the monster without blinking, for the rays do not focus so near.

Away, back and forth, went the finger, now stretching out into a full band of light, now narrowing to so fine a line that it could be but barely perceived. Some spectators with intercepting mirrors caught and flashed a ray here and a ray there, into the shadows of the cañons, on the observatory roof, or back to the hotel piazza.

From watching the light we went to the observatory, which contains a beautiful sixteen-inch glass. The perfect clearness of the atmosphere makes southern California the paradise of astronomers. We had looked through larger glasses, but not at such a height, and the elevation of thirty-five hundred feet above the murky air of the sea-level seemed to bring the stars perceptibly nearer.

We had beheld the sea and the dry land and the heavens; there was nothing else but the wider land of dreams to explore. Since we planned to come forth again at sunrise, we took a parting glance at the constellation of cities on the plain at our feet. It was a fascinating sight, even after the other constellations, and a significant one as well; we could easily forecast the merging of twinkling city with twinkling city, and imagine the time when one great city, stretching from

mountains to sea, will be a chief glory of the country we will still call great.

An unkind fog saddened our sunrise the next morning, so that we were glad to console ourselves by talking with a workman, who looked over the terribly beautiful abyss and said wearily that folks came there and made a fuss about it, but he was sure he didn't see why.

At last we turned our steps toward the chariot, which was kindly waiting to drop us over the brink. This time, instead of the bottom dropping out of things, it was the top of everything which rose and soared away, while we went slipping down through space, until it was in a kind of wonder that we found ourselves above the ground when we stopped.

In eight minutes we were among the ferns and oaks of the cañon; in another fifteen we sped between the fields of wild flowers; in half an hour more we stood in our own rose garden, with the scent of the orange groves heavy about us; and from the tropic of our palms and bananas and lime and lemon we could gaze straight up to the snowy Sierras, and mark a slender white line cutting the purple side, the route of the white chariots.

GRACE ELLERY CHANNING.

California Raisin-Making.

Until within a few years all the raisins consumed in the United States were imported from Europe. It was supposed that they could not be produced in this country because its climate was not warm enough and dry enough, for a season of sufficient length for the purpose. But when, in 1849, California was invaded by American gold-hunters, they not only found the largest and finest grapes growing they had ever seen, but discovered that the surplus quantities left on the vines, after ripening, became raisins!

These raisins were not, however, of the best quality, for the vines on which they grew were such as the Franciscan fathers brought with them from Spain, a hundred years before, when sent among the native Indians who then lived on this Pacific coast.

But enterprising Americans, aided by foreigners from the wine and raisin-making countries of Europe, imported many varieties of the best kinds of vines that could be found. Among these were the white Muscatels and Malagas, from which the best raisins are made.

The white grapes have flourished well, especially in southern California, where the long warm and dry seasons are more favorable for making raisins than further north. The entire absence of rain for the six continuous months, May to November, and almost complete freedom from fogs or dews in many localities during the ripening and drying season, render this the most favorable climate in the world for producing raisins.

The grape-vine here is not staked and tied up, in order to keep the fruit from the ground, as is done in the Middle and Eastern States. It begins bearing the second year after planting the cuttings, and for several years is allowed to trail on the ground, after being cut back each season, so that

the fruit hangs very low, and most of it even lies upon the ground. It is believed to ripen better on the dry, sandy soil than when suspended in the atmosphere, which is always cool at night.

As the roots grow older the main stalk of each is trained to a tree shape, twelve to thirty inches high, and in some old vineyards these stumps have reached a diameter of from six to ten inches. The stumps are trimmed closely every winter or early spring, and from their tops new sprouts spring forth which bear the next crop of fruit. The yield of grapes is enormous, ranging from one ton to two or three tons per acre.

Very few vineyardists manufacture their grapes either into wine or raisins. It requires more knowledge, skill and capital to do either than the mere farmer generally possesses. But the raisin-makers, like the wine-makers, generally own and cultivate a vineyard of from one hundred to one thousand acres, and there is one in Los Angeles County covering five thousand acres, the largest in the world, as a basis of operations, and in addition the owners buy all the grapes that are raised near them by the smaller cultivators.

Several methods of drying grapes into raisins are practised by the smaller cultivators. The following is the most popular, and may be seen in operation at almost every country and village house in southern California. Some time in September or October, small quantities of the finest Muscatel grapes are bought at one cent a pound. Some of the bunches weigh from two to five pounds, so large that they have to be cut in pieces to dry.

They are spread out as thinly as possible, no bunch on top of another, on some sunny porch floor, on the roof of a house or shed, or on trays made of laths or shakes, as the Californians call the redwood clapboards, and placed upon trestles in the yard. Here they lie in the hot sun all day long, and after they begin to color and shrink are generally covered at night with some kind of canvas.

In two or three weeks the bunches are carefully turned

over and allowed to continue drying for another two or three weeks, until they are thoroughly colored and the juice has all evaporated. Thus thousands upon thousands of families are now making their own raisins at a very small cost.

But now for the way in which raisins are made to sell. The grape-grower, if he cultivates but eight or ten acres, can,

Raisin-Making.

with the aid of wife and children, gather his own fruit and haul it to the raisin-maker; but if he is a man of means, and manages his hundred or more acres, he hires a force of Chinamen, who with crooked pruning-knives go through the vineyards, clip off all the ripe bunches of grapes and

place them carefully on shallow trays three by six feet, and four inches deep, avoiding the possibility of bruising them.

These trays, when filled, are gathered up and loaded into two-horse spring-wagons and hauled up many miles into level places among the foot-hills of the mountains to get out of the danger of fogs which often rise late in the season on the lower plains.

Here from fifty to one hundred acres of as level land as can be found has been scraped and rolled smooth. On these fields the grapes are spread upon the ground, by drawing the bottom from each tray and letting them drop gently on their warm bed. They are thus emptied in successions of rows, hundreds of feet long and of uniform width, from dozens of wagons that come and go day after day, from every direction.

Such grape-fields resemble an immense carpet store, where every imaginable pattern of goods is rolled out in the hope of pleasing some fastidious customer. The freshly-laid rows present a light green shade of color. Those that have been down a few weeks have a mottled appearance, while those that are about dry enough to come up have a deeper and more uniform color.

For the reason that the dry soil retains its warmth during the night, grapes dry quicker on the ground than if elevated on boards, and they also more completely retain their flavor. In two weeks the smaller bunches are ready to be gathered up and the larger bunches turned over so as to be dried on the under side. This requires two weeks longer, when they are taken up also. Then follow the gleaners, women and children, who gather up all the loose berries that have fallen off. These are sold as dried grapes.

When the later crop is on the ground, and the first showers are expected, raisin-dryers bring upon the field great rolls of oiled Manila paper; and at night, or when rain is threatened, this paper is spread upon the rows of grapes for the purpose of keeping them dry. This process is sometimes continued until late in December.

The dried grapes are put into boxes holding about a bushel, and hauled to the packing-house, where they are piled on top of each other as high as the ceiling or roof. In the course of eight or ten days the slight moisture left in some of them, and the heat, cause them to sweat, and this moisture so permeates the whole bulk as to give them a soft and fresh appearance. They are then ready for sorting and boxing. This is done by women and Chinamen, seated, forty or fifty in a room, at long tables.

To each is emptied as needed a box full of fruit; and alongside of each are placed two new, clean boxes, into one of which the largest and most perfect bunches are packed, which are labelled "London Layers," and into the other box the smaller and less perfect bunches, which are labelled simply "Layers," or as some California raisin-makers are now taking pride in stamping them, "California Layers;" while the loose berries are passed through a windmill and cleaned of their stems and dust, and boxed as "Loose Muscatels." Though most of them are the finest berries of the crop, they sell for a much lower price than those adhering to the stems.

Three sizes of boxes are made, one to hold five pounds, another fifteen pounds, but the largest number to hold twenty pounds; and as the boxes are filled heaping full a careful inspector examines and weighs each, taking out any surplus, and passes them to the press-man, who places on the lids and puts them in the press, where they are gradually squeezed down and the lids nailed on.

They are then ready to be shipped to their Eastern and Northern markets by the carload — about one thousand boxes to the car. But as they are not considered perishable goods, like oranges, lemons and pears, they are not rushed off, regardless of demand or prices. The consequence is, they have a steady as well as ready sale at prices which afford a very fair profit to the enterprising manufacturer.

ELIAS LONGLEY.

In Death Valley.

Death Valley.

Death Valley derives its name from the fact that the majority of a party of emigrants who attempted to traverse it perished from thirst and the intense heat. In all probability quite as many would have perished had the party attempted to cross the Mohave or the Colorado desert at any other point, without knowing the location of the few springs and natural reservoirs.

Had the leader known something about the character of the country, or had he taken the precaution to employ an Indian guide to pilot him to King's Springs, it is highly probable the party would have made the trip with no more danger than attends a journey through any part of this region. Knowing the location of the few springs and tanks, or natural reservoirs, one may safely travel through either desert at any season of the year. Without this knowledge, however, it is almost certain death to attempt it, especially in summer.

Death Valley is situated in Inyo County, California. It is a small portion of the desert region which forms a part of the Great Basin. It lies between two low granite ridges, and is the northern extremity of a depression extending into lower California. This depression possesses one remarkable feature: nearly every part is below sea-level. It contains a number of dry lake-basins, one of which, the sink of the Amargosa River, practically constitutes Death Valley.

Another, somewhat larger, is the sink of the San Felipe River, better known as Conchilla Valley. Both stream beds are now nothing but dry washes, though at some former and not greatly distant time each must have carried a considerable volume of water. After the lakes had become dry the saline deposit left by the evaporation of their waters was quickly covered by the dust carried thither by sand-storms, and in a few places only is the deposit left uncovered.

At King's Springs, Death Valley is two hundred and twenty-five feet below sea-level, though it is probable that there are places where the depression below mean tide may exceed three hundred and fifty or four hundred feet. A few miles distant from Dos Palmas, now a station on the Southern Pacific Railway, the writer found a point in Conchilla Valley three hundred and twenty feet below the sea-level; Dos Palmas itself is two hundred and sixty-one feet below.

The reputed volcano in this valley is nothing more than a hot spring, and the alleged eruption consisted merely of a sudden and very large increase in the flow of water, accompanied by ejection of mud. It is probable that a hot spring had previously existed at that locality, and its sudden increase was most likely due to an earthquake.

There are no poisonous gases emitted from the volcanic rocks in either locality; on the contrary, the atmosphere, because of its relative dryness, is remarkably pure. Moreover, in this respect neither valley differs from any other part of the Great Basin, or in fact from any part of the plateau region. Meat exposed to the air will jerk, or dry up, but it will not putrefy. This fact is attributed to the purity of the hot, dry air, which is free from germs and organisms that produce putrefaction.

The most interesting features about Death Valley and its twin, Conchilla Valley, are their excessive heat and dryness. During midsummer the temperature will often remain between 110° and 115° for weeks at a time, and on one occasion a temperature of 130° was recorded at Indian Wells. In spite of its intensity, however, this degree of heat is not intolerable, and one may remain out-of-doors day after day without the slightest danger of sunstroke. Indeed, in this region a temperature of 110° is by no means so disagreeable as one of 95° along the seacoast or in a region where the atmospheric moisture is great.

In these valleys and throughout the desert region excessive dryness is a peculiar feature of the atmosphere, and General

Sherman's assertion that "even the steel rails of the railway track shrivelled and curled up" is a pardonable exaggeration. Water upon the ground disappears almost instantly, and the whole volume of the Rio Colorado would not fill either valley, so rapid is surface evaporation.

Still another peculiarity is the presence of an unusual amount of electricity in the air. Rubbing the hand through the hair will cause a fierce snapping, and in the dark will produce a profusion of sparks. Horses' manes stand almost erect, and their tails are almost globular in shape, because of the self-repellent force exerted by the electrified hairs. In the trading post at Dos Palmas there used to stand a wooden bench on which several hundred cans of preserved goods were kept. The metal of the can acted as a condenser to the extent that at times one could draw sparks an inch in length from the surface.

The rainfall in this region, as in all parts of the Colorado and Mojave deserts, is less than two inches a year; if evenly distributed over the whole surface of the desert, it would probably be only a small fraction of two inches. But the rain-storms are local, rarely covering more than a few hundred square miles, and when they occur they are apt to come in the form of cloudbursts. There is a sudden darkening of the sky, a deluge of water, and then the sun is pouring its torrid ray on the white, glistening sand almost before one realizes that anything has happened. Possibly more than an inch of rain may fall in less than five minutes, and another cloudburst may not occur in that particular locality in two or three years.

By far more trying, however, are the sand-storms. These come with about as little warning as the cloudbursts, and they are infinitely more disagreeable. During one of these storms the clouds of dust are so dense that the darkness is almost that of night. The finer dust is piled up in drifts fifteen or twenty feet high, shifting from place to place with each storm; the coarser particles are hurled with a force

sufficient to lacerate and bruise the skin. The fact that telegraph-poles eight inches in diameter have been cut almost entirely away in less than a year may give one an idea of the force of these blasts.

Life, either animal or vegetable, does not thrive in either valley. There are a few species of cactus and one or two of lizard. The cacti, judging from the number of dead plants, seem to be succumbing to the intense heat and drought. One species of lizard is a beautiful, graceful and agile little creature that emits a musical chirp; the other is the famous horned toad. Inasmuch as there seems to be neither water nor insects for them to subsist upon, just how they live is a mystery. Several of the latter, made captives by the writer, lived for nearly five months, apparently on nothing. No amount of coaxing would induce them to eat insects or bits of shredded muscle, yet they seemed lively up to a few days before dying.

JACQUES W. REDWAY.

The Queer Surface of Nevada.

The State of Nevada has very few inhabitants, and is commonly supposed to be a desert that ought to be avoided by men who wish to establish homes. Yet its vast area is rich in many ways, though considerable portions of it are given over to freaks of nature — deserts, plains, sinks and ugly eruptions. But the State can well afford room for its queer spots, as it has, exclusive of them, enough fertile soil to overlie the whole of New England.

The traveller who crosses the "Sage-Brush State" in the cars sees much of its dreariness and little of its pleasant places. He does not suspect that Nevada has great stretches of valley wherein are ranches and cattle ranges, and lazy rivers winding through broad, bright ribbons of green.

Indeed, water works emerald miracles in this strange land, and there the farmers reap easy and sure harvests. Their fields pay abundantly in hay and grain; their herds furnish ample measure of milk, butter, cheese and beef; their flocks produce well of long, wholesome wool, and their orchards bow down with loads of fruit.

The surface of the state is about five thousand feet above the sea-level, on an average, the range being from three thousand feet, in some of the valleys, to ten thousand feet, where snow-clad peaks lift into the deep blue vault above. The aspect of the whole is gray, because sage-brush covers nearly the entire extent, and the surface is a varying succession of mountains and valleys.

At various places occur alkali flats, some of which are readily reclaimed, while some are veritable deserts, almost as white as snow, flat as a table, and barren as the bottom of a sad-iron.

Some of these flats are forty miles long and ten to fifteen

miles broad. Over them the winds blow blinding, parching clouds of smarting dust. On the edges of such "blisters" springs frequently gush forth, but the water is brackish and often poisonous.

Beneath these chalk-like floors riches sometimes lie. Men

Queer Surface.

dig trenches near the edges and fill them with water. The sun dries them out, and behold! a fine crust of crystal salt, pure and clear. Or, again, there may be borax deposits, and laborers plow or dig out the cotton balls of borax, grind

them up, crystallize them, and get rich from the sackfuls and tons of it carried into distant cities.

The state is wonderfully and richly endowed with springs. To say nothing of snow-chilled, rock-filtered founts of pure water, there are hundreds of freaky spoutings, both cold and hot, some of which have attracted the attention of science from afar. I doubt if any like area contains so great a number of hot mineral springs.

Sulphur taints some so thickly at times that the bottoms of the ponds are formed of the grayish stuff, and every submerged twig and root is coated heavily with it.

The hot springs, however, which are found in almost every valley, are the most attractive. These gush up in many sorts, but nearly all are said to possess healing qualities and are exceedingly pleasant to bathe in. There are six or eight of them within a short distance of the capital city, Carson.

One of these, Steamboat Springs, is famous in the scientific world. The waters spout, small, geyser-like, from deep rifts and chasms, making much to do of it and rumbling mightily. Where the heated and agitated fluid issues forth it drops a burden fetched from afar down and leaves it, red and heavy, at the outside door. This deposit is cinnabar, or quicksilver ore, and is regarded with great interest by geologists.

Another strange feature of Nevada are the sinks in which its rivers disappear completely. The Carson River, the Humboldt River and the Truckee River, not to mention small streams, flow their life-imparting way to apparent lakes, which are really huge sinks. Carson Sink, Humboldt Sink and Pyramid Lake, respectively, swallow down the whole output of the mountain springs.

Fish live in these uncanny lakes, and ducks and geese gather in thousands on them, but the water is a little off taste. Some much-learned heads shake wisely, and assert that subterranean passages conduct the streams away.

In this wonderland are caverns that rival the great Mammoth Cave of Kentucky; beds of salt where slabs may be

quarried out like stone; deposits of sulphur as pure as can be made in the underground laboratories; ledges of mineral soap that may be cut out with a knife, and countless combinations, chemical and curious.

There are vast treasures of metal, gold, silver, copper, lead, iron, and those the names of which are much less commonly known.

There are beds of coal, forests of trees and acres of sand intermingled with gold in flakes. These sands are the placers, and it is not easy always to separate the precious bits of shining metal from the dross.

There are mountains of granite, sandstone and marble, not to mention the volcanic and igneous formations. Quarries of all of these rocks are worked a little, but so extensive is the supply that the present working might be compared to the scratching of one hen on a large farm with design to cultivate the acres. The granite is close-grained, of all tints, and of much beauty; the marble is of infinite variety, and fit for the finest of the arts.

Some wonder-inspiring "footprints on the sands of time" are found in the stone quarries at the state prison, near Carson. There they were left ages ago by birds and animals long since extinct. Grave professors have hovered lovingly over these mud impressions, and they pronounce them wonderful.

Weird animals and birds wandered along that place, then a lake shore, while yet the mud was soft as ooze, and there left their autographs; and Nature came to save the page, and she shut on it her cover of rock, hard-wove and thick and lasting as the hills.

PHILIP VERRILL MIGHELS.

Pyramid Lake.

The volcanoes of the Pacific coast, in their extinction, have left us no more wonderful phenomena than the deposits now seen in a wonderful sheet of water known as the Pyramid Lake, in Nevada, over three thousand feet above the sea-level.

This lake lies near the eastern base of the Sierra Nevada Mountains, about one hundred miles south of the Oregon line. It is nearly forty miles long, by five to twelve miles wide. Jutting out of its waters and rising abruptly up from their very depths are hundreds of pyramids, or conic formations, of a basaltic mineral; they are not of stone proper, but the evidence shows that they were once molten matter thrown out in the upheaval of a prehistoric volcano. Whether or no the area of the present lake was once the crater of a volcano, or whether the crater was near by, throwing its jets of lava into the cooling waters, are problems that are well-nigh indeterminate. Doubtless strong testimonies could be produced in favor of either hypothesis.

The tallest of the pyramids in the lake are said to be some five hundred feet high — about as large and as high as the great Egyptian Cheops. The smallest appear to be from ten to fifteen feet in height. They are seen singly, and in groups or clusters, irregular in height and irregular in diameter, but all of singular uniformity in shape — like an ordinary V inverted, the angle acute at top, the apex pointed, and usually very sharp at that.

Some of the pyramids are hollow, having apertures in the sides through which otter and other fish-eating quadrupeds go in and out. There are thousands of these fur-bearing animals seen sporting about the pyramids. They are careful, however, to make their homes out of reach of gunshot from the shore.

Pyramid Lake.

The lake abounds in the finest of fish, chiefly of the trout and salmon family. The waters of this and its twin brother, Winnemucca Lake, lie within the bounds of an Indian reservation in Nevada, and the fish are the exclusive property of the tribe of peaceable savages living on the shores. White men are not allowed the privilege of fishing in the lakes, except by the grace of the Indian, and that means both little and much — little of the grace, and much of the consequence if you happen to be caught! You may catch a few of the fish for your own personal use, but if you are found making merchandise of them, woe to the fisherman!

The provident Indian — for there are a few of them there — spends some of his time during the summer days in taking the fish and drying them for winter use. The fish are cut open and hung, or laid, on scaffolds erected on the shore. The hot sunshine over the white sands of the beach soon dries the fish ready for packing away, the reflection of the heat from below being almost as great as the direct rays from above.

The waters of this lake, like those of Great Salt Lake in Utah, are never at rest. They are always, as I was told, while there, in a state of agitation and unrest. It is indeed a troubled sea, though its waters are fresh. Navigation over its surface is ever attended with supreme danger, and even the Indians rarely venture far from the broad, white beach. Few white men have ever succeeded in crossing in boats or canoes; many have been lost in attempting the feat. The winds sweep the lake with sudden and frequent squalls.

The Indian name of Pyramid Lake is written *Cuh-o-wah*, or *Coo-ho-wah*, a word that in the native tongue means simply waters, or the big or much water. Lying by its side is the Winnemucca, the great purple water. These lakes are the reservoir holding the waters of the Truckee River, a raging, roaring stream that leaps in considerable volume from the canons of the eastern face of the Sierras, fed by the eternal snows of the dizzy summits that rim the heavens away to the westward.

Up the northern bank of this river the Southern Pacific Railway winds its course, past the sombre shades about Lake Donner, up to the crest of the mountain at Summit Station. The mountains about the Pyramid Lake are low, sandy and quite barren. To the northward is an ugly stretch of desert, and one of the roughest highways over which human traveller is ever hurried by pitiless stagemen.

There are no waters of Nevada that have an outlet in the ocean excepting some small tributaries of the Snake on the north, and one of the Colorado on the south.

The principal river is the Humboldt, a current that winds through a desert, without a sprig of verdure to mark its shores. For a hundred miles one may travel not more than half a mile from its course and never know that there is a stream of water near. The banks are low, and in places the desert plain stretches away in unbroken level for more than a hundred miles. With the occasional exception of sage-brush and bunch-grass, nothing grows on this desert plain except in irrigation.

Humboldt River has no lake or sea outlet; the waters, after running nearly a thousand miles, simply disappear and lose themselves in a vast sand and alkali basin known as the Sink of the Humboldt, in one of the dreariest and most forlorn stretches of waste land human eye ever beheld, in the heart of a great broad plain shimmering with sickening, whitish alkali, while the far-off mountains to the southward appear like a vein of silver, with their snow-capped faces looking down on the desolation below.

M. V. Moore.

The Grand Cañon.

Having read several interesting accounts of visits to the Grand Canon of the Colorado River in Arizona, but none describing the experience of a descent into the chasm, I was filled with a desire to have this experience.

I was told that to make possible a descent to the river, the services of a guide would be necessary; but deeming the price which the local guides asked beyond my means, I resolved to go alone.

As I stood on the rim of the canon, ready to begin the descent, I must confess that I felt a little uncertain of the wisdom of my course, but I had no notion of turning back.

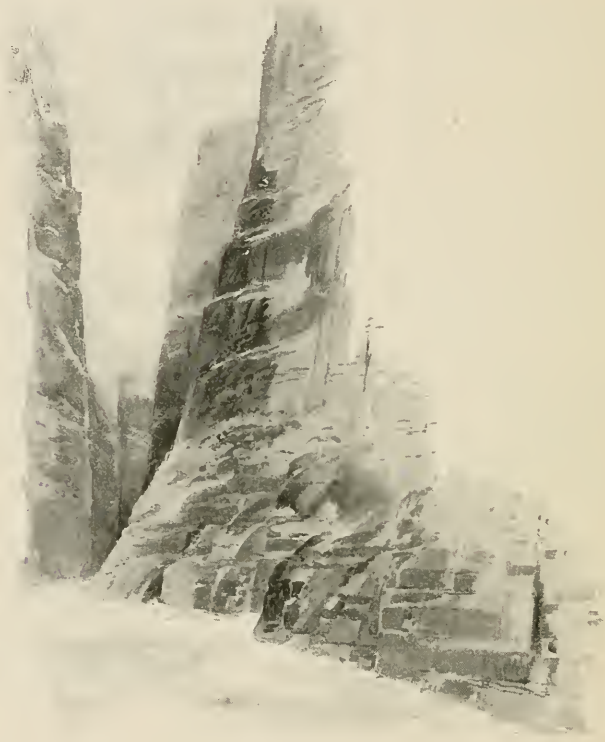
Mr. John Hance, who lives in a cabin near the rim of the canon, told me that the distance from the rim to the river was seven miles; the vertical depth more than six thousand six hundred feet; the distance from the rim to a cabin on the trail, three miles; vertical depth to the cabin, four thousand feet; length of longest rope, fifty feet.

With neither coat nor waistcoat, carrying only my journal and my lunch, I was ready for the descent. I noted the time, which was just seven o'clock and forty minutes, and bade good-by to my driver, requesting that if I should not return by the afternoon of the next day he should come down to seek me.

The trail is so steep that one can scarcely keep on his feet. I walked, ran, slid and rolled down the three miles to the cabin in just an hour and two minutes.

The scenery all the way was exceedingly interesting. Looking down, one would see a prominent ledge, or bench of rock, perhaps a thousand feet below, from which would rise a magnificent butte. A quarter of an hour's travel would bring him to a level with this base; and in the next quarter of an hour he would see it rise a thousand feet above his head.

I found it exceedingly interesting to pick out prominent points, both at a level with me and far below, and then stop occasionally and see how we had changed position. In fact, I think that is about the only way one can gain an idea, inadequate though it be, of the great descent he is making.



The Grand Canon.

At the cabin I found a beautiful stream of clear, cool water, which was very refreshing. Here I divided my lunch, leaving some for my return. After half an hour's rest I pushed on.

The canon here, which is merely a side canon leading down to the river, was perhaps five hundred feet wide, with walls nearly vertical, a thousand feet high. On every hand the scenery was indescribably grand. The canon was narrowing, the walls were getting higher; the whole scene was becoming more impressive and majestic.

The indications of the trail were growing exceedingly faint. I had gone perhaps three miles from the cabin. The canon had narrowed to about twenty-five feet, with its walls sloping at an angle of over eighty degrees.

I had descended through the sandstone and shale, and was already several hundred feet into the granite, when I came to the first rope ladder. I was glad to see it, for it assured me that I was on the right trail, although it brought visibly before my mind the fact that the dangerous part of my journey had yet to be accomplished. The ladder was about ten feet long. I tested its fastenings and easily descended.

A few steps beyond, I had to climb by a single rope over a ledge of vertical rock fifteen feet high. As I had no means of examining the fastening, I hesitated for a moment, for I knew the hardest strain would come upon the rope just as I should round the top of the ledge and be farthest from the rock below. I ascended safely, and then soon had to descend a gentle slope, clinging to a rope about forty feet long.

When I had gone about one hundred feet, the canon had narrowed in one place to a width of about five feet, and at the bottom was a pool of water about eighteen inches deep. The walls were so smooth and round that it was impossible to pass the pool without getting wet. Removing shoes and stockings, I got over nicely, and as I expected to meet even a worse case in a moment or two, I proceeded with bare feet on the smooth granite.

Turning a sharp angle in the canon, I had scarcely gone forty feet when I heard the roar of a heavy fall of water, and found myself hemmed in on both sides by steep walls, with a waterfall about fifteen feet high in front of me. On the level

of the rock below the falls I saw a bunch of rope lying against the wall of the canon, as if it had been washed there.

I at once supposed that I had reached the end of my journey, and that the rope which I saw had at one time been used to get over the falls, but was now out of reach. Nevertheless, I decided to see what I could do toward climbing around the place.

The granite was very smooth, but, being barefoot, I found climbing rather a simple matter. I was getting along nicely and congratulating myself that I had got safely around the falls, when, to my horror, upon turning to the left, I saw below what at first appeared to be a descent without bottom.

Climbing to the edge of the precipice and looking down, I concluded that this must be the great waterfall of which I had heard Mr. Hance speak, and that the rope I had noticed from the precipice, now behind me, had not fallen down from that, but was intended for this next descent.

Making sure that the end of the rope was well fastened, I cast it over the falls. It hung straight in the midst of a cascade of water four feet wide and six inches deep. The rope appeared to be strong, and I determined to try it.

The height was said to be fifty feet, but I think it was not so much. As I did not wish to have my watch and my journal ruined, I hid those articles with my trousers. As I was concealing them it occurred to me that no one was within at least six miles.

Below the falls there was a spot about ten feet square, perfectly dry. Down upon this I tossed shoes, stockings, shirt and lunch. My underwear I retained, to protect myself in some measure against the rocky wall. The descent through the falls was pleasant enough, the water having about the right temperature to produce an exhilarating reaction without chilling; and as I passed down the rope I was delighted, as well as surprised, to find the wall covered near its base with beautiful moss and maiden-hair ferns.

Removing my wet apparel, I put on what dry clothing I

had, and went on. I had gone about two hundred feet when I came to a place that troubled me. It was a slope, somewhat steep, but quite smooth, and no rope was in sight.

Examining the place carefully, I decided that the best method of descent was the one I had used years ago on my grandfather's farm in descending straw-stacks. Only one objection presented itself — the part of my costume that was missing is the one usually most relied upon on such occasions. Nevertheless, I conformed to the inevitable, and slid down without serious injury.

Only one short rope remained for me, and, almost leaping with joy, I found myself on the bank of the Colorado. The river was an angry, muddy torrent, with rapids at short intervals, flowing between rugged granite walls that rose almost perpendicularly from the water's edge.

It seemed impossible to pass more than one hundred feet up or down the stream ; and as I sat in the shadow of a mighty boulder and enjoyed my battered lunch, I thought of Major Powell and his party, who passed through here in 1869. My wonder was, not that two members of the expedition had been lost, but that any should have escaped.

Having looked upon the scene until it became deeply impressed upon my memory, I gathered a few pebbles to carry with me and started on my return. The sliding-place was soon passed, such places being, on the whole, more easy of ascent than of descent.

When I reached the base of the high falls, I removed all my clothing, even to shoes and stockings, and thrust everything except my belt into the bag in which I had carried my lunch. Fastening the belt to the bag, I buckled it around my neck. Then stepping into the midst of the falls, with my face turned upward, so that my nose should serve as a watershed, the bag hanging under my head, I ascended the rope and reached the top with my clothing only slightly wet.

The things I had hidden I found all right, and as I stopped for a little rest I wrote up my journal.

I reached the cabin at four o'clock. I called to mind that I had been told that the ascent from there would require at least three hours. At that time of the year it is dark at half-past seven; so I concluded that if I started I must climb the whole distance in the time mentioned. I determined to go on, and not to look at my watch until I had reached the top.

The distance is three miles; the elevation is said to be four thousand feet; and it was just half-past four when I started. In the first mile I do not think I ascended more than five hundred feet. That was covered with ease, and then I pressed on to the steeper part. After climbing hard for a while I sat down to rest.

As I sat there, I remember looking up at some turret-like projections of rock on the rim, several thousand feet above me, and saying: "Well, I guess about four such pulls as this will bring me out."

I struggled on. Each interval between my rests was growing shorter, both as to space and time. The number of rests was nearer forty-four than four, and by the time I had reached the top I was so completely worn out that a pull of a few yards was enough to bring me to a halt.

A dark shower which was raging on the rim had deceived me somewhat as to the hour; I supposed that it was later than it really was. As I threw myself on the ground under a piñon-tree on the rim, my heart beating at the highest speed and my flesh aglow, I looked at my watch. It was just twenty minutes past six. I had come from the cabin to the rim in just one hour and fifty minutes.

As I dragged myself to the door of Mr. Hance's cabin, the old man met me. He was unwilling, at first, to believe that I had reached the river. I told him of my experience on the ropes, and he was convinced. It is unnecessary to mention that I slept well that night.

J. G. Owens.

Cave-Dwellers of Arizona.

Arizona has an unwritten history which may be roughly surmised from the rude characters inscribed on rocks, the deserted dwellings of a prehistoric race, and the ruins of once populous towns. All these things give evidence that a peaceful, industrious people, cultivating the soil and practising some of the arts, had lived and died within the territory centuries before the European saw this continent.

This aboriginal people passed away, leaving the wild Indian and the buffalo in possession of their domain; but some of their works have withstood time, and remain to aid us in guessing their history. Who they were, whence they came, whither they went, are problems not yet solved.

Traces of these people have been discovered in New Mexico, Utah and Colorado, but in those districts the ruins consist mainly of crumbling walls, mounds of dust and masses of rubbish, the remains of old buildings. The most authentic history comes from the Great Tonto Basin in Arizona, comprising upward of ten thousand square miles. Here nearly every eminence bears ruins that prove the ancient existence of a vanished race.

Under the shadow of the Rocky Mountains flows a small yellow stream called Beaver Creek, a tributary of the Rio Verde, which runs into the Gila River. On the creek's high banks are located upward of sixty walled caves of various sizes, once the homes of that prehistoric race of whom the American Indian has no traditions.

The caves vary from five to twenty-five feet in depth. Their entrances are walled by heavy masonry of stone and cement, still in good preservation.

The largest of the caves are divided into many small apartments by partitions, or walls, of stone and cedar wood.

An Arizona Cave-Dwelling.

It is asserted by many students of the race that the inhabitants lived in the smaller apartments, securely fortified from enemies who frequently besieged their cave-towns.

The dwellings consisted of an upper and lower cave. To reach the upper cave it was necessary to ascend by outside ladders, at peril of falling to the ground, sixty to one hundred feet below. The lower cave was reached by climbing over the rugged edges of projecting rocks.

To the walls of the rooms still hang small fragments of mortar, proof that the interior of their cave-dwelling was plastered. From discernible imprints of hands and fingers, it is surmised that the mortar must have been spread upon the walls with bare hands. In many places can be seen the impressions of the small, chubby hands of little children, who were, no doubt, delighted to make their marks in the wet plaster.

Many of the caves are equal in size to some of our public buildings, and in one of the largest ruins five hundred rooms were found. Four stories still stand, but the roof and upper walls have long ago crumbled and fallen to the ground. The rooms are still well preserved. They have no other entrances than small windows, for the buildings were entered by ladders which rested in niches in the walls, and which were drawn in after the occupant.

Floors were formed of cedar logs laid close to each other with spaces between them filled in with twigs and cedar bark. The ragged ends of the logs give evidence that they were hewn by dull instruments, perhaps by the stone hatchets and saws which we saw lying about.

Many cave-dwellings erected in proximity to each other formed what was known as a cave-town. A plaza was set off in the centre, and the rooms were arranged around it. The architecture of each seemed to have corresponded in the minutest detail to that of every other, so that all the dwellings of the town were alike.

The walls of the cave were from three to four feet in

thickness, and the roof covered with timbers of cedar and dirt over a foot thick. Often these cedars are found well-preserved, and this has often caused doubt of the great antiquity of these ruins. No such doubt is felt by those who know that the cedars of Colorado and the Southwest never rot, but die standing without support until borne away on the winds in atoms of fine dust.

Cave-towns were often built in the form of a square and parallelogram, as well as in a circular form, and their measurements were exact in every detail. Their masonry reveals a higher state of civilization than that enjoyed by the Mexican or Pueblo Indians.

The circular towns consisted of three tiers of cave-dwellings, one directly above the other. The second tier receded some distance from the ground tier, and the third receded from the second. So the whole resembled a huge stairway of masonry and adobe. These tiers ran all round the enclosure, and thus formed a stronghold for defence during troublesome periods.

Among the great structures now crumbling to dust must be mentioned the *Casa Grande*, situated in the valley of the Gila. Its history antedates the time when the Spaniards conquered and occupied the country.

This wonderful building stands a short distance back from the Gila's banks. Its origin has been traced back on good evidence through five centuries. When first seen by the white man, three hundred years ago, the largest building was four stories high, and had walls six feet thick. At the beginning of the present century one house alone remained, which was four hundred and twenty by two hundred and sixty feet.

The walls are of concrete, consisting of mud, gravel and hard cement, while the interior is coated with cement, and is hard and smooth at the present time. The ruin has diminished in size until it is now fifty by thirty feet, and is rapidly sinking to a mere hillock of dust.

The inside is divided into five rooms, the central one being

eighteen feet long and fourteen feet wide, while the others are twenty-five feet long and ten wide.

The beams of cedar still inserted in its walls give proof that the building originally had four stories, with a fifth located above the central part. No stairways nor traces of any can be seen, so that, as in all of the cave-dwellings, the upper rooms must have been entered by ladders.

In all the ruins are circular apartments, surrounded by walls of masonry sunk deep in the ground. These circular chambers have an average diameter of twenty feet. They were used for worship. The cave-dwellers were probably sun-worshippers, and within this peculiar apartment were performed the rites of their religion.

In connection with the cave-dwellings have been found numerous hieroglyphics engraved on rocks centuries prior to the landing of the Pilgrims at Plymouth. That they are of great antiquity, and were engraved by men of no little intelligence and ambition, can hardly be doubted.

Without exception the sites chosen for the erection of cave-dwellings were in the vicinity of agricultural lands, and the existence of artificial canals gives evidence that irrigation was practised by their owners.

One canal, ten miles long, twenty-five feet wide and ten feet deep, still exists, and was no doubt designed to receive the waters of the Gila for distribution to the cultivated fields, in which they raised Indian corn, pumpkins, melons and certain fruits. Another irrigating canal has been followed to the Gila, a distance of forty miles.

There have been found in the cave-houses more than two thousand pieces of pottery, from large, coarse jars to cups and jugs which might well be coveted by bric-à-brac collectors; hundreds of stone hatchets, knives, arrow-heads, hammers and mortars; bows, paddles, hoes, lances and plows of wood, and mantles woven from yucca fibre, wild cotton and the inmeshed feathers of turkeys — for there is abundant evidence that the cave-dwellers had domesticated the turkey.

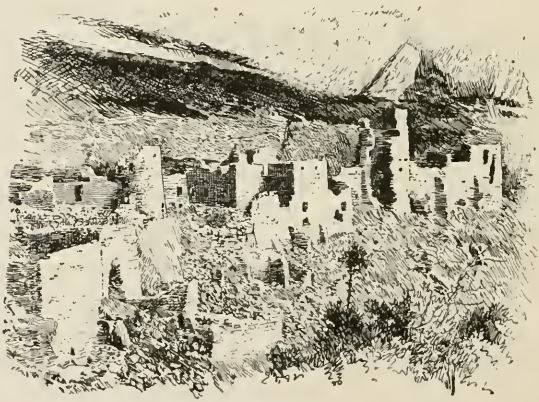
The high, dry recesses of the closed houses have preserved not only the bones, but the burial-clothes in which the people were wrapped and laid to rest in carefully walled-up niches of the crags.

The skulls give evidence that the cave-dwellers possessed average brain capacity. The skeletons show that the men were sometimes six feet in height, and the women five feet seven inches. The soft, reddish brown hair of the women is neither wiry like that of the Indian, nor kinky and black like that of the negro, but fine and straight.

The remains, indeed, indicate that these denizens of pre-Columbian America may have been comely women and strong, intelligent men.

Surely, from their homogeneous character, beauty, and precision in detail of construction, we must believe that the cave-dwellings and the domestic articles found in them are the work of a great people, whose civilization was of a higher order than that of the tribes which have succeeded them.

PRESTON H. UBERROTH, U. S. R. M.



A Builded Lake.

A reservoir of water for mining purposes or the irrigation of land usually costs vastly more in money and in time than any one would think of devoting to such an undertaking, if nature could be trusted to send rain enough for the work intended. But in a large portion of the far West of the United States rain comes seldom, and when it does fall the time is winter or early spring, though the water is especially needed in summer. It comes in torrents, rushes down the mountain-sides, roars into rocky canons, and vanishes, leaving its traces only in washed-out mountain trails, countless gullies and undermined railroad tracks.

The plan of water-storage is to catch the water as it falls in the winter-time, store it up in a huge reservoir, and use it for irrigation in the summer season.

The site of the lake-basin should be shut in by hills, with an outlet through some narrow cut in the rocks, as at the mouth of a canon, which can be easily closed by a dam. The area drained by the lake should be as large as possible, so that the water-supply may fill the reservoir every year. Then, too, if the water is to be used for irrigation or mining, the dam must be built somewhere near the ground to be worked.

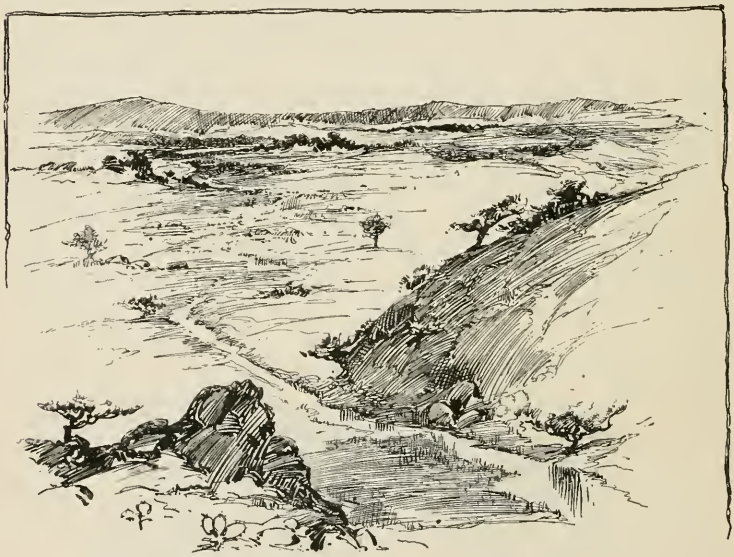
The simplest way of locating a storage-lake would be to discover some ancient lake-basin and close its outlet, precisely as was done in building the reservoir at Walnut Grove, Arizona.

The dam at this place stands one hundred and ten feet high above bed-rock, and is four hundred and ten feet long across the top. It is a huge wedge of stone, built up of four hundred and fifty thousand cubic yards of rock, and sealed by an apron of three-inch planks, calked and painted with asphalt, as stanch as the sides of a ship.

At the beginning of the work Walnut Grove was in the

wilderness, fifty miles from any place, but a town sprang up quickly about the site. Hundreds of men were constantly engaged on the job, all the day and all the electric-lighted night, for nearly a year, during which time no rain fell. This unusually long absence of rain was a great source of good fortune to the builders; but when all was completed we anxiously desired a flood, that the great structure might be tested.

We grew impatient and began to doubt whether such a

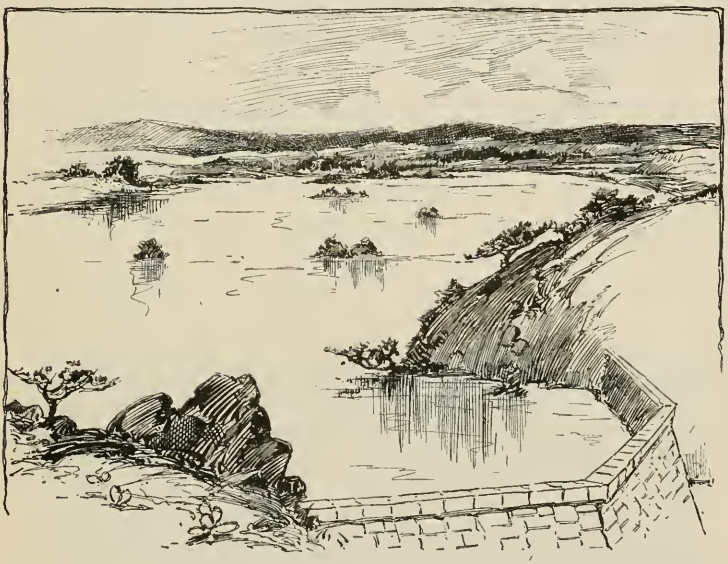


The Valley.

brazen sky could rain, and whether, if it did, all the water in the territory could fill that immense lake-basin, which lay parched and lifeless beneath the blistering Arizona sun. Indeed, the outlook seemed dubious enough. There lay the outstretched water-basin, a very desert in barrenness, its red volcanic soil aggravating the sense of aridity derived from

seeing the lurid heat. In the basin were brown grass, brown rocks, stunted oak-brush, withering cactus, cattle dying on the road to water, the only water in sight a sluggish creek winding through the valley and sinking, at intervals, out of sight beneath the sand.

The flood-gates had been closed three months in expectation of the rains, but winter had come and gone without even a sprinkle. Heavy snow had lain on the mountain since February, but no rain had fallen to bring the snow down in a



The Lake.

freshet. At last, in April, came a driving wind and rain, blown in from the Gulf of California.

Rain-drops as big as marbles bounded from boulder to boulder and down into the lake-basin. Every groove in the rocks fed a hollow, the hollows fed the streams and the streams quickly grew into torrents that tore their way through

the empty creek-beds. The lake-level rose three feet in an hour, but the effects of the warm rain on the mountains had yet to be seen.

At midnight a cowboy rode in on horseback, breathless with excitement, to tell us, "There 's a wave from fifty to a hundred feet high crashing down the valley!"

We seized our pouches and lanterns and started for the boom. We could hear the roar of the river, ten miles away, but it was an hour before it rushed in upon us, twenty feet high and fifty feet across, a great tidal wave, seething with foam, carrying trees, boulders, everything before it. Then followed the deafening boom of the other creeks, as one after another they came down.

We hurried back to camp, to find our approach nearly cut off by the rising water. Everybody was awake and rustling. The croakers, who had built on the flat in defiance of the dam-level, were scurrying about in the dark, scooping their belongings into gunny-sacks and rushing up the hill to establish new claims above the one-hundred-and-ten-foot line.

By morning the rain-gage showed a rainfall of two inches, but this gave no clue to the rise in the lake. We looked out at daybreak to find the face of the country entirely changed. The rocky water-basin of yesterday was now a lake, three-quarters of a mile wide, a mile and a half long and eighty feet deep by the dam, on which floated logs, tree-trunks, fence-rails and islands of sawdust that had drifted down from the sawmill above.

Roads, trails and cabins had disappeared. We found ourselves entirely at sea, and had to look off repeatedly to the distant mountains to find where we were. Even the cattle looked confused. Being used to a swallow of muddy water from the creek, they stood appalled at the ocean that lay before them, and refused to drink.

The change in the landscape was too sudden to realize at once, the smooth expanse of water being so striking a contrast to the rocky water-basin it displayed. We had known

beforehand exactly how high the lake would rise when the dam was full, but imagination had not pictured to us the beauty and variety of the constantly changing outlook.

As the lake-bottom sloped very gradually upward, a slight increase in depth added greatly to the size of the lake. Hillsides disappeared under water to become shelving beaches and fine swimming-grounds, rocky cliffs became islands or steep promontories, curves in the creek-beds made peninsulas, valleys between the hills became bays, all changed as by magic when the water rose.

It continued to rise for three weeks longer, until the lake stood one hundred and five feet deep, covering seven hundred and fifty acres. The débris on the surface gradually sank, leaving the lake surprisingly clear and blue, like a translucent amethyst in its setting of terra-cotta hills.

HELEN FRANCES BATES.

The Oldest American Houses.

Santa Fé is said to be the oldest city in America. That the statement is not true would be hard to prove, because the question of its origin and age is wrapped in mystery.

When Coronado explored Mexico in 1540, he found many Indian pueblos on the Rio Grande River, and speaks of several which must have been near the present location of Santa Fé. The one which it is generally supposed was on its precise site at that time stretched along its river-banks for six miles. Coronado reported that he found here a beautiful and fertile valley, under high cultivation by the Indians.

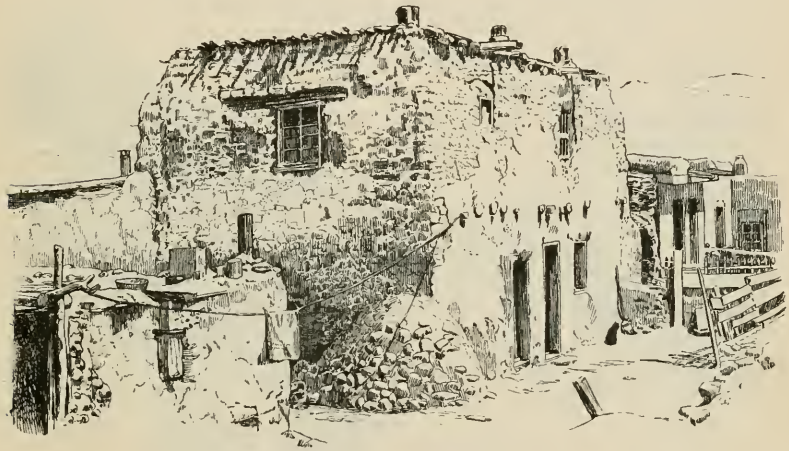
Visiting Santa Fé to-day it is hard to realize, ancient as the old ruins look, that one can really be gazing on walls which Coronado saw nearly three centuries and a half ago.

It is still harder to realize what must have been the oppressions and cruelties which have brought about the present degraded and wretched condition of the Indians whose ancestors formerly occupied and cultivated the whole valley. That a race which, over three hundred years ago, had reached comfort and success in agricultural and pastoral occupations, should be to-day an abject, supine, wretched race of beggars, is a melancholy comment on the injustice they have received. They did not sink without struggles.

Santa Fé, being the seat of government, was always the point of attack, the chief centre of strife, and very terrible scenes have been enacted there. As late as 1837, a Mexican governor who had ruled with great severity and laid oppressive and unjust taxes on the Indians' crops, was murdered by them under circumstances of tragic horror.

The struggle which took place at this time was the last the Indians made. They were soon subdued, and remained peaceable till they came, with the rest of the New Mexico citizens, under the government of the United States in 1846.

There is still standing in Santa Fé one building which has been the home of the most prominent persons, and the scene of the most important events, through all these vicissitudes of the city and its government. It is still called, as it was called three hundred years ago, "The Palace." Anything less like a palace could hardly be conceived of. It is a low adobe building, one story high, with a veranda running its entire length. It makes the north wall of the plaza, and in it are still the governor's home and all the offices of the



The Indian House.

government; the United States and territorial court-room, libraries, Congress halls, etc. It has been so often repaired that it has lost much of its ancient look, but the massive walls and heavy hewn beams remain unchanged, and will, no doubt, bear their mute witness to its antiquity for a century or more to come.

The plaza on which it fronts is two and a half acres square, well-shaded, provided with seats, and, commanding a view of all the life there is in the town, it is the best possible point from which to gather an impression of Santa Fé.

Sitting there, looking at the governor's old palace on the north, and the row of smart Jew shops on the south, at the low and half-crumbling mud-walls and houses, and the big new brick and wooden buildings cropping out here and there, and overtopping everything, one sees an effective picture of the clashing of the new and the old.

It is the new that suffers most by contrast. The long, low adobes, with their lines of absolute simplicity, and their soft yellow-gray color, seem far more dignified than the modern

Street in Santa Fe.

wooden building, or even the substantial brick one, with copings and facings of different colors. Contrasts no less marked will be seen in the passers-by in the streets. The successions are almost fantastic.

Close on the heels of two dapper young Americans in a buggy, with surveying instruments and charts in their hands, comes a Mexican cart, creeping along, drawn by oxen; its wheels are circles of solid wood, sections of tree-trunks,

roughly hewn, with an irregularly-shaped hole in the centre, in which creaks the rough-hewn axle.

The driver is in rags and dirty, but he wears a fine broad-brimmed sombrero, with a roll of twisted silver wire and straw around the crown; and as he goes he sings a lilting song to himself, or whistles softly, or takes a nap in his cart, and he would not change places with the hard-working young surveyors if he could.

Sauntering through the plaza, and looking curiously, with furtive glances, at strangers, come his sweetheart and her friend. They wear trailing cotton gowns, sweeping a foot behind them, and begrimed half-way up the skirt with the impalpable, ineradicable Santa Fé dust; they would feel humiliated to lift them, and to wear them short would be disgrace.

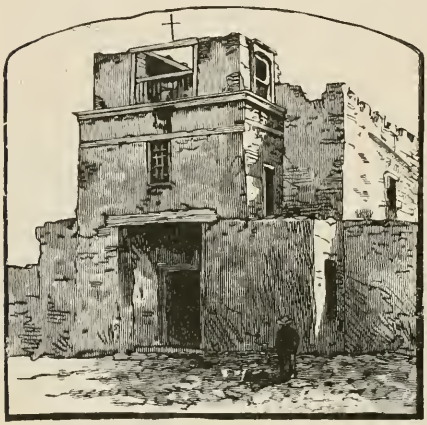
To be unconscious of dirt, superior to it, is dignity. On their heads they wear gay shawls, black with gaudy flowers, or white striped like a rainbow. With one hand they hold the shawl-folds firm over their mouths, their soft, but passionate black eyes gleaming out of the triangular opening above, as from the bars of a prison-window. They are used to only half-seeing; for the few windows they have in their houses are without glass, and shut off from the street by jail-like gratings of close-set wooden rails.

Behind them comes, with brisk step and erect carriage, an American woman, the wife or sister, perhaps, of some officer of the fort garrison. She is dressed in the last Paris style; nothing escapes her eyes; as she passes the sauntering Mexican damsels she glances disdainfully at their dusty trains; and they in turn speak scornfully to each other of her needless uncovering of her ankles.

In a few moments, to complete the human panorama, there go stalking along outside the plaza paling a group of Pueblo Indians, bareheaded, wrapped in scarlet blankets. The dignity of their bearing and the grace of their drapery put both Mexican and American to shame.

Nothing can be finer. Roman senators in togas never folded their arms better, or stood straighter. They make for the shops. They have walked all the way in from their village, twelve miles or more, having made a little money by selling some of their pottery. They have come in to spend the last dollar of it.

The two most interesting ruins in Santa Fé are the San Miguel Church and an old building opposite it, called the Indian House. This is, undoubtedly, the oldest house in America. It is a rough, two-story adobe, with a low, narrow door, and with windows like port-holes. The logs that hold up the dirt roof show no signs of decay, and the building is yet used as a tenement-house. The church is also of adobe, but built on a foundation of small stones laid in mortar, which is the reason of its wonderful preservation. It was first built in 1640, was partially destroyed by the Indians in their revolt in 1680, and built up again in 1710. The interior of the church is still in tolerable repair, and service is held in it.



San Miguel.

The altitude of Santa Fé is a little over seven thousand feet. Its winters are sunny and mild; a little snow falls occasionally, but it never lies long, and the air is exceptionally dry.

HELEN HUNT JACKSON.

New Mexico.

It was midnight when we were landed at the Santa Fé station, on the south side of the town. The moon was shining brightly. In a moment I was riding, in effect, through foreign streets. They were narrow, rocky, lined with squatty, unlighted, silent, sombre adobe houses. It seemed as if a gentle, fun-making earthquake had jostled them out of line, tilted them off base, started them down grade, perched them in awkwardness. Un-American! Old! I cannot conceive of a time when those old adobes were not there, sprouts from the adobe soil, as it were.

The next day after I arrived at Santa Fé I asked the price of a large plum of a Mexican dealer.

"Five cents; not less could be."

"One for three cents?" I asked.

With scorn the dealer replied, "No three cent here! Five cents lessest money here. One plum, two, three, four plum — all same; five cent."

Seller, buyer, Spanish, American people alike have here contempt for the change-making of the East, all declaring that they would not live with people so mean as to bother with change for five cents.

One reason why provision-dealers in these mountain towns can sell their wares nearly at Eastern prices is, because in the cool, pure, dry air of New Mexico, foods do not spoil. In Santa Fé the tradesman delivers you a slice of butter as he does a slice of cheese with no fear, even in July, of its melting, and it reaches the consumer in August as firm as in December.

Rents average somewhat higher in this little-understood territory than in the Mississippi Valley, but the fine climate confers on your apartments unexpected adaptability. The comfort possible in a couple of adobe-rooms, which are usually

large, is a surprise to a person brought up in the North. Bivouacking is possible every day, and makes indoor comforts less imperative. You can go picnicking forty-eight out of fifty-two weeks.

Nowhere are sun and air on better behavior. There is scarcely a summer morning when a light piñon fire would be oppressive; scarcely a winter noon when you might not dispense with all fire.

I had ever at hand, ready-made, the means for keeping a comfortable bodily temperature. If the air was too cool, I moved into the sunshine; if unduly warm, into the shade, and the relief was always immediate and complete.

I had heard that the people were foreign, unapproachable and unsympathizing! Instead of this, in the most cordial friendliness they began at once to advise me what to do, and what not to do, to get the full value of my visit.

Mexican ladies are chary about seeking the acquaintance or friendship of visiting States people, but they are responsive to your advances or calls.

If you ask a Mexican gentleman to direct you to some place, he will not only give you the information, but will give time, if it seems to him necessary, in showing you to the place and explaining noticeable features. At parting he will thank you for the pleasant hour you have given him.

A Mexican lady acquaintance cheerfully spent a morning showing me from one place to another, looking for rooms, pointing out advantages and disadvantages, advising me as to prices and neighborhoods.

When it was known that I intended to furnish rooms, there came the most surprising offers of loans — blankets, pillows, chairs, desk, table.

Beside loans I was offered gifts, as a cook-stove from an Alabamian who declared that she couldn't eat stove-cooked food, and that her cook would use nothing but the fireplace, as they did down South.

A Spanish friend sent word, "I will lend you my Mexican

to make you a fireplace. There's one in that angle of the wall. He'll open it."

They close fireplaces in a free and easy way down there. They break up a little space of the yard, stir in water, and fill the fireplace to the jambs with the plastic clay. The mud is then smoothed with the hand, trowel-like, finishing with mud whose brown has been lightened with coloring matter.

The Mexican that was loaned to me cut into the adobe packing with which some former tenant has filled the fireplace, carried it into the yard, brought it back plastic, smeared it over jambs, hearth and mantelpiece, finishing all smoothly by

A Mexican Street.

the pliable hand. It was all by primitive methods, but the comfort and health that resulted from that bright little adobe fireplace will make the name of one Spanish señora a sound of music to my heart.

You have heard, no doubt, that the people of New Mexico are lazy, to use plain English; that the territory is the land of *Mañana* — the land of to-morrow.

Before I deny or confirm that statement, let me ask, Who

are the people of New Mexico? By the census of 1890 it had more than one hundred and fifty thousand inhabitants, without counting the Indians on the reservations. The area being so vast and the population so scattered, there is some difference in the estimate.

About one-fourth of the entire population are Americans, and a large part of these were born in New Mexico. The Americans of New Mexico are the equals in culture and in enterprise of the Americans in any part of the United States.

Of the people not American, about one-eighth are of Spanish descent and three-eighths of Indian descent. The other half are of a mixed race, Spanish and Indians, by the Americans commonly called greasers.

To say, "The rich people are Spanish, the poor are Mexicans," is a taunt in New Mexico. There is a proud protest in many minds against being consigned to that bottomless genealogical pit entitled Mexican. On the other hand, I have met many people of pure Spanish blood who resent being called Spaniards, claiming with pride that they are Mexicans.

If people mean that the peasant or laboring Mexican is lazy, my observation leads me to contradict the statement. In a climate so invigorating as that of New Mexico, laziness is hardly possible. Mexicans are indifferent to many things about which the people of the United States are anxious, and for which they struggle.

Some conditions of comfort regarded as essential, the Mexican has without the cost of labor or money. A large percentage of the world's work is done to keep the bodily temperature within its narrow normal range. In New Mexico this work is not needed, for there is but little extreme cold or extreme heat to guard against.

"Make hay while the sun shines," has small significance in a land where there are three hundred and sixty-five days of sunshine in the year, and where there are four or five crops of hay to the season, and not a stack or a mow is ever mildewed.

The fact is that the Mexican peasants are workers from childhood. They are reserved toward Americans. They do not importune for work, but I never asked one for service of any kind that I did not get the service at reasonable price. There is no task that a Mexican will not undertake, especially if he can reënforce himself by the assistance of a burro.

The burro, facetiously called "the sweet singer of Mexico," has a range of only two notes, but these are powerful. This is what heartless people say of the burro. "The perfect playmate for boys" would be a more just title.

All the children of New Mexico learn to ride burros, which

Burros and their Burdens.

are as docile and harmless as hobby-horses. One often sees four or five boys on one of these patient creatures, or two or more men, their legs dangling almost to the ground. It is not a matter for surprise that brute playmates have been expressed to New York and other Eastern cities for children's use in learning, without danger, saddle-riding and driving.

The loads that the burros will carry are remarkable. They take the place of market-wagons. I recall a caravan of a score of these pack-animals under one driver. They would come to town laden with melons, or mission grapes, or other wares, bringing loads larger and heavier than themselves.

Like soldiers under drill, they would range themselves in ranks before a store on the sidewalk. Nobody was offended or afraid, for they were cleanly and harmless.

As soon as one was unpacked he would walk off into the street, where he was sure to find something to eat, if only a bit of paper. The goat is no more nearly omnivorous than the Mexican burro.

In a ride of fifteen miles out of Santa Fé I once met two hundred and fifty-three burros, with packs, industriously plying their mouse-colored legs. The loads were largely cedar and piñon wood, cut and split.

I have seen a burro carrying a cook-stove, or bringing over mountain-roads timbers for a house. When they are carrying unbaled hay they present a most amusing appearance. One sees the great ears working, a tail switching, and four little hoofs twinkling; all the rest is a moving haystack.

If there was ever a flesh and blood creature capable of living on a straw a day, it is the hardy, faithful Mexican burro. So inexpensive is its keeping, with its unstable habits of life, that the poorest peasant can afford the comfort of this helpful companion, the friend of the mountaineer. It will obey every tone of the master, every touch of his hand. But a stranger must study burros well to get their best service.

SARAH WINTER KELLOGG.

Adobe.

I have frequently watched the making of adobes by the natives of New Mexico. Adobes are sun-dried bricks about twelve inches long, eight wide and two deep. They are used where the States' people would employ kiln-seasoned bricks and stone, and for many purposes for which lumber is used in a wooded section. Fences, for instance, are largely made of adobes; corrals, gardens, orchards, yards, churches, schools and convents are enclosed by walls built of adobes.

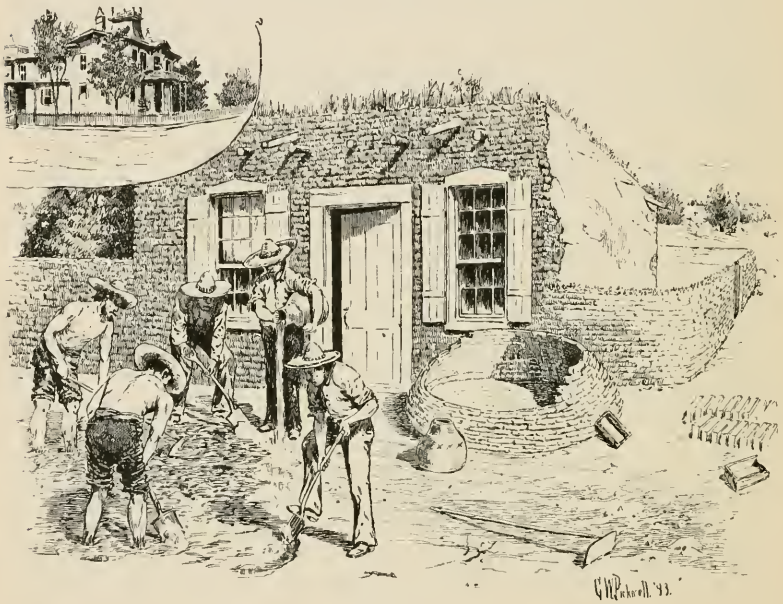
These mud walls are often seen with cacti planted thickly on their tops, as a double security against thieving or other purposes. When cacti are not easily procurable, the walls are defended by broken glass bottles, imbedded in the top round of bricks before they are thoroughly dry.

On lines where protection is not called for, I have seen the tops of these fences picturesquely ornamented with bright flowering plants, such as scarlet and yellow cacti, the wild sunflower, the Spanish bayonet and the Mexican lily.

When a house is to be built, an addition to be made to one, an oven to be built or a fireplace, or a piece of ground to be enclosed, the enterprising Mexican assembles his helpers as at a primitive house-raising. The first move is to spade up a patch of ground, often a portion of his own front yard. Sometimes, as an act of friendliness, the adobe-maker gets permission to spade up a neighbor's yard, or a vacant lot near the building site.

The ground being well broken, water is brought on and the mixing is begun. As the surface, before the breaking, was in all probability but carelessly swept, many bits not essential to good bricks get mixed in the mud — bits of glass, stone, pottery, tin, wire, chips, rags, etc. But it is not in the purpose of the adobe-makers to use other materials than water and the soil everywhere found.

There is a little preliminary mixing with hoe and spade, but shortly the workers strip to the waist, bare the feet, roll above the knees whatever there may be of trousers legs, and walk bravely into the mud. Standing in the brown mixture of precisely his own color, the expressionless, statuesque Mexican might, by an easy reach of fancy, be regarded as an



Making Adobe.

outgrowth of the adobe mud. Now hands and feet reenforce spade and hoe, until the mixing is complete.

Rough wooden molds are then filled by the hands with the mud, and scraped level by the hands. The molds are carried away a short distance and the molded mud is tipped out on the ground.

There the adobes lie for days or weeks, sunning, while the owners are sunning themselves against adobe walls centuries old, it may be. There is no fear of the blocks being spoiled

by rain, in this white and bright land where the sun shines three hundred and sixty-five days in the year.

The mud-bricks being sufficiently baked on one side, they are turned over, and in time, on edge, until all sides and edges have had the effect of a sufficient period of direct sunshine.

An Eastern brickmaker would regard these adobe bricks as rough, uneven, unsightly. But they have their merits. Their making does not call for any skilled labor; they can be made in a day, dried without expense, and can be laid by inexperienced hands. They form such inexpensive building material that the poorest man can have his own house.

I have seen many a comfortable adobe house of four rooms, plastered well inside and out, erected at a cost of five hundred dollars.

I choose the adjective comfortable advisedly. Without the shelter of a tree, in a land of perennial sunshine, an adobe house furnishes a complete protection from summer heat, however high the mercury may be. The earth walls never get heated through in such a climate as New Mexico's; neither do they ever get chilled through.

In the shelter of an adobe house, you can forget that there is winter cold or summer heat.

The Mexican peasant builds an unpretentious lodge, but for comfort it will stand comparison with the peasant-house of any land. He lays the adobes on the bare earth, builds up two or three feet, then waits some days to insure the walls' dryness, builds a few more feet and again waits.

When his wall has reached a height of ten or twelve feet he stops. Then he lays on the beams or rafters, usually of the unbarked trunks of the piñon-trees, not fully grown. The piñon is the mountain pine of the nut-bearing variety.

The rafters are not of uniform length. Some project a foot over the wall, others more than a yard, furnishing a place for drying plants, or for the storing of hay, or for the roosting of Mexican boys ambitious enough to climb to the roof.

These rafters are the support for the thick planks or boards

laid closely across, which are to receive the dry adobe dirt. This is piled on, to the thickness of about thirty inches. This makes a dry, warm roof, on which, in the course of time, chance seeds take root, causing a little forest of plants to spring up on the low roofs.

The dirt roofs are safe as long as the timbers are sound, and the timbers, being measurably protected from damp and air, remain good for long periods.

But ants sometimes find out the rafters of a house and honeycomb them, making no visible sign of their presence. The timber then suddenly gives way, letting down the mass of earth, imperilling life and injuring the house's belongings. The brother of a Santa Fé banker once lost his life by the falling in of one of these dirt roofs. Many adobe houses, however, both old and new, have roofs of a better character.

One might think that the adobe house would be a perishable structure. In a land of rains, of much freezing and thawing, it might be; but there are adobe houses in New Mexico and Arizona centuries old, and as good as when first built.

Some adobe houses have walls eight feet thick. These were built not only for sure protection against heat and cold, but also as defences against Indians and other enemies.

The adobe house is the outcome of ages of experience in a climate of peculiar conditions. The Americans have introduced some architectural improvements, but they have taught the Mexicans little of real value in their climate.

Even the wealthy Mexican of to-day, educated, it may be, in Washington or St. Louis, builds preferably an adobe house. If one is built on a stone foundation, with hooded windows, far-projecting roof, with balconies or portals, there is no more comfortable, weather-proof, picturesque dwelling. For a small expenditure, a house can be built in that delightful climate in which not an hour of discomfort from heat or cold need be spent in all the year.

SARAH WINTER KELLOGG.

ON THE PLAINS.

The Prairie Schooner.

The Prairie Schooner.

The hull or foundation of the prairie schooner is a double box about twelve and one-half feet long. This box is usually three and a half feet wide, though many pioneers extend the upper box a foot on each side and support it by iron braces. A wagon sheet stretched over four or five good elm bows covers the box, which does not, however, comprise the whole carrying capacity of the schooner.

Secured behind the box will be seen a large packing-case, with front, rear or sides of slats or woven wire. This coop is the home for the long journey of perhaps a dozen hens, the nucleus for a flock at the new home.

Biddy is worth, even during the journey, a good deal more than the small trouble of carrying her. She supplies the family with fresh eggs every day, for the fatigues of the voyage do not turn her from the regularity of her habits, nor seem to upset her nervous system.

The door of the coop is opened when the schooner stops for the evening camp; out fly the hens, and then how the dust flies! Such a fluttering, scratching and cackling! Such running after grasshoppers and other insects! But the sinking sun soon warns them that it is time for all good fowls to go to roost; they fly up to the box as naturally as if they had never slept elsewhere; the door is closed and they are ready for another day's drive.

On top of the hen-coop are piled chairs, stovepipes and other light, bulky articles; boxes are fastened outside the wagon at every convenient place to carry tools, cooking utensils and other articles. On one side, held in position by iron rods, may be a keg holding five or ten gallons of water, a prime necessity, that must be carried over many miles of the American desert.

The water found by the way in springs and stagnant pools

is often brackish, or alkali water, which cattle and horses drink readily enough, though man refuses it as distasteful. The best that can be said for it is that it is wet.

It is not uncommon to see a cow, and sometimes a hog, led by a rope tied to the rear of the wagon. They easily learn to follow, and to find their living on the prairie at every resting-place. The daily fresh milk for the farmer's children richly repays all needed care of the cow.

The cover of the prairie schooner is not always closed down on the sides of the box; it has strings by which it can be reefed up two feet or more on each side, so that the top will resemble a large umbrella. Thus the inhabitants can look around the horizon as they travel. Occasionally one may see a row of heads poked out under the canvas, some white with infancy, some white with old age; and it is piteous to see some poor old grandmother submitted to the hardships of journeying by the prairie schooner.

The long trip is always an experience of discomfort, and often of danger. Great gales, waterspouts or washouts may be encountered; horses may be lost or stolen; tires may come off or some other accident may happen. Proper nourishment for the very old and the very young is scarcely to be had, and no wonder many die on the voyage.

But fate is seldom hard on the pioneer. Through all the trials and hardships that beset his path, he moves west with hope like a pillar of fire before him, and the vision of a new home where independence will reward his toil and peace bless his declining years.

JAMES FULLERTON.

Prairie Signs.

The Dakota prairies are not uninteresting, as many travellers would have their readers believe. Their monotony is only apparent. A close study of even the most level and apparently characterless stretch of sod will yield the most surprising and interesting results. It is like the ocean in its immense sweep and changelessness of its lines, and in the great variety of its shades of color and light-effects.

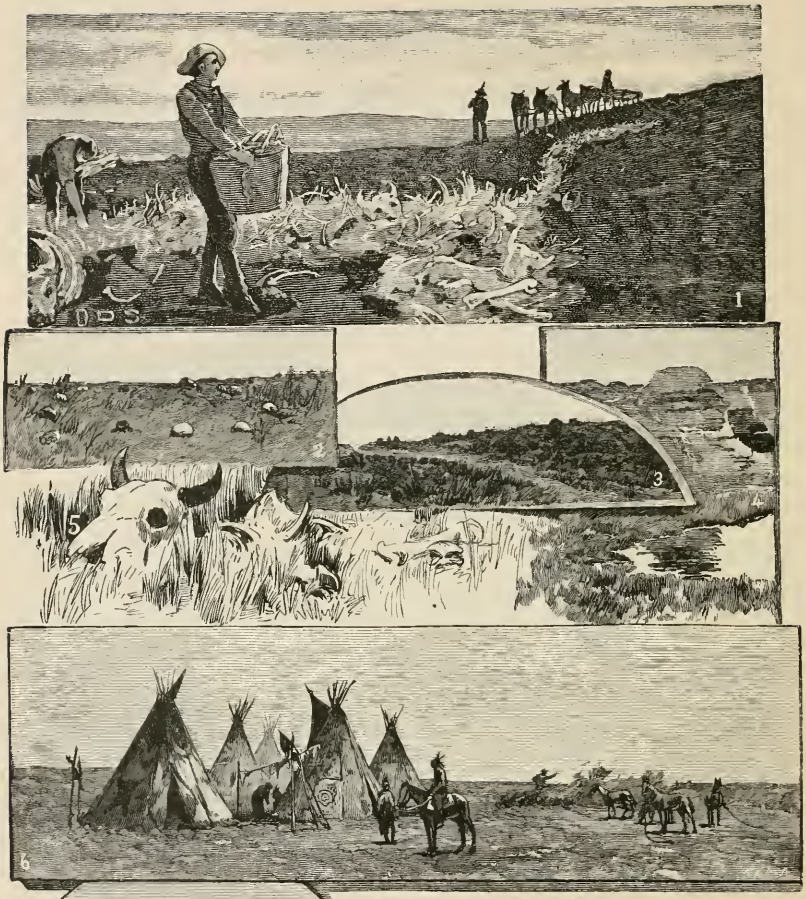
But it is unlike the ocean in retaining traces of change upon its surface, mysterious marks of storm and fire. Looked at closely, the turf is a page written with strange and often pathetic lines, whole histories of storm and stress of war.

One of the signs first to strike the eyes is the sight of the buffaloes' bones scattered thickly over the plain. Gathering them for shipment eastward became profitable to the pioneer boys. The living buffalo long ago disappeared from these prairies, and the freshest crib of bones that I saw dated back ten years.

Many of these, I suppose, were twenty-five or even fifty years old. Of these last nothing remained save the hardest part of the skull and the teeth. The burial-places of others, still older, are indicated by the more luxuriant growth of grass.

Dakota boys soon found that the buffalo carcasses on the upland were good places to look for arrow-heads, for the Indians sought the young and strong animals, and generally killed them on the open plain. I have seen arrow-heads and spears driven quite through the shoulder-blade, showing with what great force they were sent.

Next to the bones, in interest, come the buffalo trails, seen everywhere as deep, crooked furrows. At the place in Dakota which I have in mind, they ran from the southeast to the northwest. These undoubtedly show the course of the buffaloes as they came and went from the feeding-grounds to the watering-places.



1. Gathering Bones.
2. Teepee Stones.
3. Buffalo Trails.
4. Buffalo Wallows.
5. Buffalo Bones.
6. Indian Camp.
7. A "Circus Ring."

Occasionally on the prairies one comes upon an Indian trail, shown by two parallel furrows, more direct and purposeful than the buffalo trails.

Still more interesting are the circles of stones found very plentifully in McPherson County, indicating where the teepees were pitched. The stones, I suppose, served the purposes of pegs, being laid on the edges of the tents. As they were simply rolled off when the tent was folded, they served in turn for others.

I well remember what a stir it gave my imagination, one beautiful May morning in 1863, as I stood in the midst of the level sward in McPherson County. On the west was the low, irregular line of treeless hills, and on the east the fresh, green, level plain, stretching into the misty distance like the Atlantic Ocean, the far-away, advancing line of shanties, like a fleet of little boats, keeping up the illusion of a sea.

I was in advance of civilization. There was no sound save the trill of the lark, the cry of the plover or the short, shrill shriek of the hawks. It was a weird scene. I stood in the centre of one of these rings of stone, and in imagination I recalled what must have been a characteristic scene, as characteristic of the land and people as the tourney of feudal England.

I saw the group of tents, surrounding the large one of the chief; the horses picketed, waiting the morning mount; on the far-away hills dark masses of buffaloes and swifter masses of antelopes.

On a distant mound, like a figure of bronze, the wolf stood, with long body alert and head thrown sidewise. Men were swarming about the tents, some mounted, with arrows slung at the back and spear in hand, impatient to be off, while the rest consulted and motioned toward the distant herds.

I imagined with what joy the young men vaulted upon their horses, and how impatient they were to start. The sunlight fell upon the plain, and the springing grass was

as sweet to the eye as the word to the lip. The white man's world was still far away, almost unknown.

It is probable that the Indians' real life and emotions will never be written; but it seemed to me that morning that I got nearer to the feeling of the wild huntsmen of the buffalo than ever before or since. These Indians were not beasts nor demons, but men living under conditions which required and produced savagery in some things.

One sign which I have never seen written of at any length, nor satisfactorily explained, is the "fairy circle." These marks on the sod are figures wrought in grass of a darker green than the rest, usually found in places where the ground is perfectly smooth. They can only be seen at favorable seasons of the year, say the first of June.

The circle is of even breadth, and looks like this. It is thirty or forty feet in diameter, and has an appearance as if dark-green grass had been planted by a gardener in the midst of a yellow-green sward.

Sometimes the rings are mere crescents, or crescents with a supplementary line. Sometimes the supplementary line is complete, in other words, a circle having one side much broader than the other. Sometimes it seems to be an attempt at representing a bow. This last form is very rare; I have seen but few like it.

What these are I certainly do not know. They are too large to be the result of tent-setting, and besides, they would not be found in low ground in such case. It has been supposed that they are the marks left by electrical vortices during storms. I think they are the result of intelligent force; but I have no theory.

I am no more sure of their cause than I am of that of another phenomenon to which my attention was called. There are many instances where, in the exact centre of a shallow basin in the sod, a dip thirty or forty feet across, there rests a huge boulder. The whole effect is that of a

circus ring, and the children call these depressions by this name.

The depression is so round and the stone so exactly in the centre that one cannot rid himself of the impression that the spot was a threshing-floor or a circus ring. If the ground beneath were of limestone formation I think I could explain it; but as it is clay for thirty feet, and an impervious layer of slate at last, I simply retire from the field of discussion.

Another mark almost equally baffling is the shallow pit, or wallow, which is not unfrequently found in Dakota. These pits are quite unlike the hog-wallows or buffalo-wallows of Iowa and Minnesota. They are on the upland, have abrupt perpendicular sides, and look precisely as if the soil had been lifted out bodily a foot or two deep, leaving the clay subsoil exposed. The bottom is generally covered with gravel.

There are many theories as to the cause of these. It has been claimed that the cavities were burned out during great drought, and also that they were worked out by the buffaloes pawing the dust. Others see in them the work of the wind as well. My opinion is that the buffalo and the wind together did the work.

These are a few of the signs which the observant eye of the traveller will see as he rides or walks across these strange stretches of short, crisp grass. As I rode toward the hills, entering through narrow defiles into valleys holding alkaline lakes surrounded by deep grasses, it required little effort to imagine savage men signalling from peak to peak of those bare and stony hills.

I could imagine a gigantic sentinel buffalo standing like a figure of granite outlined against the sky, watching the surrounding valleys for his foes, the red men, and roaring a sudden warning upon his herds as he thundered down among them. It was so silent and so lone, and the landscape was so peculiar, that I had gone beyond the reach of anything I had ever known or loved. I shall never be able to forget that scene, as we lay in the shade of our wagon and looked at the

hills, the faint, delusive gleam of the distant lakes, and saw the cranes rise out of the grasses.

Those hills! Prodigious mounds of clay and loose boulders, each slope white with stones looking like a flock of sheep rushing toward the valleys. Those lakes — stagnant, poisonous, silent; no life there, no paddling duck, no swinging blackbird. Foam-edged, soapy, yet clear and crystalline; lakes toward which, on countless sultry days, the buffalo had rushed, mad with thirst, and drank and died; lakes that burst on the hunter's famished eyes like the gleam of silver, only to burn his parched throat like lye. Grasses thick, yellow mixed with green, old with new,— so thick that the antelope were lost in it,— shelter for the cold fox and wolf in winter, into which the antelope cowered when the north wind swept over the hills.

Once again, as I write, the wild geese pass by overhead, the shadows of clouds slide down the hills, the hawks scream in their sport, the wolf looks down at me from a distant swell, and out of the unknown west the wind drives the white puffs of cloud.

HAMLIN GARLAND.

Pioneer Life in Dakota.

The pioneers upon the wind-swept prairies of Dakota, where winter almost merges into summer and a frost in August is quite common, exercise much thought and ingenuity devising ways and means for the protection of their homes, stock, crops and their own lives.

The settler often lands upon the prairie in the spring, with a few possessions which he guards with care while camping with his family in a covered wagon or a tent until a dugout, shack or log house is completed.

The dugout seems to be the favorite dwelling for new settlers. It costs but little save the work of excavating in the side of a ravine, and is secure against a cyclone, sand-storm or the dreadful blizzard that so often rages on the northern plains.

The climate of Dakota is so dry that moisture never gathers in the dugout, and the earth walls soon become so hard that plaster will adhere to them and they will never crumble.

Frequently a schoolhouse is provided with a dugout, into which the teacher and her pupils flee for safety during a wind-storm of such violence that they dare not risk remaining in the schoolhouse.

If the settler has success in farming or in raising stock, he builds a house of some kind near his dugout, which remains a place of shelter in emergencies like those described.

Sometimes he sets a frame house on his dugout, connects it with the dwelling by a staircase in the rear, and has a quaint, two-storied dwelling for all sorts of weather. In summer he may occupy the breezy upper part; in winter, live below, and thus defy the howling blast.

Next to dugouts for security and warmth are log houses. These are numerous in Dakota. When cared for by a thrifty

A Dakota Log House.

housewife, the interior of a settler's log house is by no means uninviting. The walls are often lined with muslin and adorned with pictures that suggest a cheering thought, even though they may lack artistic merit.

If there is no carpet on the living-room, fur rugs usually protect the feet if there are large boys in the family. For where is the pioneer boy of the Northwest who has not rid the country of some prowling coyotes, and perhaps one or two gray wolves? Now and then a cow-skin, from a long-haired three-year-old, is thrown across a wooden settle or a straight-backed chair, to keep a chill from creeping up the spine.

If the owner of a log house is ambitious for a frame house for appearance's sake, yet wishes to retain the warmth and comfort of the former dwelling, he is apt to weather-board the logs, and seal or plaster the inside, and thus his object is accomplished without loss of comfort.

The frame houses of the Northwest are more securely built than those in warmer climates, having tarred paper under the weather-boards and builders' paper under the laths, or ceiling-boards. These papers, with storm-windows and a storm-room at the north or west door, help to exclude the wind and cold. Sometimes a stockade of split logs, extending to the eaves, is built along the north and west sides of the house to stop the wind.

Those who live in shacks, or board shanties, have the least security, and woe betide them if they lack fuel in a blizzard.

For those who live a long way from the railroad coal is almost unattainable, and wood is very scarce, save in the vicinity of large streams. Hence in many places twisted hay is used for fuel. To save the work of twisting it by hand, some settlers have a twister, or machine for preparing the fuel for winter use.

Those who travel on the prairie in the winter often use a double box, in which they ride in safety, sheltered from the wind. This is made by bracing tiers of boards upon a

wagon-box until the sides are several feet in height. The travellers sit upon a bed of hay inside the box, wrapped in furs or comforters, and in this way brave the bitterest cold. The driver guides the horses with the lines drawn through a space in front.

If a blizzard overtakes the traveller thus equipped, he may turn the horses loose, and overturn the double box and camp beneath it in the hay and coverings. The snow will drift about the cracks beneath the double box and bank it in. The

Caught in a Blizzard.

horses will not wander more than eighty rods, and usually will seek some hollow near the camping-place and there survive the storm.

Second only to the welfare of the family with the Northern settler is the care of properly providing for his stock.

For immense herds of cattle nothing can be done except to leave them free to seek the shelter of ravines that break the herd lands here and there. They may endure the cold and scarcity of feed and water until spring, or may perish by the hundreds. For smaller droves a shelter is provided in a line

of open sheds facing south in a corral. When a storm is brewing the stock is driven into this corral by the active members of the family, sometimes including the girls.

No slight danger to the settlers and their possessions is occasioned by the prairie fires, driven by the wind across the vast, wild tracts of grass-land in the spring and fall.

The prudent settler plows a strip about his premises, but the fire will sometimes leap this barrier and spread in threatening nearness to the home. Then all the family make a valiant fight against it, whipping it with strips of carpet, brooms and woollen cloths, or whatever falls to hand.

The Russian thistle, or the Russian cactus, has become a pest to farmers in Dakota. It is supposed to have been introduced into South Dakota in seed wheat brought from Russia by immigrants from the vicinity of the Black Sea. It spread with startling rapidity, and now the two Dakotas and parts of Minnesota, Nebraska and Wisconsin are infested by the weed, which must be fought with great persistence, or it smothers crops and takes complete possession of the land.

The plant grows rapidly in grain-fields after harvest, and its seeds are ripe about the last of August. It is now so stiff and bristly that animals shrink from passing through it, and when horses must be used in such fields their legs are often booted or wound with cloth to protect them from the irritating effects of the thistle. The plant varies in size from slender specimens two inches in height to dome-shaped masses six feet in diameter, weighing twenty-five pounds.

As soon as the plant is killed by the frost it is broken loose from its decayed root by the wind and rolled over the prairie for miles, scattering innumerable seeds along its track.

Sheep are very fond of the thistle until it becomes coarse and woody. By pasturing sheep on the young plant it may be kept down, and the only valuable quality the plant has may be utilized.

THEODORA R. JENNESS.

Cowed by a Hawk.

The Hated Coyote.

It was sunrise on the western border of Nebraska, where I had slept in a sod house. I was only half-awake when a strange noise fully aroused me.

Satisfied that it was not a nightmare, but an actual sound, I hurriedly dressed and went out to see what could make such a noise. It was like the muffled howls and barks of many curs beneath the earth at my feet, with the yelps of puppies in the skies, and the groans and sighs of pandemonium all mingled between.

The sun was up and the morning was bright and clear, but nothing could be seen far and wide over the almost uninterrupted prairie. My host soon joined me, and laughingly asked me the cause of my bewilderment.

"I am looking for that pack of wolves."

He laughed at me and told me that the wolves were coyotes, that there were probably but two of them, and that one was making all the noise. Moreover, he soon proved to me that he was right.

Coyotes are usually harmless, though they sometimes carry off poultry, and once in a great while even a young pig. Yet the settlers almost always try to impress you with the fact that they and almost all other living creatures hate the coyote.

One ranchman said that he had seen his steers, one after another, chase a coyote by the hour around among the herd.

"Why do they do that?"

"Oh, they hate them, everything hates them."

Another frontiersman, seeing his horses run up and down between the rows of dry corn-stalks the greater part of an afternoon, wondered what they meant, especially as the horses seemed to be vying with each other for the lead, and the leader always seemed to have his head down and ears laid

back as if he were reaching out to snap at something. When he drew near he saw the horses were chasing a coyote.

He had scarcely watched them ten minutes when a colt outstripped the rest, ran ahead, struck the coyote in the small of the back with his sharp hoof and killed him almost instantly.

"But why did your horses do that?"

"Oh, they hate the coyotes; everything hates them, even the birds hate them!"

To substantiate this last statement he told me how he had seen a flock of crows, with ceaseless cawing, one after another, worry a coyote till he was well-nigh tired out.

An exhibition of this hatred at last came to my notice. Driving over the prairie one day I was suddenly startled in the midst of a long and oppressive stillness by the scream of a hen-hawk, one of the large kind that looks like a smaller copy of the American eagle. Having once owned one of these birds for a pet, his voice sounded familiar, and I stopped to watch his graceful flight. Not more than six hundred yards ahead he was sweeping in majestic circles, repeating his royal call.

Nearly every time he completed the circle he gave a loud blast, as from a clarion, folded his wings to his side and shot down out of sight among a little cluster of hillocks covered with prairie grass. Thence he would soar up again, seemingly out of the earth, screaming as if in triumph.

I drew in my horse and slowly approached to see upon what the bird was so intent, and found that he had two coyotes there at bay. Darting down upon the one in advance, he would at each descent open his folded wings as if to alight on the coyote, and reach for him with his beak and hooked talons. But he never touched the coyote with these, though he often struck him powerfully with his wings.

The coyote attacked would sprawl down flat in the grass and press his head close to the ground, with his ears laid back. The other one would sit on his haunches with the

guilty appearance of a dog awaiting expected punishment from his master.

As the hawk soared again, the coyote crouching in the grass would sit up on his haunches, and both would turn their eyes upward after the hawk with signs of relief.

When the bird was farthest away in his circle they often tried to run away, but were always overtaken before they could take half-a-dozen steps. Then the one would have to crouch again, while the other showed uneasiness for his mate's safety.

Sometimes the coyotes would not attempt to leave. Then the hawk would enlarge his circles and even go around several times, but if the coyotes showed restlessness or took their eyes from the hawk he would come down, first on the one in the rear, rise a few feet and then drop on the one in front. Thus forcing both to duck by one descent, he rose, shrieking as if delighted by their submission.

At last the coyotes seemed to be reduced to a state of complete despair. They lay down and held their heads erect only enough to enable them to watch their enemy, who was then better satisfied, and screamed only when he was directly over them. But even then, when I made a noise to attract their attention, he came down to draw their attention from me and to himself again.

Though the hawk was for the most of the time about a hundred feet in the air, and his circles were often about a quarter of a mile in diameter, his head was constantly turned toward the beasts. The sun was setting. I had watched them for more than an hour, and then I left them.

But I asked myself, Why do these birds hate the coyote? He cannot molest the crow or her young in their nest, nor can he wage war against the hawk in his lofty aëry.

I. N. Quest.

Boy-Life on the Prairie.

Every year there come days which seem especially to mark, even in the city, the change of seasons — days that to me, at least, are full of strange power. Every autumn there comes a day when a powerful wind roars over Boston, trampling the trees and hurrying the leaves along the ground like a flock of young partridges — the herald of winter.

Walking under the huge English elms, or sitting at my desk and listening to the roaring voices of the branches, I forget where I am. Instantly I am back to the West.

I am in the midst of the wide, level prairie, lying deep in a clump of hazel-bushes, holding my horse by his rein, listening to the hoarse singing of the wind in the grass, the tinkle of the cow-bells and the scream of the blue jay. Around me on the ground are delicious hazelnuts, brown and smooth as my own face.

Hawks are drifting down the wind, tipping and wheeling on their search for mice and gophers; and always the wind's voice is in my ears and the gray sky over my head.

It seems curious that each change of season, as it comes sharply upon me, should cause me to live again those far-off boyish days, and enjoy them, too, for they were not always perfectly enjoyable then. The boys of Iowa now have little of the wild prairie-life left, but the farm-life is nearly the same.

As soon as the harvest was gathered into the stack the plows were set at work, for plowing was a very long and hard fall task. From the age of nine or ten we were required to drive a team in the field, and very irksome it became to us. Out in the morning in the frosty half-light doing chores, out in the field before sun-up, plodding to and fro all day and till sunset at night — no wonder we looked forward eagerly to taking our turn at herding the cattle.

In those days there were vast open tracts of prairie on

which the cattle and horses pastured, and the neighbors used to combine herds and keep their boys watching the cattle. The boys took turns at this work. Some of my richest memories of the West are associated with those wild, free rides on the prairie.

We virtually grew up on horseback, and to ride was as natural as to whistle or to run. Many are the wild rides we

The Wild Rides.

had with the half-wild colts or young cattle, and many were the trials of speed among ourselves. Sometimes a fox or wolf invited our attention, and with whoop and halloo we dashed after him in keen, hot chase.

For eatables on these rides we had berries, plums, wild grapes and, last of all, hazelnuts. I am afraid the city boy who reads this will hardly know what a real hazelnut is, for

I have tried many a time to get such nuts, but could not find them. When just right, they are a delicious nut, unequalled in flavor, and they form a pleasant reminiscence of boy-life.

Oh, such days! Indian-summer days, when the warm haze slept on the yellow-green grasses, with not wind enough to stir it; when the crickets sang in ecstasy and the hawk sailed high in the air; when the gophers worked busily among the nuts and the trees stood as in a dream; days when the sky was bright as a sword and the wind was abroad like the rush of an army; when the grasses tossed and wallowed, and the poplar groves grew full of song and rustled and hummed and roared overhead; days when the ducks began to thicken as they flew from pond to pond, and occasional cranes swept solitarily by, far up in the central glow of the sky.

There were rainy days, too, when the rain struck slantwise across the plain where the cattle fed, tails to the wind, and the colts stood in the lee of the groves dismally, with broad tails blown forward and mane covering their eyes; long days to the boy, who sat in his rubber coat on his horse in the grove, listening to the rain spattering lonesomely in the leaves, feeling the gray showers which the impatient branches flung down upon him.

On such days how cheerful the kitchen fire seemed to the wet, cold and hungry herdboy coming home at night through the darkness and thickening rain, following the steady clank of the cow-bell!

But sometimes, when the prairies were dry and feed short, the cattle were watched in the fields and the boys took turns in patrolling the edge of the corn-field.

This was especially delightful, for the melon-patch was almost always in the corn-field and furnished just the kind of refreshment necessary. Great, luscious Mountain Sweets, pink Peerless and the delicious green-fleshed cantaloup lay there, just waiting for the boy with a knife.

What pictures and sounds that melon-patch calls up! They are an interminable series. I can hear the vast,

multitudinous rasp and rustle of the ripening leaves, turning straw-colored under the frost and sun. I can see the long colonnades and feel the leaves brush against me as I run swiftly between the rows, leaping the leaning stalks, dodging the pumpkin-vines. The dry tassels shake over my head; the heavy ears, beginning to droop, touch me on the shoulder as I pass in zigzag flight to the centre of the field, where the melons lie in green and yellow toothsomeness amid the frost-seared leaves.

Boys are like bees in some ways. They extract the honey of delight from most ugly-looking flowers sometimes; and when the herdboy sat in the sun on the lee of the corn-field and ate his melon or carved his jack-o'-lantern, while the wind roared and the muffled cow-bells told the cattle were in the stubble, he was happy.

The boy of the town or city would have died of loneliness; but this boy, thrown back upon himself and on nature, succeeded in being quite happy most of the time, though there were times when a longing for company made even the sight of the distant plowman a comfort.

And when John came over to share a melon with the cowboy an hour of boyish fun followed, so delightful that it seemed only fifteen minutes, though the horses knew they ought to be busy. But it wasn't their business to say anything!

For the months of August, September and October, alternate plowing, herding the cattle and digging potatoes formed the boys' work, broken only by the county fair, which was all pleasure, and by the threshing season, which was mingled joy and weariness.

The corn was slowly ripening under the mighty alchemy of the frost; and usually before October was gone the husking began.

Husking in the West is quite different from husking in the East. The corn is left standing in the fields till the other work is done — till the ears are dry enough to shell. Then

the teams, with huge wagons, drive into the rows, and the men walking beside the wagon husk the ears and throw them into the wagon. When there are more than two men with a wagon the wagon passes over a row. This is called the "down-row," and is the boy's row.

The boy of ten or twelve is expected to keep up the down-row; and very hard work he finds it sometimes, when the cold wind has numbed his face and wrists, and the frost has wet his mittens and chapped his quivering hands.

At first it was beautiful work — on a fine, clear October day, when the ground was dry, the sun warm and the stalks tall and straight. But even then the fingers soon got worn and tender, the husks chafed the wrists, and the incessant action made the arms ache with fatigue.

Ah! that interminable row of stalks — I shudder at it again. But John is there, and father is there with cheery words, and Rover is there; poor old Rover, who bade me good-by at the gate, never to see me again! Rover looks into my face with sympathy, which says, "I wish I could help you."

The leaves stream in the wind like pennants; the silks twine round my wrists like tresses of hair, and the heap of yellow corn slowly rises in the wide box — and the darkness falls.

These are a few of the pictures which pass before my eyes as I hear the north wind snarl amid the elms and twang at the electric wires and howl weirdly at the eaves and corners of the house. I have heard the wind in the grasses without being wet, have eaten up the melons again, have watched the cattle without being lonely and husked corn without being tired; and I am half-sorry it is all a musing, and that I am a middle-aged man in a world of care and struggle such as the boy never knew.

The boy dreamed the man would be happier, and now the man dreams the boy was happier. Who knows? I don't.

HAMLIN GARLAND.

Ranch Life.

The word ranch is a contraction of the Spanish word *rancho*, which means a hut covered with branches or thatch for herdsmen, or a farming establishment for the raising of horses and cattle.

On the Plains and in the Southwest the word has come to be applied indiscriminately to all farms, whether the land be used for grazing or for agricultural purposes.

The word has a seductive sound. It suggests beautiful and picturesque surroundings, green trees, running streams, and a life of freedom and plenty; and I shall not soon forget the disappointment with which I first looked on a Colorado ranch.

I saw a small, unpainted house, a story and a half high; a few outbuildings built of logs in the roughest manner; no fences, not a tree in sight, not a bush; chips and other litter all around; tin cans lying about in abundance; a most desolate-looking spot, with discomfort and deprivation staring one in the face at every point.

This was a cattle-ranch. The proprietor of it owns several thousand head of cattle. He himself lives in a good house in Colorado Springs.

This is the most comfortable way to keep a ranch: put a man, or men, in charge of it, and live yourself where you please, visiting the ranch often enough to see that things are in order. But of course this method is possible only to persons with means.

The principal grazing sections in Colorado are along the Platte, the Arkansas and the Republican Rivers, but the plains in all sections are thus utilized. Some of the parks lying high up among the mountains also afford fine ranges.

To the eye of a stranger, nothing could look more unsuited for grazing than the bare brown stretches of the

Colorado plains. But there is a sweetness and nutrition in the low, dried grasses which is wonderful. No hay that is made can compare with these grasses dried where they stand and ready to be nibbled all winter.

To a stranger nothing could seem more improbable than that cattle should thrive, running all winter long unsheltered, uncared for, in a country where the mercury frequently falls at night to zero, and below, and where snow often covers the ground to the depth of several inches. But the facts show that the cattle do thrive under these conditions.

Sheep in the Snow

They are very thin in the spring, and exceptionally severe snow storms in March or April will kill off some of the feeblest; but at the end of the year they make, on the whole, fair returns, and there are many cattlemen in the state who are growing steadily rich.

The same is true of the sheepmen, though this business is subject to greater risks and fluctuations. When heavy snow-storms come, sheep are helpless; they are silly, also, and sometimes in a single flock hundreds will be stifled to death by trampling each other underfoot in haste to get the food which has been thrown down for them when they have been driven in after a long storm.

One winter in Colorado was exceptionally severe, and thousands of sheep perished in the snow. The sheepmen took warning, and put up sheds on a large scale.

It would seem a simple matter of humanity, as well as policy, to provide them. Cattle can run before a storm, and

it is said, will often run forty miles to escape one; but the poor little sheep are too clumsy and slow; they are soon snowed in and under.

Life on the larger and more remote ranches is lonely and monotonous to a degree which, it must be admitted, can hardly be wholesome for either mind or body.

The daily life of a herder of sheep, for instance, seems but one shade above that of the sheep themselves. He takes his flock out at daybreak, stands or lies still, watching them while they feed, drives them back to the ranch at night, cooks his own supper, washes the dishes, and goes to bed at nine o'clock, too tired to keep awake longer. This routine is varied by an interval of very hard work in the shearing season, and during the weeks when the lambs are born in the spring.

If the ranch is near a town of size, he goes, perhaps once a week, to that town to buy what he needs; but the larger ranches are all remote from towns, and must necessarily be so, in order to secure sufficient range for large flocks and herds.

For a ranch sixty, seventy or a hundred miles distant from its centre of supplies, purchases must be made by wholesale two or three times a year, and the ranchmen will have no intercourse with the world except at these times, and when chance travellers pass by their place. A primitive and genuine hospitality is kept on most ranches; all travellers feel free to stop at them, and by no means the least of the fatigues of the ranchman's life is the preparing meals at any time for as many as happen to come.

These are some of the drawbacks on ranch life. On the other hand, there are advantages by no means to be scorned; open air, year in and year out; freedom from all conventional and troublesome customs; independence and the indefinable exhilaration which almost all men find in a wild and untrammelled life.

The cattlemen for a great part of the year have little to

do, except to keep their buildings in order and attend to the few animals they keep with them. When the cattle are to be gathered together, branded and counted, or driven from one range to another, then the cattleman rides, day after day, as madly as a Bedouin in the desert.

There is probably no better riding than can be seen at the summer round-ups, where dozens of vast herds of cattle have been gradually driven in from their ranges and collected in a dense mass in some open place, for the owners to pick out their respective cattle. Any cow or steer found unbranded then can be taken possession of by any one; such cattle are called Mavericks, and there are more of them than would be supposed; they might be called Ishmaelites among cattle.

A Lonely Ranch.

As the ranchman prospers, he adds building after building to his ranch. You may read the history of many ranches in the successive stages of buildings, from the roughest of log cabins, which was at first the dwelling and is now merely an outhouse for tools, implements, etc., up to the two-story wooden house, possibly clapboarded, which was at first the dream and is now the home in which the ranchman's wife takes pride, and in which you will find one or more carpeted rooms, a rocking-chair or two and a newspaper or magazine.

I know one ranch, a sheep-ranch, in which the record runs farther back than the log house; it runs back to a dugout, a sort of compromise between a cave and a huge oblong ant-hill, in which the resolute sheepman lived, or rather burrowed, for

more than a year, when he began his ranch life, like David, with a few sheep in the wilderness. Now he is the owner of two ranches and many thousand sheep.

The one chief and greatest objection to ranch life is the food. This need not be so bad, but there seems an unconquerable tendency in men living lonely and isolated lives, and doing with their own hands all the work to be done in the house, to shirk cooking, adopt the easier methods and fall into a dreary monotony of diet.

The difficulty of procuring any variety of fresh meats, also, is another trouble which it is easier to evade by a perpetual recourse to ham and bacon than in any other way.

The trouble of milking cows and making butter is also very easily evaded by going without both butter and milk ; and it is no uncommon thing to find a ranchman owning many hundreds of cows and not milking one. All these things are to be taken into account by people who are often recommended to go out on some ranch and rough it for a year.

But after all is said and summed for and against ranch life, there remains a certain element in it which can be neither said nor summed ; and whose worth each individual will reckon at his own individual valuation, and cannot safely estimate for any other man. It is the nearness to nature, the remoteness from man, all of which goes to make up his outdoor life.

What the Bedouin knows of the desert he could never tell ; and the ranchman would probably find it quite as hard to give reasons for his love of ranch life.

HELEN HUNT JACKSON.

Cowboys of the Plains.

There is little of romance attending the real life of the Western herder. It is about as hard a life as a young man can undertake, unless he enters upon it with his hands full of gold; even then it is no boy's sport, if he is really in earnest.

I know a graduate of one of our great Eastern colleges, a young man of culture and fortune, who went to Colorado with sufficient money to buy and stock a large ranch. He was wise enough to know that success depended upon strict attention to business; and out of a home of luxury he stepped into a hut, where to-day he cooks his own breakfast, washes his own clothes, sleeps hard and works hard, all as cheerfully as if he had never known a life of less hardship and toil.

In summer he starts off before sunrise, with a piece of jerked beef at his saddle-bow, to ride all day among his cattle, seeing that they do not stray too far from good feed and water; returning only at night, to cook and eat a hasty supper, and throw himself, weary, but thoroughly contented, on his hard couch.

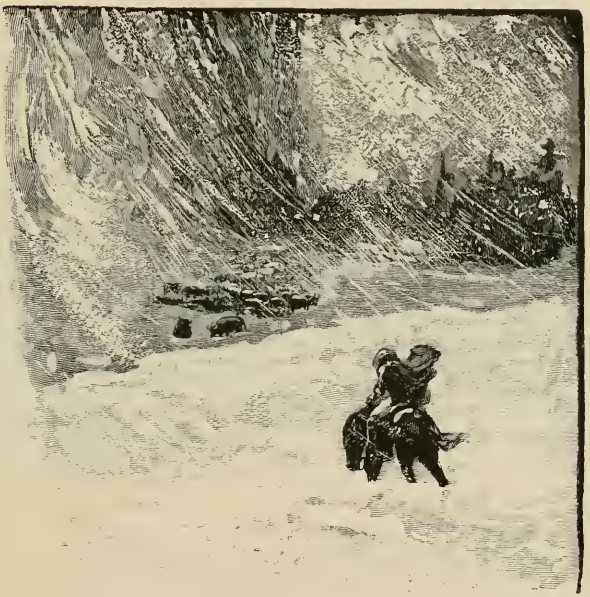
Sometimes he does not come home at all for days. Often in winter he rides up into the mountains, among the canons of which his cattle find shelter from the storms, and sleeps on the snow, wrapped like an Eskimo, with just a breathing-hole in his blanket, resting comfortably, with the temperature of the Colorado night sinking below zero.

This is the life of his choice. But he is his own master, and the master of other men. There are other former college boys who are now cowboys, but only a small proportion of them have his immense advantages.

He acts as his own foreman, thereby saving a great expense. Foremen on large ranches command high wages, often a share in the increase of the stock, but it is only an

experienced, able and fortunate man who obtains a situation of this kind.

The ordinary herder works hard under strict discipline, obeying orders like a soldier, for thirty or forty dollars a month. A good roper, however, gets more. A roper is one who can throw the lasso and capture a steer stronger than his horse. It requires skill and agility to do that.



The Cowboy in Winter.

By saving his wages and investing them in cattle, the cowboy may in time get a small herd of his own, which will rapidly grow to be a large herd. Many prosperous ranchmen have begun business in this way.

But the majority of cowboys remain cowboys until they wear out, or weary of the work and turn to something else. The hard life they lead induces reckless habits, and drink is

the curse of many a generous fellow, who without it could not fail to become an honorable and useful citizen.

The traveller notices a great difference among cowboys, in different sections of the country, in respect to sobriety. Here, as a class, they are steady and industrious; there, reckless and dissipated almost to a man. It seems as if a few strong spirits among them influenced the rest, for good or ill. Hence the danger which every young man incurs who leaves family and friends and becomes the daily associate of a powerful, generous, jovial, but too often unprincipled set of men.

To a "tenderfoot" who comes among them, timid and complaining, afraid of hardships, they can be rough enough in their fun-making. But a stranger exhibiting quiet qualities of pluck and endurance will find them as kind and helpful as brothers.

In winter the cattle on open ranges are mostly left to take care of themselves. They get together in immense, straggling herds, from different ranches, feeding on sage-brush, dry buffalo-grass and bunch-grass, and drifting with the storms, protecting one another by the mass in which they move, until they strike the mountain or some sheltered vale. Travelling through western Kansas, I saw the carcasses of thousands of cattle lying on the north side of the fences bordering the railroad track, where their drifting had been intercepted by the fence, and they had perished from cold and starvation.

It is the business of the cowboy to prevent, if possible, such calamities. Then in spring comes the general round-up. The herds of various owners are all mingled together; and some have strayed twenty or thirty or more miles from home. The country has to be scoured two or three times over, to bring in all the stragglers from the gulches and small streams; and weeks are spent in bringing all together in one enormous bunch.

All the herders of the region unite in the work of the round-up. They travel in companies, each with its cook and camping apparatus, carrying their canned food with them,

even their canned milk, if they wish milk for their coffee; for one thing a cowboy never does is to milk one of his herd.

If they wish for fresh meat, they may, perhaps, shoot an antelope or deer, where such wild game still abides. Otherwise, they choose a Maverick out of the herd for the butcher's steel. A Maverick is an animal that has no brand; so-called after a

The Work of the Round-Up.

man of that name whose herd, it was noticed, increased magically, and who was found to make a business of picking up stray cattle that bore no owner's mark.

If no Maverick is handy, they choose any well-conditioned steer, kill and eat it, crediting it to the owner whose brand it bears.

The round-up has reached its most important stage when all the cattle of that part of the country have been bunched. Then comes the work of cutting out. The most skilled of the cowboys ride in among the frightened and bellowing herd and

separate the different brands, cutting out with wonderful dash and rapidity the cattle of each owner.

The movement, the yelling, the bellowing, the rush of rider and horse, the flying rope, the running out of the selected animals,— all this gives great animation to the scene.

Occasionally, in the round-up, neither the brand nor the earmarks of a beast can be readily made out. In that case the rope is used, the creature thrown, and its sides washed, to bring out traces of the hot iron, which, once burnt into the flesh, are never wholly effaced.

The laws concerning the brands of cattle and sheep are very strict. In Denver there is an official register of all the legal brands in the state. No man is allowed to imitate another man's brand; and he must have his own duly registered. If he buys an animal, he at once adds his own brand to that of its former owner.

Cowboys become very skilful riders, and they are sometimes fond of showing off. In southern Colorado I witnessed some performances which were as good as any equestrian feats I ever saw. A cowboy rode through the streets of a small town at full gallop, picking up whatever was thrown in the way before him,— a hat, a whip, a handkerchief. This he did by stooping from his saddle, putting down one hand to the ground, while he held on by the other and by his feet, and springing up into his place again without even slackening speed.

Then he galloped through the streets, lassoing dogs, cattle, and even his friends. I noticed that the rope was gathered in a coil, with a noose at the end about six feet long; this was swung around the rider's head several times, and finally projected twenty or thirty feet, with surprising accuracy, at the object to be captured. A dog usually slipped his head out of the loop as it tightened, and ran away yelping; but a horned creature had to wait until released.

But the most exciting fun was when two cowboys, in picturesque hats and fantastically fringed leather leggings,

mounted on the briskest of ponies, attempted lassoing each other. As one flung his rope, the other would dodge it by dropping down on his horse's neck, or leaning over the side of his saddle; then he would spring up and fling his rope in turn.

Once both were noosed; then it was diverting to see the trained horses pull and back and brace themselves, and the men haul at the ropes, each trying to free himself and at the same time to drag down his antagonist. The horses seemed to understand the friendly game, and to enjoy it as well as the men, though they themselves sometimes got lassoed over the neck or about the legs.

I most earnestly advise every youth who is ambitious of being a ranchman or a cowboy to learn something of the trials and hardships he will have to undergo before attempting that new life; then, if resolved to undertake it, to set out fully prepared to encounter, with Spartan sobriety, hot suns, cold nights, and the hardest of hard fare and hard work. Unless his health is of the soundest, let him not risk it in the saddle and bivouac of the Colorado cowboy's life.

If he has money, and wishes to go into the business of cattle-raising, let him first learn that business on a well-ordered ranch. After a few months he may be able to decide whether it will suit him, or whether he can safely invest his life and capital in it.

J. T. TROWBRIDGE.

The Great Cattle-Trails.

When the government opened the Indian Territory lands to settlement it ended a unique feature of the prairies, the cattle-trails. These broad, hard-floored paths, two or three hundred yards wide, reaching away over valley and hill for five hundred miles, were the thoroughfares leading up from the vast feeding-grounds of Texas and New Mexico to the shipping stations of the North. The cattle that followed these irregular roads were worth millions of dollars.

From the start under Texas skies until the freight-train carried the last of the herd from the Kansas or Nebraska station, the herders lived in almost continuous excitement and severe labor. But the task was one that hundreds of energetic young men enjoyed, for the cowboy was a power when on the trail. Moreover, his position was often the starting-point toward the wealth and dignity of a cattle-owner, with a ranch and herds of his own.

The first trail across the Indian Territory was opened in 1867 by Joseph G. McCoy of Illinois, then scarcely more than a boy, after he had heard some stockmen talking of the peculiar condition of the cattle industry. The herds of Texas were increasing rapidly, but there was no way to get them to market.

Young McCoy went out on the railroad then partly built across Kansas, and after a long interview with the manager persuaded him to construct stock-yards at Abilene, the extreme western limit of the completed track. The manager had little faith in the project, but decided to give the enthusiastic visitor a chance.

McCoy sent out messengers, who rode toward Texas, seeking the cattlemen. For some weeks they journeyed through the Indian Territory, and were usually laughed at when they proposed driving cattle to the new shipping-point.

Nevertheless, one herd of twenty-five hundred head was turned northward, and the owners made such handsome profits that the business grew rapidly.

Thirty-seven thousand head were shipped that season and nearly eighty thousand in 1868. Thenceforth the business steadily increased and became permanent. The trails were

Herds on the Trail.

soon well-defined, and could be seen for miles, brown and dusty furrows, washed by the rains, flanked by drifted sand-banks, and sprinkled with skeletons of animals that had died on the road.

Individual ranch-owners sometimes broke their own paths, but nine-tenths of the north-bound cattle were driven over the established courses. During the height of the season the herds were so close together as to be with difficulty kept from

mingling. Five and even seven or eight thousand cattle were driven in a body. The narrow column, strung out for two miles or more, with its broad-hatted guards riding at intervals alongside, had much the appearance of an army on the march.

A peculiarity of cattle on the trail is that they arrange themselves instinctively in regular order. Once well under way, certain broad-breasted ones will be found always in the lead. Others will cause much annoyance by wandering from the line in search of novel experiences, while the weak drift steadily to the rear and are finally deserted, as prey for the skulking coyotes.

Not more than ten to fifteen miles a day were made by the herds, and many weeks were spent on the march. The cattle were guarded night and day by the herders in relays. A camp-wagon with cooking-utensils and sleeping arrangements followed the moving procession, and was the temporary home of the guards.

Added to his liability to attack when separated from his pony, the cowboy had to contend with the danger of stampede. To control five thousand fleet Texas cattle, having long, sharp-pointed horns, is no simple task, for at the crackling of a stick or the howl of a wolf every head may be raised, and the hairy mass run off in a blind panic. It is impossible to stop the herd by riding in front of it.

The common method of bringing the mad creatures to their senses was by riding on one side of the leaders, and gradually turning them until the herd was running in a circle. Then, however, another danger arose, that of "milling." This turning like a millstone wore out the less muscular animals, and it was necessary to stop it as soon as possible.

Sitting quietly on their horses, the cowboys would join in some old-fashioned hymn, singing lustily the pious words familiar in boyhood. One by one the whirling cattle would halt and listen, until soon the whole herd was quiet once more.

A soothing influence was attributed to any musical sound, and the herders had a custom of attaching a heavy bell to the

stirrup or saddle-horn, believing that the steady ringing made the cattle more tractable.

Frequently half a herd would be lost by a night stampede, the cattle rushing pell-mell off a bluff or into a morass. There was a feeling of relief on the part of both owners and cowboys when, after an outbreak of this kind, the great herd were peacefully grazing as before.

Sometimes a herd of buffalo would cross the trail in a wild rush from some foe, and it was with difficulty that the cattle could be kept from following their bovine cousins.

Indian attacks were always to be feared. Again, the exposure which came from all-night rides in the saddle through drenching storms was trying to the health. The rivers were broad and sometimes deep. Crossing them entailed no little risk.

Arrived at the shipping station at the northern end of the trail, the cowboy prepared for a period of enjoyment. After loading the unruly steers he was paid off for the year, and with his pockets filled with money he too often indulged in a week of dissipation.

In 1869 and 1870 half a million head of cattle were shipped from Abilene, and the next year a full million were driven over the trails. Other stations were now shipping, but most of the herds headed toward Abilene. For twenty miles in every direction they were pasturing on the plains through the late summer and fall. Never before or since in the West have so many cattle been massed in so small a territory.

It was an unfortunate season for the dealers. Spanish fever broke out among the herds, and the Eastern markets would not allow the Texas cattle to enter. Three hundred thousand head remained on the prairies of central Kansas when fall came.

Early in the winter, about the first of December, a three days' storm of sleet, which froze as it fell, covered the buffalo-grass with ice. The cattle died of starvation by the thousand, and their carcasses were skinned and left on the plain.

From one station fifty thousand hides were shipped, from another twenty thousand, and from Abilene thirty thousand. Hundreds of horses and a score of cowboys perished, and that winter is yet remembered as the most terrible in Kansas history.

After that there was no more boom in cattle-drives, but year after year from one to two hundred thousand head came leisurely over the trails, finding ready market. Even after the railroad had made its way through the Indian Territory the cattlemen kept the trails well worn, because they could, by driving overland, escape the semi-tropical heat of the South and save considerable expense in freight.

The cattle business is greater in the West to-day than ever. There are a hundred head where there was one during the palmy cattle-trail days, but they are scattered over the settlers' farms and the fenced ranches, instead of roaming the prairies.

In the Northwest, in Wyoming, Montana and Idaho, are great ranches, with their cowboys and round-ups and brandings. Trails lead from park to park, and along the foot-hills of the Rockies make highways for transferring cattle from the ranches of New Mexico to the northern feeding-grounds, where, after having spent the summer moving slowly over the prairie, they are fattened on the corn of Nebraska and Dakota. These paths, however, resemble little in size or use the original trails of the middle West.

Where the herds once crossed the Indian Territory, the settlers are planting corn and sowing wheat. But traces of the great cattle-trails will remain for years to come. Together with the weather-worn buildings, saloons and gambling-houses in the old time, the cattle-towns and the unmarked graves of cowboys in the prairie cemeteries, they are the visible tokens of a passing era and its attendant life.

C. M. HARGER.

The Language of Cattle-Brands.

The language of cattle-brands is very perplexing to a man who has never before met it. It is written on the hides of living cattle with a hot iron for a pen. A man may never have to learn to write it, but he may have trouble enough in reading it after it is written.

At present a large part of the branding is done with what are known as dotting-irons. There are two of these; one a straight iron bar and one a half-circle. With these two irons nearly any brand imaginable can be made, but necessarily only in a somewhat imperfect manner. When we consider the material and the instruments used in the writing, we cease to wonder that the writing itself is hard to read.

Suppose, for instance, that you were on your pony galloping across the prairie, and that about a hundred yards or more to the right you should see a steer with what look like scars on its left hip, something like these marks:  How would you tell what kind of a brand you had noticed? An algebra student might possibly call it minus or plus T, but the ranch foreman would only stare and wonder what that meant. He himself would probably say something like this:

"Say, pardner, I noticed one of them barcrossty steers back in that bunch yonder."

Probably the reader may not remember ever having heard the word barcrossty before; Noah Webster was equally ignorant when he compiled his dictionary. There are many other words used on the stock-trail that he never heard of. However, it is written on the hips of thousands of cattle on the plains as clear as can be. Look at the brand again: bar-cross-T. How could it be made any plainer?

Suppose, again, that a muscular-looking man with two six-shooters in his belt should bring his wiry little bronco to a halt and address you thus:

"Hold on there a minute, pard. Have you seen any of them nail-shoe-nail steers over on your part of the range?"

Would you know how to answer him? Probably not, for the brand which he refers to is made like this:  That half-circle in the centre is supposed by courtesy to be a horseshoe, while the two straight lines sticking out at each end are nails. So you can clearly see the nail-shoe-nail.

Now the reader has got this much of a start at learning the language, let him try to read this brand:  It is the shoe-bar brand, and is used by one of the wealthiest stockmen in Texas. It is quite easy to read, after you know how to read it. You will have little or no difficulty in reading two more simple brands:   Cattle that wear the first sign are known as the anvil stock; those bearing the second mark are the circle-bars cattle.

 Here is still another brand that may possibly be harder for you to read. It is the brand of a wealthy stock-owner whose name is Mr. Drake. It is supposed to be the picture of a drake, or duck. It is merely a matter of justice, though, to remark that the likeness is a gross libel on Texas ducks. It does not look like them at all.

 Here is another brand, in which the likeness is not much better. This is the turtle brand, and it takes two impressions of the half-circle and six of the straight bar to make it. Two of these latter are for the head and tail; the other four are for the legs.

Of course many of the brands in use consist of letters and figures, but these have been used so often that a new combination is difficult to find. Moreover, most letters can be added to or changed until the original brand is lost sight of. Changing brands was formerly one of the most frequently practised methods of cattle-stealing.

The story is told of a man named Charles Upton who came to Texas shortly after the war, and took for his brand C U. A dishonest neighbor settled near him and took for his brand I C U. Thus by merely one stroke of his iron he

got his brand on many of his neighbor's cattle. The first man then changed his brand to I C U 2. "I see you, too." By using the additional characters he got back all his original cattle with good interest.

A few years ago a thrilling story was told in The Youth's Companion of the recovery of a large herd from cattle-thieves who adroitly changed a brand of two letters. The owner, Joseph Villemont, marked his cattle with his initials, JV which, by the skilful addition of only three straight lines, the clever stock-thieves changed to this brand YN and at the round-up claimed all the bar-Y-N stock. Their dishonesty was discovered by an acute cowboy, who recognized in their herd a J-V steer with which he had had a tussle some time before.

It is to prevent such dishonest practices that some of the brands have been brought into use which I have described. They may seem unnecessarily complicated, but they show the owners' determination to secure a mark that cannot be easily disfigured, and that shall prove entirely distinct from all previously registered brands.

P. W. Horn.

Breaking a Bronco.

Anna's first view of the performance called breaking a bronco was from a corral fence. She sat out of harm's way, on the farther side of the cattle-shoot, a little enclosure leading into the corral.

The two young men, or boys, looked quite picturesque. They wore stiff, seatless, leather trousers with fringed seams, for protection against barbed wire, sharp stones and the like. The usual far-western gear, flannel shirts, sombreros and buckskin gloves, completed their dress.

On this occasion John took a well-broken horse named Stub, collected, or rounded up, a bunch of eight animals, and drove them into the corral. It was amusing to watch the boys circumventing these horses till all were within the gate. Then Stub was tied without, the bars put up, and John and Carlos walked into the corral.

After several vain attempts, John lassoed a dun mare, which they were especially anxious to break, passed the loose end of his rope around the snubbing-post and held it tight. Carlos speedily noosed the mare also. He then let the other horses into the pasture.

The boys, to tame the dun, concluded to choke her down. Carlos kept behind her at a safe distance, holding his rope taut, and gradually drove her close to the snubbing-post. John drew his rope shorter as fast as she approached. The dun, with both ropes around her neck, stood breathing hard. Carlos pulled on his rope, choking her, and she soon lay down. He ran and knelt on her neck.

She threw up her head a few times, but made no other resistance while he pulled her jaws open and proclaimed her a three-year-old.

He next loosened his rope on her neck and knotted it securely at the chest. Then he caught her right hind foot in

a noose and tied it firmly. In his hurry he had made a mistake and caught up the wrong hind foot. A horse is broken from the left side, as it is mounted from that side. However, as the dun was evidently not fierce, it was decided to let the rope remain as it was.

All this time John had been holding his rope steady on the other side of the post, in case the dun should try to get away. Now he secured it and came round to help Carlos.

They tied a blind, or cloth, just above her eyes. Then Carlos rose from the dun's neck and tried to scare her up. She would not budge, but lay and groaned till Anna thought she must be dying. The boys said she was only sulking.

As she persistently refused to rise, they used the blacksnake whip on her, but to no purpose. So John pulled her head up by the snubbing-rope and Carlos pushed her from behind. She gave a wild scramble, and stood erect on three feet.

A Three-year-old.

While Carlos had been on her neck he had patted and rubbed her, to gentle her by degrees, but she did not like it — wild horses never do.

When she was standing, Carlos gradually approached her to draw down the blind above her eyes. She backed off as far as she could till choked by the noose that was around her neck and secured to the snubbing-post. Then she lay down again.

They hoisted her up once more, and blinded her by pulling the cloth down over her eyes; then John threw on the saddle-blanket and the saddle. She immediately lay down and refused to move, even when they raised the blind. The boys took a brief rest, while she groaned continuously.

They lifted her again till she scrambled up, when the

saddle was quickly cinched, or girthed. As they finished, she lay down again and began to groan dolefully.

A bridle was placed in her mouth, and the rope confining her foot taken off. She was allowed to lie and groan while John brought up a red colt and turned him into the pasture. When he returned, the dun had discovered that her foot was free, and she was standing.

John brought Stub to a convenient spot, removed the snubbing-rope, and pulled down the blind over the dun's eyes.

Getting Ready to Ride.

Then he led her into the road by tugging at the bridle, while Carlos went behind with a whip and touched her when she balked.

Carlos took the bridle and sprang into the saddle. John pulled up the blind and jumped aside. Away went the dun, racing across the prairie. Whenever she came too near barbed wire or other danger, John, on Stub, headed her off.

Half an hour's hard running tired her out, and John drove her again into the corral. The bridle was of no use to guide her until she had had several breakings-in, but it was useful in holding her head up to prevent her bucking, or leaping up

and coming down on her forefeet. To buck thoroughly a horse must get its head down to its knees.

As soon as they were in the corral John dismounted from Stub and held the dun's blind down while Carlos sprang off. It took over two hours to tire her out this time.

There is as much difference in horses as in human beings, so bronco-breaking was an ever-novel sight to Anna. She learned that there were in the West professional horse-breakers, who go about breaking broncos for from three dollars to eight dollars per animal, riding each horse from two to six times. It is a hard life, and soon cripples a man.

The next horse the boys broke was named Texas. He took the process very calmly, but after he had been used several times he proved a bucker. For his first experiment he chose a time when Carlos was alone and remote from assistance. Carlos stayed by him, but with some difficulty, as he was not expecting such behavior.

Texas was not choked down, but after being snubbed up was caught by the hind leg and thrown. This is the method usually employed with a full-grown animal.

It is said by old bronco-breakers that a horse is easier to conquer if he bucks at first. He then learns thoroughly that his rider is his master. An animal that bucks after being in use becomes, if he succeeds in unseating his rider, very hard to cure of this habit. He is then known as a spoilt horse.

HESTER WASHBURNE.

A Chase for Wild Horses.

Toney lived on the plains near the famous North Platte River. One day, while following some thievish Indians, he discovered a number of wild horses, and planned to capture the whole herd.

He told his discovery to several friends whose lives were spent in the saddle, herding horses and cattle, and who owned tough, wiry broncos. It was agreed that a concerted effort should be made to secure the herd for the good price they would bring in the local market.

The men assembled, as agreed upon, and with six or seven days' rations for the party and forage for their horses in a wagon, they started for the Blue Water, which they reached in a day's march. Here they camped on the stream and gave their riding horses a good rest, while on the next day two men with the horses from the wagon rode up the valley to locate the herd. Although the horses did not appear, their fresh tracks were seen, and the two men returned to camp to report the fact.

Before the sun had set that day, four of the horsemen, with their blankets tied behind their saddles, left camp and ascended the valley to the place in the creek bottom where the tracks of the wild horses that came to drink in the morning and cool of the evening were thickest. Posting one man in sight of the drinking-pool, the others took positions down the stream about a mile apart, in such locations that the horses could not drink without being seen.

Their purpose was to keep the wild horses from getting a drink that evening or next morning, so that on the morrow's run they would be at a great disadvantage, compared with their own fresh horses.

One of the men saw them trooping down as dusk was coming on. He let them get very near the water, then

frightened them back ; not violently, but just enough to make them take to the hills. In about a half-hour they came cautiously back, stopping every minute or two, with ears pricked forward, to survey the scene, especially where the horsemen had appeared.

The Wild Horses.

Again he allowed them to approach near to the water, when he slowly rode toward them, and they trotted rapidly away as before.

Soon darkness set in, and as these animals never travel at night it was fair to presume that they had gone to rest with-

out their evening drink, a deprivation to which they were not altogether unaccustomed. Having discovered where the wild horses came to drink, the scattering line of men drew together at this point, partook of a cold supper, picketed their horses on the best patches of grass near by, and, spreading their blankets on the ground, went to sleep.

At the first break of day they arose, ate their breakfast cold, and with their horses saddled, waited for their prey. They strung along the stream, but not so far apart as before, for when the wild horses put in an appearance again they wanted to be near enough for concerted action. They had not waited very long when the horses came over the hills and down into the valley, toward the stream, with an assured walk, as if they felt certain that their annoyance of the evening before must have had ample time to get away.

When the horses were about to drink, they were turned back toward the hills and followed by the nearest two men at a slow trot. The other two men now mounted and walked their horses to the top of the nearest high hill overlooking the country for miles, and there sat down to wait. The horsemen following the herd rode at a trot to the crest of the hills, where they saw them on a distant ridge, probably a mile away, and turned toward them.

Again they followed at a trot, the intention being to allow them no time to graze. This desultory and long distance chase was kept up until the wild horses had been followed some twelve or fifteen miles to the northwest, when the two horsemen, by making a wide detour, got around them and started them back.

Now the chase was made much more energetic, and the whole caravan was kept at a good swinging gallop, till the two horsemen recognized that they were very near the Blue Water again, when they pressed the panting wild horses at a fast run, although they were not able to get closer than four or five hundred yards. Lathered with sweat, the pursuers and pursued reached the Blue Water, and as the latter gained

the crest the second set of men took up the chase, giving the wild horses hardly time to breathe, and running them over the same course.

Hardly two or three miles had been made before it was seen that the wild horses could be easily turned to the right or left; and after a mile or so was added to this distance they were sent back, and once more approached the fated hill, with their pursuers not a hundred yards behind them. The two men on the hill drew cuts for the next run, for the horses were so well in hand that a single horseman on a rested animal could easily control them and direct their movements.

This single rider hardly chased them a mile before he turned them and brought them back, almost as hard as he could press them, not ten yards in their rear. The next man, when he desired to turn them at the end of his chase out over the rolling prairie, simply dashed through the exhausted herd, and when sighted coming back he was seen lashing the rear ones to keep them going.

The two most tired horsemen now returned to camp, leaving the freshest at this alternating pursuit; and when the wild horses, thoroughly tired out and tamed down, could be driven in any direction whatever, as if they were so many domesticated cattle, these two turned them toward the camp, keeping them at a gait that gave them no rest.

When they passed the camp, the other horsemen had exchanged their animals for fresh ones, and taking the herd in hand they drove them across the North Platte River so fast that they could not drink. They were followed by the entire camp, wagon and all, for the fastest speed the horses could possibly maintain now was only a good dog-trot.

At the close of the day they had the satisfaction of driving the whole herd into a cattle-corral at a railroad station, some fifteen miles distant, and before the sun had set the next day they sold them to a wealthy ranchman.

MAX OWEN.

Ancient Farmers and Sportsmen.

Long before Columbus claimed this continent for his sovereign, thousands of steady, patient, industrious farmers tilled the soil and planted wheat in Texas. They were dwarfs in size, but having six legs, were capable, perhaps, of enduring as much fatigue as larger beings. They were dumb, but possessed a silent language quite as eloquent and intelligible to each other as any taught in asylums for deaf-mutes to-day.

The prairies of southern and western Texas are dotted all over with little knolls that look like bald-headed men, because their sides are covered with herbage, while their tops are bare. The baldness is caused by ant-hills. If you examine one of these knolls any time after the middle of January, and sometimes even earlier, you will find the summit alive with ants who are farmers.

Some are carrying off the accumulated débris left by winter winds and rains, some are turning up the soft earth with their mandibles, others bringing up tiny grains from the granaries underground, and still others planting these grains in the earth.

A few weeks later, if you should ride over this same prairie, you would find every knoll crowned with a little circular patch of tender green. It is the young ant-wheat.

A nearer view will show you the farmers still at work, though not in such numbers. They cut out every weed as soon as it appears, and drag it out of the field, which is generally about three feet in diameter, forming a solid wheel, of which the entrance to the ant-hill is the hub, and a narrow, beaten path on the outer rim the tire. Weeds, sticks, everything that hinders the growth of the crop is carried beyond the tire of the wheel.

But perhaps the strangest sight of all will reward

inspection when the wheat is ready for harvest. All the available working force of the farm is brought out. The wheat is now from three to six inches high, according to locality and fertility of soil.

A tiny granger selects his stock and, climbing to the top, cuts off the highest grain of wheat and brings it down. A second granger takes it at the foot of the stalk and carries it to the hill, where a third receives and takes it down to the barns, which are underground.

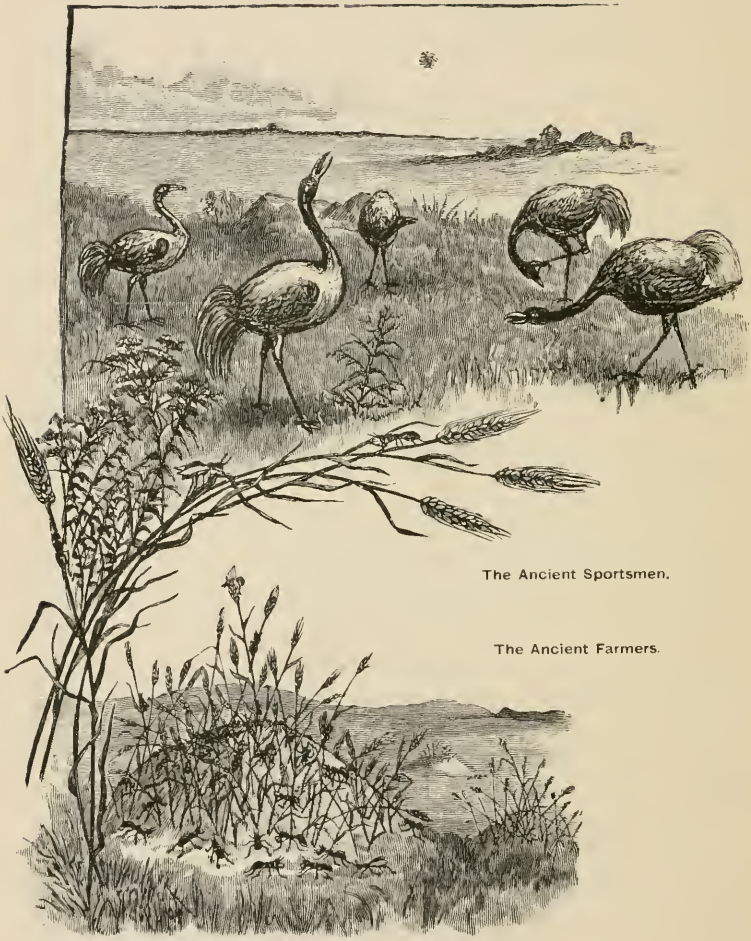
These barns are oblong cells, with arched ceilings, and walls smooth as marble and perfectly waterproof. One hill will have a large number of barns, and these are usually all full at the end of the harvest. One, and sometimes two barnfuls are saved for seed.

When the crop is harvested, every stalk is cut down and carried out of the field. Sometimes two crops are raised in a year. But the farmer is not idle after harvest. He gathers leaves for the winter quarters, having first brought out all of last year's bedding, and does a hundred little chores; in fact, the Texas ant works pretty much all the year, and doesn't hibernate, like the New Mexico planter.

In the South we call a man who raises only grain a farmer, and one who raises sugar, or cotton, or both, a planter; therefore I call my New Mexico agriculturist a planter. Perhaps he came to this continent with the Texas farmer, and being more adventurous, pushed farther west; or perhaps he came the Pacific route, and fled eastward with the Indians from the Spaniard. Anyway, he is nearly related to the Texas ant, although the latter is red and larger than the Mexican, who is nearly black.

When I went to New Mexico I thought I had found my old Texas friends in that odd and surprising country; for I saw the round fields in every direction. But a nearer view showed me it was not ant-wheat that flecked the arid mesa and rocky canon with pale green disks.

Week after week I watched these little plantations up in



The Ancient Sportsmen.

The Ancient Farmers.

a canon fifteen hundred feet above sea-level. Instead of wheat-stalks, they were covered with a small spreading plant, which grew close to the ground, one plant sometimes covering an area of four inches, sometimes two or three, but never more than an inch and a half high. As the summer wore on, a white veil spread over the delicate green of the little fields, until they looked like patches of snow.

Every day I watched the planters for hours. One August morning I saw unusual bustle and activity in a plantation near my window, and going to my usual post of observation, a very large ant-hill on the side of the mountain, I found my planters picking cotton! By this time the little plants were entirely covered with a soft white furze, and hundreds of ants were stripping the leaves and stems of their fleecy robes.

I have seen many cotton-fields picked in my life, but none left so clean as these. The leaves of this cotton plant are about half an inch long, cylindrical in shape, and about the thickness of a pencil-lead. One ant would strip five or six leaves and carry the cotton in a loose ball on his head down into the hole. He did not shift his burden, as the Texas ant does, from one to another. By what process he himself was picked of the tiny particles that clung to his legs and mandibles I do not know, but I do know that every ant coming out of the nest was spick-and-span clean.

After the cotton was all picked the leaves were cut off and carried into the nests, and the stalks cut down and hauled off.

When my parents moved to Texas, in 1840, it was little better than a wilderness. Wild animals hardly deserved that epithet, they were so tame. I suppose that nowhere in that vast state could now be seen the very extraordinary performance I am about to relate. I never saw it before or since, but I certainly saw it then, and so vivid is the picture in my memory that I seem to see it now as I write.

We were travelling from Houston to Grimes County, bowling along at a brisk trot over the smooth prairie-road in the cool of the morning. Suddenly the carriage stopped and

the driver cried, in a frightened voice, "Look at the cranes playing ball!"

On the bare top of a knoll on the right of us, and quite near enough to be seen distinctly, was a group of five cranes of the kind known in Texas as sand-hill cranes. Four of them stood at equal distances apart, forming a square, and a fifth stood off a few feet from the players, as if keeping tally. The four players were tossing a ball, high in the air, from corner to corner, catching it as it came down, and passing it on in like manner. One would catch it, toss it up toward his right-hand neighbor, and so on.

After watching them for about ten minutes, we found out what the fifth crane was for. One of the players missed a ball; it could not have reached the ground before the fifth crane caught it, when the unlucky loser stepped out, the odd crane took his place, and he waited in turn for a miss from some other player to get in.

I do not know how long we sat there enjoying this novel game before father's curiosity to see what sort of a ball they had, caused him to ride up to the enthusiastic sportsmen. He almost touched them before they saw him, and with a loud "ky-ank! ky-ank!" they flew away.

The ball proved to be a hair ball, such as all Texas cattle-raisers know and dread. They form in the stomachs of cattle, and are always fatal. Near the playground was the dried carcass of the animal in which, no doubt, the cranes found their plaything.

AURELIA H. MOHL.

The Water Cactus.

We sometimes read, in narratives of travel and adventure in the deserts of the Southwest, that men in the last extremities of thirst have saved their lives by obtaining water from a species of cactus called the Fish-Hook Cactus, or Water Cactus.

This plant when fully grown bears a general resemblance to the Giant Cactus, and both varieties are frequently found growing side by side. But the Water Cactus is readily distinguished from the other by its broad, flat spines curved like fish-hooks, while those of the Giant Cactus are slender and tapering, like needles.

Another distinguishing trait is noted in the ridges from which the spines protrude. On the Giant Cactus these run perpendicularly from base to apex, like the fluting of an Ionic column; while on the Water Cactus they ascend the shaft in spiral fashion, giving the plant a marked corkscrew appearance.

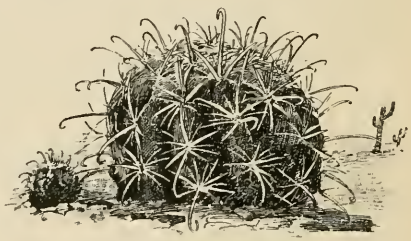
During the first few years of its growth the Water Cactus is spherical or globular in form. Its subsequent growth is a gradual elongation upward, so that it becomes ovate in form, and finally cylindrical, attaining a height, when full-grown, of six to seven feet, with a diameter rarely exceeding fourteen to sixteen inches.

To be able to find and recognize the plant is not enough; one must know how to make it give up the life-saving fluid; and this is by no means an easy task. The pulpy interior is enveloped in a skin more impenetrable than the toughest leather, and further protected with an array of stout, wiry spines, so springy that the largest rock thrown against them will violently rebound, leaving them uninjured. No animal save man can make any impression on this porcupine of the vegetable kingdom; and even man, unless provided with

fire, as well as an axe or stout-bladed knife, would find it impossible to penetrate one.

There is but one method of dealing with the spines, and that is fire. They burn like tinder, taking fire readily from a few dead leaves or straws ignited at the base of a cactus on the windward side. The flame spreads rapidly from spine to spine, consuming them instantly with a fierce, crackling blaze; and in less than one minute both fire and spines have disappeared.

Then it only remains to chop or cut a segment from the top of the now denuded cylinder, and scoop out a basin in the soft, spongy interior. By continued pounding with the back of the axe, water enough will ooze into the hollow to satisfy the thirst of twenty men.



The Water Cactus.

Should the searcher after water be provided only with a knife, as is generally the case, the job of effecting an entrance is long and tedious, for the tough rind cuts no more easily than a tin fruit-can; in fact, it is more difficult to cut, as it does not present so firm a resistance to the knife.

The entire inner portion of the cactus somewhat resembles the white of a watermelon in consistency, but is more springy and fluffy. One may squeeze water from it as from a sponge, water, too, that is quite cold and refreshing, so impervious is the tough skin, even to the blistering heat of the sun, that may have been beating down on the plant all day.

Those who have never suffered thirst on a scorching desert cannot readily imagine the delicious sensation experienced in squeezing a lump of this cold, snow-white cactus heart in the mouth, when one's throat is on fire and one's lips parched and swollen.

It must be acknowledged, however, that this cactus-water is really palatable only when one is extremely thirsty. One summer, while prospecting a difficult mountain-range where no other water could be obtained, I depended for nearly a week on these cacti alone; and I grew so weary of it that I almost preferred going thirsty.

The water, when first obtained, has a whitish, smoky tint, though it settles clear as crystal in an hour or two. It has a flavor, when one is not thirsty, somewhat like raw potatoes. This becomes extremely disagreeable after a while, and is not removed by boiling; though it is not noticeable in tea or coffee, nor in bread.

However, beggars cannot be choosers; and one who is reduced to the necessity of partaking of this cactus beverage is not generally in a critical mood.

P. C. Bicknell.

Government Camels.

It is not generally known, or not generally remembered, that the United States Government at the close of the Civil War was the proprietor of sixty-five or more camels, which were kept at the abandoned military post of Camp Verde, about fifty miles west of San Antonio, Texas.

These camels were chiefly the descendants of a herd imported some years before by the government as an experiment to test their adaptability as pack-animals for frontier service. Should it prove successful, it was proposed to utilize them for many purposes in which the long-suffering mule had hitherto been employed.

The results of the experiment were satisfactory, and it is not easy to see why it was abandoned. Possibly the breaking out of the war had much to do with it. The government had much graver questions to consider than that of supplanting the veteran mule by these ships of the desert. It was generally admitted that these animals were peculiarly adapted to the wants of the army, and especially to the cavalry branch of it.

Not only were they capable of carrying with ease double a mule's load, but they were in many other respects superior as pack-animals. They could subsist, and even thrive, where a mule would starve, and they required water only once a week.

Another great recommendation for the frontier was the impossibility of stampeding them. As a test, men hid themselves in the bushes, and as the camels came along rushed out suddenly, shouting and firing pistols. The camels viewed these demonstrations with an expression of supreme disgust, merely turned their heads to one side, and continued their stately march unmoved.

During the war these animals were cared for by the

Confederate Government. They were not utilized in any way that I ever heard of, but were simply kept stabled in the old cavalry corrals at Camp Verde, in charge of the same attendants employed by the United States Government before the surrender of its property to the Confederates.

Major King and myself found ourselves detailed, with fifty men, for a tour of three weeks in the vicinity of Camp Verde, to report especially on the number and condition of the government camels, which had been so long lost sight of. The old post of Camp Verde is beautifully situated in the Bandera hills, and in former times, when regularly garrisoned, must have been a delightful station.

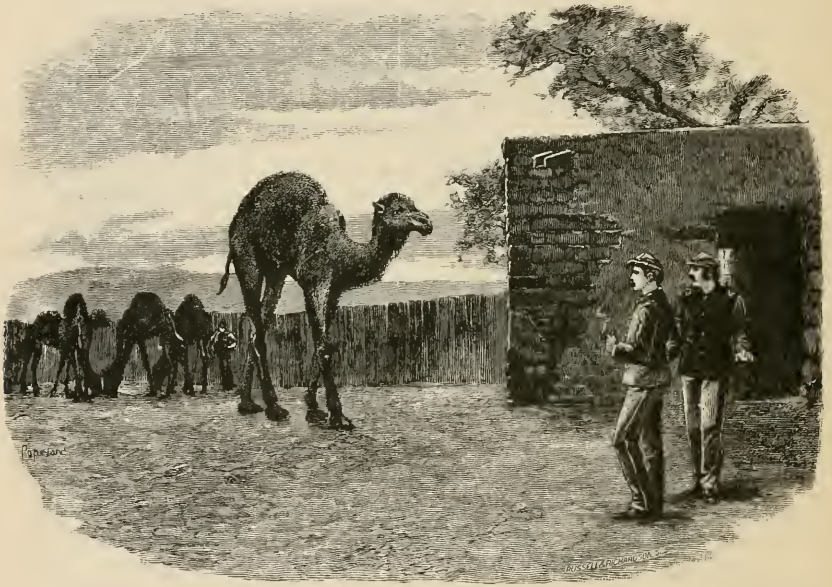
At the time of our arrival, however, the first troops since the withdrawal of the garrison in 1861, everything was in the most dilapidated state. Officers' and men's quarters and the hospital building were the homes of numerous herds of goats. Destruction and decay reigned supreme, where once neatness and the strictest order had prevailed. The only part of the post that seemed to have survived, in a measure, the neglect of years, were the cavalry stables, which were now occupied by the sixty-five camels.

As our detail of fifty men filed round to the open side of the corral, every camel made a rush for the picket fence, which was the barrier on that side. Thrusting their long necks over the paling as far as possible, they stared with the stoniest of stares at the unusual sight of a company of cavalry, at the same time uttering their peculiar guttural sound, which, in sixty-five different keys, made the most unearthly din.

The effect on the horses of the command was electrical, and in the highest sense ludicrous. Every one seemed possessed with the insane desire to walk on his hind legs and spar the air with his forefeet. Many men were thrown, while with others the horses, wild with terror, took the bit in their teeth and made a clean bolt with their riders across the prairie. A more demoralized body of troopers could not have been found during the hottest battle of the war.

Not for some time could the scattered men and horses be got together and something like order restored, and it was several days before the horses and camels became reconciled to each other, but they finally got on good terms and occupied the same stable during our stay at the post.

The camels afforded us the greatest amusement. The first evening of our arrival Major King and I strolled down to the



The Approach of Old Frances.

stable to look at the menagerie, and while in the corral watching the feeding process Major King lighted his pipe. After he had taken a whiff or two, an immense camel, or dromedary, one of the original herd, was observed coming directly toward us, with most solemn and stately tread, and with eyes fixed and immovable.

Old Frances, for that was the name of this beast, was a

most formidable-looking object. We stood our ground for a moment and then retired a little; as this towering presence continued to advance, apparently as resistless as fate, we became wholly demoralized, like our horses, and bolted out of the corral.

A shout of laughter from one of the keepers called a halt. We were informed that we were in no danger, and that Old Frances only wanted a smoke, which proved to be the fact. We were also told that some camels were very fond of tobacco-smoke, and would follow any one about who was smoking.

After we had found out the cause of Old Frances' attention, we gave her all the smoke she wanted. To place the bowl of the pipe in her nostril and blow hard through the stem seemed to have the best effect. She would give a loud snort, and throwing her head back almost on her hump, would curl up her lip, close her eyes, and seem lost in an ecstasy of enjoyment. Two rounds of this smoking business fully satisfied her, and nothing could induce her to indulge again until after several hours had passed.

These camels were, with one exception, as gentle as sheep. The children of the keepers played among them with perfect safety, and often climbed on the backs of the younger ones.

The only vicious one was the huge stallion, Major, who was very dangerous, and was kept securely chained. His chief delight was to kill every mule he could get at, and his method of doing so was certainly original. He would place his breast-bone on his victim's back, and by throwing forward his great weight, would crush the poor brute to the earth, and break its back.

Only one man dared lead the Major to water, and he did not do it unnecessarily often. This performance was quite a complicated one, for the Major took his own time. He would walk a few steps, then stop to browse a few moments, and no power on earth could induce him to move on until he was ready. A little farther on he would, perhaps, rear on

his hind legs to nip the foliage of a live-oak tree, often reaching to an astonishing height from the ground. The man in charge could do nothing but stand meekly by until his lordship saw fit to complete the trip. This watering process generally consumed several hours, and the keeper thanked his stars when it was over.

The scene in the morning, when the camels were taken out together, was quite Oriental. Sixty-five strung out in single file, Old Frances in the lead and the young ones bringing up the rear, made a long line. One could always tell, without looking, when the camels were out, for every tethered mule would bray and tug at his halter, and every loose animal would charge around like mad till the camels were out of sight.

Orders from Washington finally came to sell these animals by public auction, and they were soon disposed of at a very low price, chiefly to circus and menagerie owners, and were dispersed in the United States and Mexico.

A. I. Peck, U. S. A.

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