

TWO EXPEDITIONS TO MOUNT ST. ELIAS.

I.—THE EXPEDITION OF "THE NEW YORK TIMES" (1886).



THE main object of "The Times" Alaskan expedition of 1886 was geographical research in the vicinity of the St. Elias range of Alaska. If the rear or even the higher points of that ponderous pile of peaks could be reached, it was known that wholly unexplored land on the British American side would be exposed to view. The attempt to cross the mountains was abandoned when we ascertained that only one trail led across the range, and that this could be traveled only in winter. In scaling the St. Elias peak we were fairly successful. Two previous expeditions had attempted without success the ascent of this colossal peak, the highest above the snow level in the world. The mighty St. Elias range, greater by far than the Swiss Alps, is off the line of ordinary travel and has only of late been accessible to tourists. It was therefore seldom visited except by those engaged in the duties of ex-

ploration. A fur trader here and there, or a prospecting party of miners, had invaded a few points offering favorable inducements to their vocation, but very little geographical knowledge of the country was gained through these sources.

From the northwest corner of the United States, along the Pacific coast-line of British America and the shores of Alaska to within sight of the St. Elias range, a beautiful, picturesque, and protected waterway extends for nearly two thousand miles, flanked by perhaps the most magnificent mountain and glacier scenery in the world.

It was originally intended, upon reaching Sitka by the excursion steamer, to employ the largest kind of native canoes, and in one or two of these to reach the nearest point off the St. Elias range; but we were not compelled to make use of canoes at all, thanks to the kindness of Mr. Whitney, the Secretary of the Navy, who authorized the

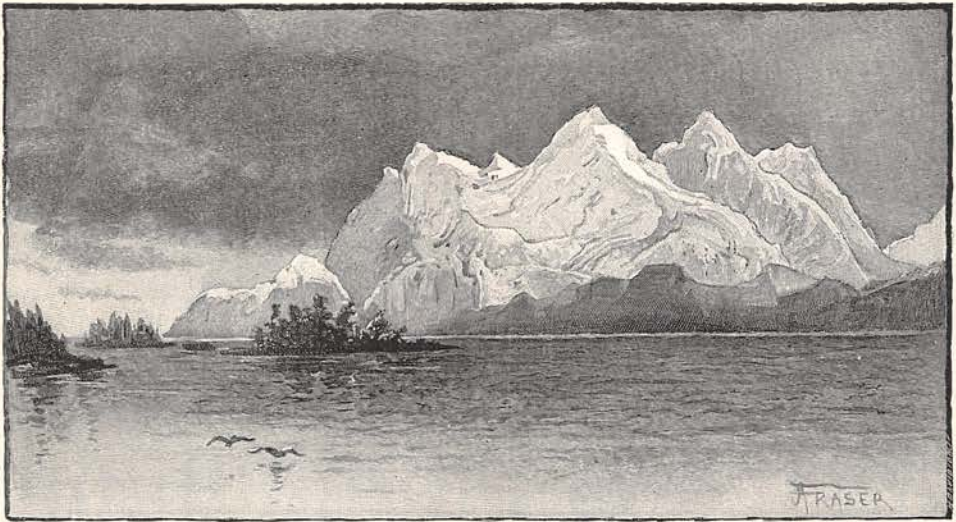
use of the man-of-war *Pinta* in the Alaskan waters.

Our party left Sitka on the 10th of July. It was composed of Professor Libbey of Princeton, who had charge of the barometrical and meteorological work, and who also made an ethnological collection from the Yakutat Indians; Mr. H. W. Seton-Karr, an Englishman and experienced Alpine climber, who joined forces with us and was the only person in our party able to sketch; Joseph Wood and John Dalton, cooks and men of all work; and Kersunk, or Frederick, a native boy from the Sitka mission school, who was taken along as interpreter. He was a perfect master of the Tlinkit language, and withal a thoroughly conscientious lad, on whom we could rely when we could understand his imperfect English.

dozen magnificent unnamed points and pinnacles besides.

Even as late in July as this the snow reached almost to the bases of the great peaks, and I could well appreciate that when Cook, the English navigator, first saw this part of the Alaskan Alps, in May, 1778, "these mountains were wholly covered with snow from the highest summit down to the sea coast." Down their rugged gorges creep some of the grandest glaciers south of the polar zone itself. Just beyond the base of Mount Fairweather, which reaches the ocean in a bold, beetling spur, lies La Grande Plateau Glacier, with a terminal front of some four or five miles. It is only one of many such frozen rivers between Cross Sound and Yakutat Bay, our destination.

On the morning of the 12th of July I did



SALISBURY SOUND.

He also did good duty for us as a packer, an art in which all Tlinkit Indians are proficient, the adults averaging about one hundred pounds over the roughest mountain trails for ten and twelve hours a day.

We left Sitka at ten o'clock, and after five hours spent in threading the complicated network of inland passages we reached Salisbury Sound, which opens into the Pacific Ocean. Just as we left the Sound Seton-Karr succeeded in getting a sketch of the cape at the northern entrance.

About ten o'clock the next morning the heavy fog that obscured the rising sun began slowly to lift, revealing the glistening white glaciers; then the misty vapor swept away, and like some wonderful phantasmagoria all the southern spurs of the mighty St. Elias range came into view. There were Fairweather, Crillon, Lituya, Ditgetlet, La Perouse, and a

not arise until broad daylight, which might be considered procrastination on the part of an explorer; but as it was daylight at 2 A. M., and I had not retired till twilight, at 11 P. M. the night before, it was not inexcusable laziness. The sky was as clear as the proverbial crystal. We were just rounding Ocean Cape to enter Yakutat Bay as I looked from the little window on the port side of the *Pinta*, and there burst into view one of the most glorious alpine spectacles one could possibly imagine, with Mount St. Elias in the central background, covered to the very base with ice and snow, and raising his glistening white head for nearly twenty thousand feet¹ into the light steel-blue sky. There are half a dozen peaks in sight from Mount St. Elias, to the eastward; Mount Cook and Mount Vancouver in the foreground, and Mount Malaspina

¹ 15,327 feet by later measurement.



AFTER THE CLOUDS HAD LIFTED.

farther to the rear, are the only ones that are named. St. Elias stands isolated from the other high peaks, and to this isolation is undoubtedly due much of its grandeur and impressiveness.

Five o'clock in the morning saw us at anchor just in front of the Yakutat Indian village. It was as silent and deserted as a midnight graveyard. A solitary cur looked at us sleepily, and then slunk off into the high weeds back of the buildings. The Indians, we soon learned, were at the head of the bay hunting seals for their winter supply of oil and skins. In these waters seals abound, and the Yakutats catch them by shrouding the bows of their crafts with white cloth so as to resemble ice. In this way they are able to approach close enough to the seals to harpoon them.

The Indians considered our expedition a dangerous one, and it was five or six days before we could come to any agreement with them. Some solace was found between discussions in wandering around and examining the curious features of the new country. One of the most unexpected was the dense profusion of strawberry-vines, loaded with fruit.

The Indians were at last obtained, a small Yakutat canoe was added to the party's property, and the *Pinta* headed for Icy Bay, some fifty miles farther up the coast, it being a better base for operations in the little-known region about Mount St. Elias. A mighty glacier from the seaward flanks of the mountain has advanced at this point a short way into the ocean, and the shallow crescent thus formed is called Icy Bay.

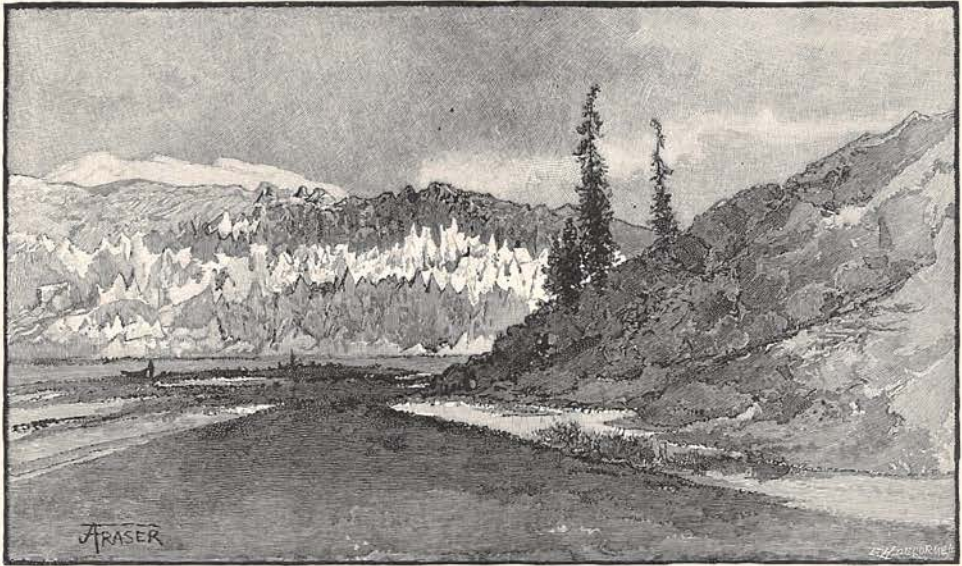
Of course it was out of the question to think of landing on the side of Icy Bay formed by the glacier, the least contact with its sides being liable to detach an iceberg, which would add an unpleasant amount of freight to the boat that started it, not to mention the abrupt way in which it would be loaded. The other side of the bay—the eastern—was a low,

flat, sandy coast, on which the high surf from the great Pacific swells kept constantly thundering, even in the best of weather. To get through that surf was the problem of the day. It was, however, finally solved in a way not altogether devoid of ingenuity. The boat was rowed till it was very near the line of breakers forming the first indications of the surf, when a light anchor was cast over the bow and the boat headed seaward, every sailor being at his oar. The anchor rope was then slowly paid out, until the boat was nearly on the crest of the breaking surf, any attempt of the rushing waves to carry it ashore being overcome by the oars and the rope until the breakers were at their minimum height and force, when the boat was allowed to drift in on a favorable crest, the men jumping overboard as it struck, and remaining alongside to push it farther up as each succeeding wave lifted it. In this way all our effects were landed with immaterial wetting, although the men were drenched to the skin in the splashing surf. There yet remained on the *Pinta* the little Yakutat canoe. We had about given up attempting to get it ashore, when one of our Yakutat Indians, who saw our dilemma, volunteered to bring the craft to us safely, and returned in the last ship's boat for that purpose. His feat of landing the little canoe through the heavy surf was the prize act of that day's performance, and was witnessed both by those on land and those on shipboard. Many of the latter were old sailors who had "surfed it" on almost every coast of the world where the surf beats and breaks, and they too pronounced it the "slickest" piece of nautical work a mortal could do. Its bare narration can do it but scanty justice, even though an abler pen than mine should essay it. Approaching the first white-cap on the breaker, he steadied his little craft carefully until what must have appeared to him to be a favorable opportunity, though it was the very reverse of the large boat's choice, for he selected the biggest breaker, and, mounting its crest as it broke into suds around

him, he maintained this position by lightning-like strokes of his paddle, the great breaker throwing him as if from a catapult, and landing his canoe in the seething foam that spread up the shallow, sandy shore. Half a dozen sturdy fellows seized the craft, and actually pulled it up to the dry sand beyond, while the Indian still sat laughing in the canoe, the inside of it as dry as dust.

The *Pinta*, with whistle screaming, sailed away. A day or two was occupied in wandering around among newly discovered strawberry fields, measuring grizzly-bear tracks, some of them eight by fourteen inches in di-

gained during the remainder of our time on its course, convinced me that we had probably struck it during a comparatively low stage of water. Its western bank was the same glacier that formed the western shores of Icy Bay; but as the swift-running water, loaded with sediment and cutting like sandpaper, eroded the glacial front even more rapidly than the pounding waves of the open bay, there was more white ice exposed along its course. The point where this marble-like bank faded into the dark moraine far away to our left we inferred to be the mouth of the river. It appeared to me at the time, and subsequent investiga-



LOOKING ACROSS JONES RIVER TO GUYOT GLACIER FROM CAMP NO. 2.

mensions, and getting our effects in shape for our contemplated journey to the interior. The first party got away on the 19th of July, in the morning, and our route lay along the shore of Icy Bay, almost at right angles to our general course. As we started we had a good view of the upper part of Mount St. Elias projecting through the drifting clouds. A perfectly clear atmosphere about this great range is almost unknown in summer. The vapor in the warm air above the equatorial ocean current which impinges upon this coast is condensed into fog as it strikes the frozen sides of the great mountain, and thus keeps it perpetually cloud-capped.

Shortly after ten o'clock, as we broke through a pretty little clump of firs and hemlock, we came suddenly on the banks of the great river described by the Indians. It was probably a mile and a half wide. My first idea was that we had found it during a high freshet, but the assurances of the natives, and the knowledge

tions confirmed the idea, — though not beyond all cavil, I will admit, — that the flow of this mighty stream was too steady to be fed only by the seaward watershed of the St. Elias range. I named it the Jones River, after Mr. George Jones of New York City, the patron of the expedition. A short distance up its course we came unexpectedly upon what appeared to be an unknown tributary coming in from the right. It turned out to be a channel of the main river that had swung far out into the country, and was probably caused by the slow forward movement of the western glacier intruding upon the river-bed.

That evening we reached a point about ten miles from the coast, and camped where Jones River came out from between two huge glaciers. The scene here is weird and desolate, but withal extremely picturesque. About two miles from Camp No. 2 the glacier from the east — which I named Agassiz Glacier — comes down to the river-bed and spreads over

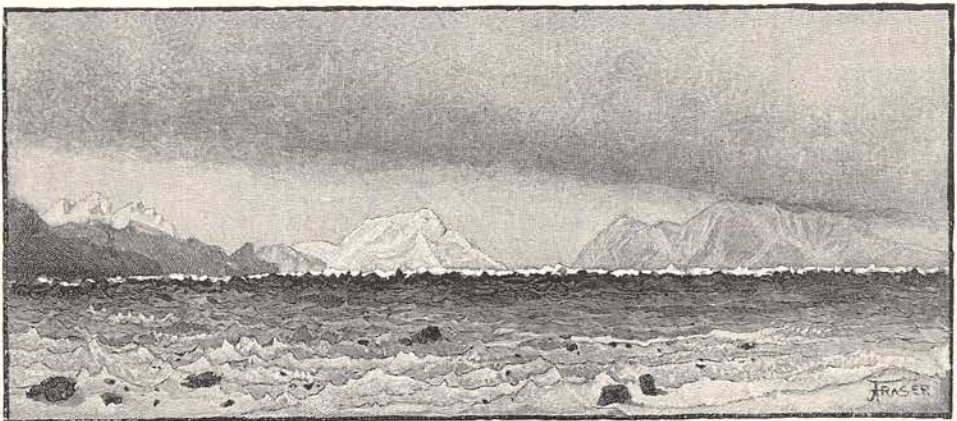


MEETING OF AGASSIZ AND GUYOT GLACIERS.

the huge stream in a natural bridge of ice till it abuts upon the glacier from the west, or Guyot Glacier. From this point of juncture to the foothills of St. Elias Jones River is a subglacial one, and in our trips of from twelve to fifteen miles across the ice we often passed from one glacier to the other over the ice bridge thus formed. The line of demarcation between the two seas of ice was well marked. The debris of rocks, so characteristic of all glaciers, on the Agassiz was nearly all dark colored and of igneous origin, while the Guyot moraines were lighter in tint and of sedimentary character. The hard Plutonic rocks of the first glacier were but little worn, while the soft sandstones and shales of the other were ground into powder, which, mixed with the melting ice, made fields of mud.

The two days' tiresome trip across the chaotic hummocks of ice being completed, we entered a little forest at the foot of some hills, which I called the Chaix Hills, after the president of the Swiss Geographical Society. These

hills were covered with green moss and alpine shrubs, and looked like an oasis in the desert, surrounded as they were with fields of ice for many miles around. At one point the ice-foot of the glacier had shoved down into the timber, crushing into pulp and splinters huge trees five and six feet in diameter and piling them up in immense windrows, as a child would sweep together his pile of jackstraws with his hand. Where two branches of the Jones River united just before passing under the ice bridge already spoken of a beautiful lake had been formed. The quantity of water, being too great to rush easily through the subglacial culvert, had caused it to gather here. Huge icebergs were detaching themselves and floating out into the deep water from both the Agassiz and the Guyot fields. The lake, having no outlet, was so clogged with bergs and fields of floating ice that only in a few places was open water to be seen. I named this lake Caetani, after the president of the Italian Geographical Society.



MOUNT COOK AND MOUNT VANCOUVER ACROSS TYNDALL GLACIER.



MOUNT ST. ELIAS AND TYNDALL GLACIER.

On the 25th of July we traveled from the forest at the base of the Chaix Hills to the foot of Mount St. Elias. The entire distance of fifteen or eighteen miles was over glaciers, about a fourth or fifth of the way being over the Guyot and the rest over a new glacier coming from the *névé* of St. Elias itself, and which I named the Tyndall Glacier. All around us was a wild scene of alpine and arctic desolation, and on a scale that nearly overpowered the senses. Mr. Seton-Karr said that the Alps seemed like toy representations of the colossal chain ahead of us, all white with snow, steel-blue with glacial ice, or black with frowning flanks of igneous rock. Cumulus clouds threw over the snow shadows like gigantic fields of retreating black.

The early morning of the 26th revealed a clear sky with only a few light clouds clinging to the cones of St. Elias. The night had been so cold that ice had formed; this is indeed a summer resort for those desiring cool weather!

The point of attack on St. Elias was to be by way of the Tyndall Glacier, and the plan was to keep going, if nothing interfered, from early morning — from four to six o'clock — all that day and the next day till nine or ten o'clock in the evening; or, in short, about forty hours' continuous walking and climbing, broken only by rests so short that we should not get chilled in the intervals. There were three persons to make the ascent, Seton-Karr, Wood, and I, each carrying from ten to twenty pounds of food, extra clothing, and scientific instruments, all packed in the most condensed form.

We scrambled up the broken, winding, icy ways between the crevasses on the edge of the Tyndall until we got to the center of the glacier, where we found better walking. The ascent from this point became somewhat steep. At seven o'clock we halted for a short rest; not that we needed it, but the alpine scene before us was so inexpressibly perfect that we stopped long enough for Mr. Seton-Karr to get a sketch of it. A half-hour's more walking brought us to a change in the aspect of the glacier. Heretofore the ice of the glacier and the snow bridging the crevasses could be easily distinguished, and the latter readily avoided as the more dangerous. But now the snow bridges could hardly be told from the weather-worn ice on the surface of the glacier, and, as is usual in such alpine climbing, the members of the party were tied together with a rope. We were arranged in the following order: Wood came first at the head of the rope, I second, and Mr. Seton-Karr last. At quarter-past ten we were high up on the Tyndall Glacier, and could truly say we were ascending the mountain proper. Both center and sides of the great ice stream were now breaking into frightful crevasses running in all directions, with very few snow bridges spanning them, and these required the most laborious windings to reach. We often walked a hundred yards to make a dozen along the axis of the glacier. Straight ahead towards the great mountain we could plainly see every glacier on its southern side. At a long distance they had looked easy enough of ascent, but a nearer inspection revealed an ice

cascade, that bane of alpine climbers, on every one. The perpendicular descent of the smallest was probably hundreds of feet, and being at an inclination of not less than from sixty to seventy-five degrees they were simply impassable. It was quite evident to any one that the only road would be up some of the rocky ridges that projected through the ice and snow like black buttresses from a marble building. Once above 10,000 or 12,000 feet, the summit of the highest cascades, it was evident that there might be some hope of traveling over the snow and ice again. With this idea in view we started for the most practicable-looking ridge of rock ahead of us, but long before we had reached its base we could see that it too was impassable, a front view exposing an arch of ice connecting the flanking glaciers the face of which was perpendicular for at least a hundred feet.

In about another half-hour's struggle over the heavy hummocks the ice began to be broken by both lateral and transverse crevasses into a mass of steel-blue pinnacles. There were very few snow bridges now, the crevasses being so wide that the bridges apparently could not sustain themselves over the abysses. Often two of the three persons would be on a wide bridge at one time, and more than once it happened that the whole party was on one at the same instant which would give a crevasse over fifty feet in width.

As we advanced the crevasses became wider and wider, and at some points we walked as if on the comb of a roof. As the transverse crevasses became wider the snow bridges became scarcer, having tumbled into the abysses below, and at last we reached a point where no man could go unless furnished with wings. We had got far enough to see that the ridge ahead was impracticable, when we were compelled to turn back on that route. There was still another to our left, however, and thinking we might find a circuitous route here we essayed it about noon; but light clouds were now collecting on the mountain side and heavy fog-banks were seen rolling in over the Chaix Hills from the ocean. St. Elias had received the best of reinforcements in the struggle.

The ascent of this ridge of the mountain lasted from 12.40 P. M. till within a few minutes of five o'clock, when we were 5800 feet high, with the clouds rapidly closing in on us. Our fight off the glacier and up the ridge was the usual alpine struggle, and I will not dilate upon it except to mention one incident. We had come to a crevasse seemingly too wide to jump; the second bench of ice was also some feet below the first, and it would be like jumping on a stone sidewalk from an upper story. At one point we found a snow-bank jutting forward over the bench we wished to reach, and although it was a sort of Sam Patch game we



SEVEN THOUSAND FEET UP THE ST. ELIAS SLOPES.

made it, cutting steps up the incline to the ice on the other side.

It was now deemed advisable to stop and read the mercurial barometer, as at least three readings should be had, each a half-hour apart, which would take up a little over an hour in time—a long period considering the threatening weather. Mr. Seton-Karr and Mr. Wood volunteered to try to get a little higher before the clouds made work over dangerous paths impossible, and an aneroid barometer was given the former to compare with the standard before going and after returning. My mercurial barometrical measurements show 5800 feet as the point reached by that instrument, to which must be added 1500 gained by the aneroid, or 7300 feet altogether, fully nine-tenths of which was above the snow level, and which is believed to be the highest climb above the snow limit ever made—a result well worth the expedition.

The return to Icy Bay was made over the same route by which we came. The *Pinta* had

left us a whale-boat, and in it we hoped to reach Yakutat Bay. The first attempt to launch our craft in the heavy surf of Icy Bay was a disastrous failure, swamping the boat and wetting its contents. Our Indians, who were the only persons present knowing anything of such nautical movements, informed me afterward that probably few of us knew what danger we ran in the attempt, and which they assured me they were glad to get out of so easily. Under their management our second attempt was successful, and after a long day's rowing and sailing we reached Yakutat Bay. Here we remained about a month among the Indians of the same name, making a few excursions into the surrounding country. Before we left on the *Pinta* we saw St. Elias many times, but never long at a time, thus verifying our opinion that the lack of continuous fine weather, an absolute necessity in an alpine attempt over unknown paths, was the most formidable obstacle in conquering this king of the continent.

Frederick Schwatka.

II.—THE EXPEDITION OF THE NATIONAL GEOGRAPHIC SOCIETY AND THE UNITED STATES GEOLOGICAL SURVEY (1890).



THE National Geographic Society has for its object "the increase and diffusion of geographic knowledge." In pursuance of this object an expedition was despatched in the spring of 1890 to make geographical, geological, and glacial explorations and surveys in the region about Mount St. Elias, Alaska. The expedition was under the joint auspices of the Society and of the United States Geological Survey, and was placed in my charge.

The party consisted of myself as geologist; Mark B. Kerr, topographer; E. S. Hosmer, general assistant; and seven camp hands, of whom J. H. Christie was foreman. On account of uncertain health, Mr. Hosmer left us at our first camp, and our force throughout the remainder of the season consisted of nine men all told.

The expedition sailed from Sitka on the United States steamer *Pinta*, Lieutenant-Commander O. W. Farenholt, U. S. N., commanding, early on the morning of June 25, and reached Yakutat Bay, two hundred and fifty miles to the northwest, near sunset the following day. The voyage was over rough seas, ob-

scured by fog and rain. The Fairweather range was shut out from view during the passage, and we anchored in Port Mulgrave, at the mouth of Yakutat Bay, without a glimpse of the magnificent scenery for which that region is famous.

At Port Mulgrave there are two small Indian villages, one on the southeastern end of Khantaak Island, the other on a point of the mainland a mile and a half east. At the village on the mainland there is a trading post sustained by Sitka merchants, and a Moravian mission in charge of the Rev. Carl J. Hendrickson, who has one assistant, like himself a son of Sweden. The native inhabitants of these villages number about fifty and call themselves Yakutats. They form the most westerly settlement of the great T'linkit family, which occupies all of southeastern Alaska and part of British Columbia. The Yakutat Indians are of fine physique, have well-built houses of their own design and workmanship, and live by hunting and fishing. They are "canoe Indians," and spend a large part of their time on the water in quest of salmon, seals, and sea otters. The catch of sea otters, whose furs are most valuable of all, during the summer of our visit numbered thirty, and they were sold at from seventy-five to one hundred dollars each. The money derived from this source, and from

the sale of bear, goat, and hair seal skins, and from baskets woven in large numbers by the women for the tourist trade in Sitka, brings a comparatively large revenue to the village and enables the natives to live in comfort.

The weather after our arrival continuing foggy, with heavy rain squalls, Captain Farenholt deemed it inexpedient to take his vessel up the bay, where all sorts of imaginary dangers were reported to await her. Purchasing a canoe from the trader and hiring another of large size from the Indians, we left Port Mulgrave at sunrise on June 28 in a driving rain storm, accompanied by two of the *Pinta's* boats in charge of Ensign C. W. Jungen. Mr. Hendricksen went with us as guide and interpreter, and, as on several subsequent occasions, greatly assisted our enterprise. Our little flotilla, traversing the narrow, misty water-ways between the forest-covered islands along the eastern border of the bay, made a very pleasing picture. The trim white boats of the *Pinta* with their rhythmic oar-beats contrasted strongly with the more graceful canoes manned by our men, few of whom were experts with oars or paddles. The canoes of the Yakutats, hewn from a single spruce log, have high overreaching stems and sterns which give them a picturesque, gondola-like appearance. They are of all sizes, from tiny crafts seeming scarcely large enough to hold a single Indian, up to sea-going boats fifty feet or more in length, and capable of carrying a ton of merchandise and a score of men.

About noon on the day we left the *Pinta* a camping-place was found on the shore of the bay near the north end of Knight Island. Our tents having been pitched on a stretch of gravelly beach between the water and the encircling forest, the *Pinta's* boats sailed away to the southward before a freshening breeze, and our last connection with civilization was broken.

On the third day after leaving the *Pinta* we reached the west shore of Yakutat Bay a few miles from its head, a locality long before selected for beginning our work. We landed through the surf on a low, sandy beach, heavily encumbered with icebergs, among which the waves were churned into foam. The landing was effected by the aid of Indians in small canoes, with such skill as to prove them experienced surfmen. All of our baggage was carried through the fringe of floating ice and placed above the white line of breakers without serious damage.

Our first walk on the shore taught us something of the nature of the as yet unseen land around us. The black sands of the beach contained garnets, and, as we afterward learned, occasional flakes of gold. The boulders were

of many kinds of crystalline rock, including large masses of glittering white marble; indicating that the mountains from which they are derived consist in part, at least, of metamorphic rock. The strand was pitted with irregular holes, the origin of which was a puzzle until it was noticed that icebergs stranded on the beach and rocked to and fro by the waves were making similar excavations.

Late in September we were again encamped on this same shore during a northeast gale which piled the icebergs high on the beach, and fringed with blue and white the line where land and water meet. Many of the larger bergs, stranded in thirty or forty feet of water, stood like rocks against which the heavy swells broke in splendid sheets of foam. The shattered waves, dashing high in the air, often quite obscured the icy ramparts that sought to hold them back. The icebergs are of pure, glittering white or of turquoise blue, with every intervening tint and shade that a painter could fancy; those of deepest color had recently turned over, or had been repeatedly swept by breaking waves. One night when the storm was more than usually severe the hoarse roar of the tempest, mingled with the grinding and crashing of thousands of tons of ice, rendered sleep impossible. The raging waters, the black, stormy heavens, the strange moving shapes on the shore, like vessels in distress, now faintly visible in the uncertain light, and now buried in foaming brine, made a strangely fascinating picture. The romance of the scene was heightened, perhaps, by the fact that the rising tide, combined with the shoreward blowing gale, threatened to sweep away our tents. The white line of roaring breakers, thick with ice fragments, crept higher and higher, until only a few inches intervened between the edge of the surf and the crest of the bank that sheltered us. But the limit was reached at last; the waters ceased to advance, and then began to fall, leaving a fringe of ice within arm's reach of our frail shelters.

The day after we reached the west shore of the bay dawned clear and beautiful. The veil of mist vanished from the mountains, revealing for the first time to our eager eyes a scene of surpassing beauty. The days of sunshine in a land of mist and rain are so lovely, the air is of such wonderful transparency, and the warmth is so welcome, that even the most stoical cannot resist their inspiration. We found ourselves at the base of a magnificent mountain range trending northwest and southeast and bordered along its southern base by a low tableland stretching many miles seaward. Yakutat Bay divides this tableland like a wedge, the sharp end of which, reaching northward, cuts through the first rampart of mountains to the base of

the snow-covered peaks beyond. The waters of the bay flashed brightly in the warm sunlight and broke into foam where kissed by the breeze. Scattered over the broad shining plain were thousands of icebergs, seemingly a countless fleet of fairy boats with hulls of crystal and fantastic sails of blue and white. When the summer days fade into the long northern twilight marvelous mirage effects are added to the beauty of the softly lighted, far-reaching view. Floating bergs miles away become of huge proportions and assume strange, deceptive shapes; at times appearing like fountains gushing from the sea, but most often simulating magnificent cities with towers, battlements, and minarets of unknown architecture. One's early training in geography is apt to leave the impression that the sultry desert is the home of the mirage; but as wonderful effects due to the refraction of light are to be seen among the ice-packs of the North as ever deceived a weary traveler on the alkali deserts of Utah or Nevada, or on the sand-blown plains of Sahara.

The shores of Yakutat Bay, where the slopes are moderate, are densely wooded up to a height of about fifteen hundred feet; above that elevation there is a belt tinted with alpine blossoms, intervening between the forest and the great snow fields which cover all the higher peaks. North of our camp and less than a mile distant a rugged mountain slope rose abruptly from the sea, its higher summits brilliant with snow, and every gorge and cañon on its sides filled with glacial ice. Beyond this dark, sharply defined foreground, and filling all the northern sky, were numerous peaks and crests of dazzling whiteness, stretching away to the eastward and blending in the dim distance with the vapory mountains of the sky. Many of the spires and roof-like crests rise precipitously to a height of more than six thousand feet, forming a splendid panorama in which fresh details are revealed with every change of light. A more interesting or more completely unexplored land was never unveiled before even the greatest of voyagers. None of the great peaks in sight had ever been climbed, none had been named, and few had ever been seen by white men. A new land awaited us. No one could even fancy what wonders it might contain.

The most interesting excursion made from our camp on the shore was a canoe trip to a high rocky island in the upper part of the bay. This, the farthest point in the bay reached by the Spanish explorer Malaspina in 1792, was named by him Haenke Island, after the naturalist of his expedition. It stands in the opening through which Yakutat Bay penetrates the first mountain rampart, and rises a thousand feet

above the water. Its rounded summits of polished and striated sandstone tell of a time when the ice streams of Alaska were at their flood, and Yakutat Bay was filled by a seaward flowing glacier more than two thousand feet thick. Our trip to the island in a frail canoe was not without excitement and danger. The bay was crowded from shore to shore with floating ice, and a heavy swell was rolling in from the ocean. To navigate this grinding ice-pack required not only skill in the use of the paddle, but also much muscular effort to keep our canoe from being crushed. But the reward gained on reaching the summit of the island more than repaid for the fatigue and danger incurred in doing it. As we ascended the steep bluffs hundreds of sea birds, startled from their nests in the cliffs, filled the air with their cries.

To one standing for the first time on those polished domes and surrounded by a strangely magnificent landscape in which all the changes of season are combined in a single view, there comes a feeling of awe and unworthiness. The island is the stage in a vast amphitheater. The spectators are hoary mountain peaks, each a monarch crowned by time, and holding his place in defiance of the ceaseless war of the elements. How insignificant the wanderer who confronts such an audience!

The shores of the bay, both east and west of the island, are formed of rocky promontories, bare of vegetation except at their immediate bases. From these dark headlands the shore sweeps away to the north, forming a rude semicircle inclosing a plain of blue on which float countless ice fragments broken from the ice walls to the west and north. From a wild, cliff-enclosed valley on the west there flows a broad river of ice, the sources of which are far back in the heart of the mountains. This ice stream, named the Dalton Glacier, creeps down a steep rocky descent and pushes far into the bay before it is broken up by the waves. It expands abruptly on getting clear of its confining walls, and ends in an outward-curving ice-foot, the seaward border of which is a blue wall of ice some three hundred feet high, diversified by outstanding pinnacles and glittering buttresses. The waves, aided by the tide, undermine the cliffs, causing great masses of ice to topple over and disappear in a cloud of rocket-like spray. Owing to the distance, the ice seems to break away without a sound and the foam to fall in silent cataracts; but soon there comes a roar like distant thunder, echoing from mountain to mountain, until an answering roar, still deeper and more prolonged, comes from the great Hubbard Glacier at the head of the inlet. The Hubbard Glacier, named in honor of the president of the National Geographic Society, where it enters the sea presents the most magnificent

ice cliffs of any of the glaciers of Alaska yet seen. From Haenke Island the eastern extension of this line of dazzling cliffs is concealed from view by a projecting headland, but this obstruction only adds to the fascination of the scene, and makes one fancy that the frozen ramparts may extend on indefinitely. At the end of the season we ascended Yakutat Bay in the *Corwin*, and, so far as known, penetrated farther towards the head of Disenchantment Bay than any vessel had previously ventured. During this trip we had the full extent of the ice cliffs of this great glacier in full view, and saw also, for the first time, another large, unnamed glacier to the eastward. This glacier descends from the mountain in two broad rivers, which unite but fail to reach the sea. Its lower portion is so completely buried beneath stones and earth that one not familiar with the habits of glaciers in this region might easily fail to recognize it as a living ice stream.

Towering above the glaciers and marshaled in long ranks towards the east are a host of sharp, angular peaks white with snow throughout the year. These give rise to many secondary glaciers that descend in blue ice tongues below the summer limit of the snow fields. The cyclorama of iceberg-crowded waters, ice cliffs, glaciers, precipices, snow fields, and towering mountain peaks encircling the observer on Haenke Island is so magnificent and has so many features of absorbing interest that I have almost forgotten the long journey the reader is to take with me towards Mount St. Elias.

From our camp on the shore we moved westward across the first mountain spur. To reach this we had to cut a trail through vegetation so dense that it was almost impassable. Once through it, however, and having gained the summit of the divide joining the end of the mountain spur with an outstanding butte, we had our first view of St. Elias. Its summit is a bold pyramid firmly placed on a rugged mountain mass and towering above angular foothills, each one of which would be celebrated for its grandeur in a less mountainous country. The great peak rose clear and sharp against the sky, and formed the central point in the vast landscape. At our feet lay a dirt-covered glacier several miles broad, bordered on the west by another southward-stretching mountain spur similar to the one first reached; beyond that again, another great glacier flowing down from the mountains is lost in the sea of ice to the south. Beyond the second glacier is another mountain spur, succeeded to the westward by yet another southward-flowing river of ice of far greater magnitude than those at our feet. The ice streams expand on leaving the valleys which direct their courses, and form

a great ice plateau adjacent to the sea. This plateau extends from the shore of Yakutat Bay westward to beyond the base of St. Elias. The area of this great ice field exceeds five hundred square miles. Its glacial character was first recognized by officers of the United States Coast Survey, who named it Malaspina Glacier in remembrance of the great but unfortunate navigator Malaspina. West of St. Elias there is another vast ice field bordering the ocean, but whether this has a direct connection with the Malaspina Glacier remains to be determined. Our present knowledge of it is derived from distant views from commanding mountain peaks.

Late in the season I made an excursion far out on the Malaspina Glacier, and found it a vast, slightly undulating plateau of clear ice, with a general elevation of about fifteen hundred feet above the sea. Its surface is rough and irregular owing to thousands of shallow crevasses, and is bare of stones and earth. From the summits of the gentle swells the view is unbounded; the observer seems to be on a limitless plain with nothing to obstruct the vision excepting the great mountains to the north. It is one vast rolling prairie of ice. From the mountain spurs projecting like ocean capes into this veritable sea of ice one may look down on the great plateau from an elevation of two or three thousand feet without being able to discover its southern limits. The courses of the long lines of moraines stretching away from the mountain spurs can be followed for many miles; and far to the south the eye can distinguish a dark band near the southern margin, formed by stones and earth that have been concentrated at the surface as the ice melted. The outer border of this belt of moraines, like the lower, dirt-covered portions of many of the smaller ice streams, is densely covered with vegetation, and in places supports a vigorous forest of spruce trees. Dark evergreen forests with rank undergrowths of alders, ferns, and flowers, growing on living glaciers hundreds of feet thick, are among the most novel and interesting features of the Alaska glaciers, and, so far as I am aware, have not been noted in other countries. The great Malaspina Glacier is fed by the ice streams flowing from the mountains, and is truly a living glacier although of unique character. In many of its features it resembles the great continental glacier which covered the New England States and much of Canada during the geologically recent glacial epoch. It is the largest known glacier in the northern hemisphere with the exception of the ice fields of Greenland. When fully explored and carefully studied it should add an interesting and instructive chapter to glacial geology.

To continue our march: We crossed the first large glacier west of Yakutat Bay and traversed a deep transverse gorge in the next mountain range, which was once deeply filled with stones and earth and again excavated by running waters, leaving curious terraces along its borders. Beyond this spur we crossed another great glacier bare of debris and reached the next succeeding mountain spur. Traversing the bed of a lake at the southern end of this range, we reached another moraine-covered ice field which we named the Marvine Glacier. On the eastern border of this glacier there is a rocky island that rises through the ice and is densely clothed with ferns and flowers and deep-shadowed groves of spruce. This lovely oasis in a desert of ice we named Blossom Island. Here we established a base camp from which to explore the high mountains.

The vegetation on the lower portions of the mountains of southern Alaska, where the slope is not too steep to retain the soil, is so rank and luxuriant, and so marvelously rich in brilliantly colored flowers, that it must ever be a surprise and a joy to those who see it for the first time. The "Great North Land" is not a region of eternal frost and snow, but, during a portion of the year at least, is a land of flowers. The season of growth is short and the blossoms of the whole year appear all together. The violets of spring bloom side by side with the purple lupines of summer and the asters and gentians of autumn. The many hours of sunshine during the long summer days, when the twilight has not faded before the east is flushed by the dawn; the abundant moisture; the richness of the soil, fertilized by the slow decay of hundreds of generations of plants—all combine to force the vegetation and give it a rank luxuriance not exceeded even under the equator. The upper limit of tree growth, the "timber line" on the foothills southeast of St. Elias, is at an elevation of about two thousand feet, but decreases rapidly towards the west. All the seaward portion of western Alaska, including the Aleutian Islands, is treeless. The most abundant tree, and the only one on Blossom Island, is the spruce (*Picea pungens*, Eng.), which grows in dense groves on rocky ridges and attains the size of a noble forest tree. The dense thickets are formed of alder, currant, and salmon-berry bushes, with here and there a showy mountain ash, loaded in September with bunches of scarlet berries that rival the flame of its ripe foliage. In August and September the thickets are filled with a profusion of berries remarkable for their size and richness of color. Huckleberries of large size are abundant, while the salmon berries surpass all other similar fruits in size and richness of color, and ripen in such profusion that they frequently

give a tint to the shrubbery. Purple-black currants are the most abundant of all the fruits, but the least palatable. On sandy tracts near the shore strawberries bloom throughout the summer and produce berries that are as large and fine as many cultivated varieties. The most delicious of all the berries on which we feasted were the dwarf raspberries (*Rubus arcticus*, L.), which grow with the strawberries amid the rank grasses on the shore.

On the lowlands the spruce trees stand so thickly that the sunlight can scarcely penetrate their interlocked branches, and mosses, lichens, and fungi flourish beneath them in strange beauty. Throughout the forests the ground is covered with a soft, spongy mat of mosses two or three feet thick. Each fallen trunk is a lovely bank of green and brown adorned with graceful ferns and brilliant flowers. Even the trunks and branches of the living trees are heavily loaded with mossy coverings, making strange, weird shapes in keeping with the noonday twilight. These somber retreats are most beautiful after a storm, when the air beneath the trees is heavy with drifting mists, and the deep, rich tints of the shaggy trunks are brightened here and there with patches of sunshine.

The fields of flowers skirting the forests surpass in rank luxuriance and in brilliancy of color anything of the kind it has been my fortune to see elsewhere. On the terraces and lower slopes of the mountains projecting into the Malaspina Glacier one may walk for miles through flowery meadows, shoulder-deep in a sea of bloom. No daisy meadow in New England is more thickly carpeted with blossoms than these remote, unexplored gardens of southern Alaska. Winter and summer, lovely verdure and icy desolation, are here side by side. One may stand on the border of an ice field miles in breadth and pluck as beautiful a garland of flowers and ferns as ever graced a May festival.

A few hundred feet above the timber line it is always winter. Near the lower limit of the summer's snow there are occasional sunny slopes so situated as not to be swept by avalanches, which are covered with a dense plush of brilliant alpine blossoms, and form a most pleasing contrast to the sparkling cliffs of snow and ice surrounding them. In the higher mountains there is absolutely no vegetation. Even the tints of lichens and mosses are absent from the precipices, and all the less rugged slopes are buried beneath snow and ice.

After leaving the shores of Yakutat Bay, we did not see a single sign to indicate that man, either civilized or savage, had preceded us. No trail, except those made by the bears, was met with; not a tree had been cut; no

half-burnt embers marked the site of former camp-fires; no tin cans or fragments of black bottles, the flotsam and jetsam of the advancing wave of civilization, were anywhere seen. For the first time in my life I had the experience, dear to the wanderer's heart, of traversing a region never before seen by man and bearing no marks of his destroying hand. I could join with the poet in saying:

Nature is perfect wherever we stray,
'T is man that deforms her with care.

The rank vegetation seems to fulfil no other mission than the scattering of its own seeds. There are but few birds or mammals to eat the luscious fruits. The only animals besides the birds that feed on the berries are the bears. Of these there are at least two species, the black and the brown. The brown bears are closely related, if not specifically identical, with the grizzly: they have the same square head, and are as large, and probably exceed in size the rulers of the California forests. Two that I saw near at hand seemed as large as the largest of polar bears. The tracks made by one walking across a smooth, soft surface measured nine by seventeen inches; the stride was sixty-four inches. There are many marmots among the cliffs and living in burrows. Besides the bears and marmots no other game was seen. The mountain goat is known to live on the southeastern side of Yakutat Bay, but no signs of its presence were observed in the region we explored. Apparently the only animals that can exist there are such as hibernate during the winter.

On the 2d of August, Mr. Kerr and I left Blossom Island with its wealth of summer bloom, and started for the higher mountains to the northwest. Our course at first led up the most westerly of the main tributaries of the Marvine Glacier, where it seemed likely that a pass would be found leading westward towards St. Elias, the summit of which it was desirable to occupy in order to map the surrounding country. The day we started was stormy, and thick mists covered the mountain. Occasional rain squalls swept down from the higher ice fields and made traveling both difficult and uncomfortable. At the start we were accompanied by all of the camp hands, each man having a heavy load of instruments, rations, blankets, tents, etc., but about noon all of the men except two turned back, leaving their packs at a rendezvous on the ice. During our stay above the snow-line the men who returned to Blossom Island were busy in advancing supplies from caches made on the trail leading to Yakutat, and in carrying such things as were desired to the rendezvous at

the snow-line. The men who shared our fortunes during the most of our stay in the snow were W. L. Lindsley and Thomas Stamy. After our party divided, our little band of four pressed on through the storm and gained an elevation a short distance above the snow-line, where the clear blue ice of the lower portion of the glacier disappeared beneath the white *névé* fields above. We there made our first camp in the snow. All of the valley and all of the mountain slopes not precipitous were covered with snow and ice. The mountain spurs, descending out of the clouds, plunged down beneath the snow in steep precipices, leaving not a square foot of level rock on which to pitch our tent. By the side of a steep lateral gorge, where a small quantity of dirt and stones had fallen on the glacier, and where we judged we should be safe from avalanches, we leveled off the surface so as to mark a platform about seven feet square, sustained on the lower margin by a wall of stone. On this little terrace we pitched our tent, and after a light supper, cooked over our small coal-oil stove, spread our blankets and sought the sleep that usually comes so quickly to the mountain climber. The storm increased as the night came on, and, what is quite unusual in southern Alaska, the rain fell in heavy drops, like a tropical storm, and beat through our tent, filling the interior with spray. As the storm increased, the louder and more frequent became the roar of the avalanches. Now a heavy crash, mingled with the sharp rattle of falling stones, would come from the cliffs on the opposite side of the valley, telling that an avalanche had discharged many tons of snow and rock on to the glacier; this would be answered by another similar roar, near at hand, and repeated again and again from other cliffs somewhere out in the darkness. The wilder the storm the louder became the avalanche-thunder, the bolts of which are more to be dreaded than the lightning's flash. Soon we were startled by the rush of a small avalanche right at our door, telling that the rocks above had been loosened by the rain, and that our perch was no longer tenable. Looking out, I saw rocks the size of one's head whizzing past within arm's reach of the tent. The next instant a falling stone struck the alpenstock to which our tent was fastened, carried it away, and left us exposed to the pouring rain. As quickly as possible we moved our tent down to the open glacier, at the extremity of a tapering mountain spur which projected far into the ice, where it seemed impossible for falling rocks to reach us. Moving our soaked blankets to this new shelter, if such it could be called when those within were nearly as wet as the storm-swept cliffs without, we passed

the night as best we could, sleep being impossible. On this occasion, as on many others while camped in the snow, we found our oil stove not only a convenience but a blessing. A cup of coffee was soon made, and the tent warmed sufficiently to be comparatively comfortable.

The following morning the vapor wreaths were rolled away from the great peaks, revealing to our astonished eyes glaciers and snow fields, vast precipices and towering pinnacles, grouped in one wild, picturesque, mountain panorama. Not a tree or shrub was in sight, but a few of the lower mountain slopes were aglow with alpine flowers. The temptation to return to Blossom Island, where all was sunshine and summer, was great, but we pressed on, taking the center of the glacier as our route, and threaded our way between deep crevasses to the heights above.

Space will not permit a detailed account of our life above the snow line, which will be described more fully elsewhere. Each day we advanced over the crevassed ice, many times crossing the yawning chasms on narrow snow bridges, and at night pitched our tent where darkness overtook us, or when we became too weary to travel farther. Sometimes we found a perch on the crest of a rocky ridge at a sufficient distance from the cliffs above to escape the falling stones, but many times were forced to camp on the open glaciers, without even the luxury of a few handfuls of gravel to keep our blankets from freezing to the ice.

On the third day after leaving Blossom Island we reached the head of the Marvine Glacier at the point where the most westerly spur of Mount Cook leaves the main mountain mass. Fortunately for us a break there occurs in the mountains, forming a pass leading westward. From the many tapering spires and pinnacles on the cliffs overlooking this natural highway we named it "Pinnacle Pass." The elevation of its summit is 4000 feet above the sea, and on its northern side there is a magnificent line of cliffs from 1000 to 2000 feet high, trending east and west. From the divide at Pinnacle Pass the snows flow both east and west and form a gentle grade, which would be easy to traverse were it not for the multitude of open fissures or crevasses. Crossing Pinnacle Pass we descended the western snow slope for several miles, having on our right the great line of cliffs already mentioned, which shut out the view of mountains to the north; but on passing the end of these cliffs and gaining the Seward Glacier, the next ice stream which flows southward down the mountains, the St. Elias range with its many giant peaks bursts into view. From this point we had our first unobstructed view of Mount St. Elias. The sun

was just setting behind the great pyramid that forms the summit of the mountain, and all of the white-robed peaks to the north were flushed with a soft sunset glow. At last we had reached the most secret recesses of the mountains. The veil was lifted, and we stood silent with awe in the holy of holies!

The Seward Glacier is by far the largest and grandest of the alpine glaciers discovered during the expedition, and was named in grateful remembrance of Hon. William H. Seward, the purchaser of Alaska. At the place we first reached it the ice flows down a moderate slope, and is broken in a wonderful way. The ice stream here forms a rapid, the descent not being steep enough to produce what is known as an ice cascade. The ice is so shattered that it was impossible to cross, and we had to climb a projecting mountain spur and ascend the bank of the stream for a distance of two or three miles before being able to find a way to the western shore.

We crossed the Seward Glacier above the rapids, and, ascending a tributary stream of ice which comes in from the west, found another pass having about the same elevation as Pinnacle Pass, and, like it, leading westward. On each side of the crest of this divide there stands a bold, snow-covered dome, which suggested the name "Dome Pass" for the opening. Westward from the pass the snow surface slopes downward and joins another glacier which is fed by the snows falling on the southern slope of the main range between St. Elias and Malaspina. The lower end of this glacier, far to the south of where we crossed it, was named Agassiz Glacier by the expedition in charge of Lieutenant Schwatka in 1886. Its western branch drains the snow from the northeast slope of the crowning pyramid of St. Elias. Our way led up this western branch, which we called the Newton Glacier after the great triangular pyramid on the main mountain ridge above, next northeast of St. Elias. To gain the highest snow field of this glacier we had to ascend two ice-falls; one in the Agassiz Glacier, and the second where the Newton branch joins it. At these places the ice flows over precipices, and is so greatly shattered and crevassed that it is all but impassable. These cascades have a resemblance to what one might fancy would occur if a closely built city had been upheaved and tossed about by an earthquake. A more rugged or more fearful assemblage of chaotic ice forms could scarcely be fancied. After trying unsuccessfully to find a way through the first of these wildernesses of ice pinnacles, bottomless cañons, and broken and tossed tablelands, we left the glacier and endeavored to ascend the side of the ice stream. After much difficulty, and one or two unsuccess-

cessful attempts, we found a passage leading to the comparatively smooth plateau of snow above the cascade, and encamped for the night on the top of a large table of ice bordered on all sides by crevasses hundreds of feet deep, in which no bottom could be seen.

The next day we attempted to thread our way through the maze of crevasses and pinnacles of the upper fall, but after several hours of weary climbing were obliged to turn back and endeavor to scale the cliff at the side. This cliff is nearly perpendicular and runs at right angles to the course of the glacier. Its prolongation beneath the ice gives origin to the ice cascade. Near where the cliff emerges from the ice there seemed to be a practicable route for reaching the top. I attempted to scale it at this point, but found the way so difficult, and was suffering so severely from snow-blindness, that I was obliged to give up the attempt. Kerr and Lindsley threw off their packs, and, taking alpenstocks and a life-line, succeeded in finding a way through the deeply crevassed ice to the top of the cliff at the point where I had endeavored to ascend it. Soon a rope was made fast, and a way to the snow plateau above was secured. Along the top of this precipice, which we called "Rope Cliff," towered an overhanging wall of ice, thirty or more feet in height, which threatened every moment to crash down in avalanches; but by making the ascent while the cliffs were in shadow this danger was greatly lessened. Above Rope Cliff our way led for half a mile close underneath a towering mountain mass, from which avalanches frequently descended. This was the most dangerous portion of the ascent. The cliffs above us rose fully a thousand feet, and were covered with crevassed ice which had every appearance of being ready to fall. We had to cross the tracks of several avalanches, and once while we were making the passage an avalanche of new snow started from the cliffs above and flowed down, spreading as it descended, until within a few yards of our trail, when it ceased. On retracing our steps over this portion of our route in descending we found that the tracks made while going up had been swept away. The path of one of these avalanches was deeply grooved, and sheathed with glare ice, formed by the freezing of the waters melted by the friction of the descending mass.

A mile above the cliffs that had given us so much trouble we found the snow even more heavily crevassed than usual, and our way blocked by precipices of snow and ice from 50 to 100 feet high. We searched for several hours for a passage through this labyrinth, but found none. At last we attacked one of the cliffs with our hatchet, and after two hours'

hard work had a set of steps leading to the top. This was the last serious obstacle in the ascent. Above the steps we found ourselves on a vast plateau bordered on all sides, except that on which the glacier flowed, by cliffs and towering mountain slopes white with the snows of many winters. The highest point on the rim of this great amphitheater was Mount St. Elias, which rose above us, a vast pyramid five thousand feet in height.

Crossing the great snow field forming the floor of the amphitheater were hundreds of yawning chasms, many of them twenty to forty feet in breadth and half a mile in length. These we had to cross by narrow snow bridges or follow for long distances before being able to pass around their ends. A view into the blue depths of one of these great crevasses is a sight never to be forgotten. Their lips are of white snow, festooned and overarching in a thousand fantastic forms; below, the color changes by imperceptible gradations to the deepest blue. Their extreme depths are as dark in color as the unfathomable sea. Many times their bottoms are beyond the reach of vision; again they are level-floored and form a fairy-like valley with walls of sculptured crystal; in other instances they are partly filled with water of the deepest indigo, in which every detail of the fretted walls above is reflected. Some of the larger crevasses are crossed by snow arches, thrown directly from bank to bank, and resembling in their grand proportions the Natural Bridge of Virginia. Our way lay for miles across this beautiful but treacherous pavement, along the brink of dizzy precipices, and across narrow bridges with bottomless gulfs on each hand. Although we had been living on the glaciers for weeks and had become familiar with many of their wonders, the great crevasses in the upper snow regions were so magnificent in their proportions and so wonderful in color that they called forth exclamations of admiration from every member of our party.

On the evening of August 21 we pitched our tent in the snow at the border of a blue glacial pond near the immediate base of the great pyramid forming the culminating point of St. Elias. For ten days we had enjoyed beautiful weather, and the sun went down behind the great mountain peak we wished to climb, spreading a flood of yellow light over the rugged landscape and promising a continuance of clear skies. Every inch of the way to the top of the mountain was in plain view, and we felt confident of making the final climb on the morrow. When we retired each peak stood out clear and sharp against the dark, starlit heaven; but when we awoke next morning it was apparent that a change had taken place. The peaks were no longer clearly defined, and

from the higher summits cloud banners were streaming off towards the southeast. The vapor banks in the east were flushed by long streamers of light, and then faded to a dull, ashen gray, while the cloud banners between us and the sun became brilliant with rainbow tints. The rare beauty of that silent, wintry landscape, so delicate in its pearly half-tones and so softly lighted, was unreal and fairy-like. The winds were still, but strange forebodings of coming changes filled the air. Long, waving threads of vapor were woven in lace-work across the sky. The white-robed mountains were half concealed by shapeless cloud-masses that drifted like spirits along their mighty battlements, and far, far above, from the topmost pinnacles, irised banners were signaling the coming of a storm.

In spite of the unpromising conditions, we started on what we hoped would be the final climb; but the indications of bad weather increased, the clouds grew heavier, and at last, at an elevation of 9500 feet, we reached the base of a dark vapor bank which concealed the view above, and snow began to fall. After twenty days of fatigue and hardship since leaving Blossom Island, with our goal almost within reach, we were obliged to turn back. Regaining our tent, we concluded to remain until the morrow, hoping that the weather would moderate. But the snow continued to fall throughout the day, and the storm increased in force as night came on. In the morning the tempest was still raging. We were in the midst of the storm cloud; the vapor and fine drifting snow crystals obscured everything from view. The snow was already more than three feet deep about our tent, and to remain longer with the short supply of provisions on hand was hazardous, as there seemed no limit to the duration of the storm. Resuming our packs, we roped ourselves together and began to descend through the blinding mist and snow, which rendered the atmosphere so dense that a man could not be distinguished at a distance of fifty yards. With only our instinct and the direction of the storm to guide us, we worked our way downward between the deep crevasses and over the snow bridges that had obstructed our way during the ascent. All day long we continued our slow journey through the blinding storm, and at night believed ourselves to be near the steps cut during the ascent, but the darkness came on before we reached them. Shoveling the snow away as best we could with our hands and our basins, we cleared a space down to the old snow large enough for our tent, and went into camp. In the morning the storm had spent its force, leaving the mountains with an immaculate covering of white, and still

partly veiled with shreds of storm clouds. We found ourselves on one of the many tables of snow, bounded on all sides by yawning crevasses, and not far from the great crevasse in the side of which we had cut steps. The steps were obliterated by the new snow, but by means of a rope and alpenstocks we made the descent without much difficulty, and passing beneath the cliffs, dangerous on account of their avalanches, reached the precipice where we had left a rope. A heavy avalanche had swept down from the heights above during our absence, sending its spray over the cliff where we had to descend. We gained the previous camping-place below the cliff, but far enough away to be out of reach of the stones and avalanches that were frequently shot down from above, and there passed the night.

The following day, after some consultation, it was decided to attempt once more to reach the summit of St. Elias. Lindsley and Stamy, who had shared without complaint the privations of our life in the snow, volunteered to descend to a lower camp for additional rations, while Mr. Kerr and myself returned to the higher camp, hoping that we might be able to ascend the peak before the men returned, and if not, to have sufficient rations, when they rejoined us, to be enabled to continue the attack. The men departed on their difficult errand, while Mr. Kerr and I, with blankets, tents, oil stoves, and what rations remained, once more scaled the cliff, where we had placed a rope, and returned on the trail made the day previously. About noon we reached the excavation in the snow where we had bivouacked in the storm, and there prepared a lunch. It was then discovered that a mistake had been made as to the quantity of oil in our cans, as scarcely enough remained to cook a single meal. To attempt to live several days in the snow with this small supply of fuel seemed hazardous. Mr. Kerr volunteered to descend and overtake the men at the lower camp, procure some oil, and return the following day. We then separated, Kerr starting down the mountain, and leaving me with a double load to carry through the deep snow to the high camp previously occupied.

Trudging wearily on through the deep snow, I reached the high camp at sunset. I pitched my tent in the excavation previously made, using my alpenstock for one tent-pole, and piling up snow, saturated with water, for the other; the snow froze in a few minutes and held the tent securely. The ends of the ridge-rope were then stamped into the snow and water was poured over them; the edges of the tent were treated in a similar manner, and my shelter was ready for occupation. Cooking some



ST. ELIAS FROM DOME PASS, LOOKING NORTHWEST.

supper over my oil stove, I rolled myself in a blanket and slept the sleep of the weary. On awakening in the morning I found the snow drifting into my tent, and, on looking out, discovered that I was again caught in a blinding storm of mist and snow. The storm raged all day and all night and continued without interruption till the evening of the second day. The coal oil becoming exhausted, I filled a can with bacon grease, in which a cotton rag was placed for a wick, and over this "witch lamp" did my cooking during the remainder of my stay. The snow, falling steadily, soon buried my tent, already surrounded on three sides by a wall of snow higher than my head, and it was only by constant exertion that I kept it from crushing in. With a pint basin for a shovel, I cleared the tent as best I could, and several times during the day re-excavated the hole leading down to the pond, which had long since disappeared beneath the level plain of white. I also began the excavation of a tunnel in the snow, with the expectation that the tent would soon become uninhabitable. The night following I found it impossible to keep the tent clear in spite of almost constant efforts, and early in the morning it was crushed in by a great weight of snow, leaving me no

alternative but to finish the snow-house and move in. I excavated a tunnel into the snow some four or five feet, and made a chamber at right angles to this, about six feet long by four wide and three feet high. In this I placed my blankets and other belongings, and hanging a rubber coat, supported by an alpenstock, at the entrance, found myself well sheltered from the tempest. There I passed the day and the night following. In the morning I was awakened by the croaking of a raven on the snow immediately over my head, and found that the soft blue light of my grotto was replaced at the entrance by a pink radiance, telling that the day had dawned bright and clear.

What a glorious sight awaited me! The heavens were without a cloud, and the sun shone with dazzling splendor on the white-robed mountains. The broad, unbroken snow plain seemed to burn with light, reflected from millions of snow crystals. The great peaks were draped from base to summit in the purest white, as yet unscarred by avalanches. On the steep cliffs the snow hung in folds like drapery, tier above tier, while the angular peaks above stood out like crystals against the sky. St. Elias was one vast pyramid of alabaster.

The winds were still. Not a sound broke the solitude. Not an object moved. Even the raven had gone, leaving me alone with the mountains.

As the sun rose higher and higher, and made its warmth felt, the snows were loosened here and there on the steep slopes and broke away, gathering force as they fell, and rushed down in avalanches that made the mountains tremble and awakened the echoes with a roar.

To witness such a scene under the most favorable conditions was worth all the privation and anxiety it cost.

On the sixth day after parting from my companions, judging that they must have returned at least to the camping-place where we had separated, I packed my blankets and the meager remnants of food still remaining, abandoned the tent, and started to descend the mountain. Even under the warm sunshine of



A GLACIER RIVER FLOWING OVER ICE AND ENTERING A TUNNEL.

like thunder. From a small beginning high up on the slopes the new snow would slip downward, silently at first, and cascade over precipices hundreds of feet high, looking like a fall of foaming water; then came the roar, increasing in volume as the flowing snow involved new fields in its path of destruction, until the great mass became irresistible and plowed its way downward through clouds of snow-spray, which hung in the air long after the roar of the avalanche had ceased. All day long, until the shadows of evening fell on the steep slopes, this mountain thunder continued. The echoes of one avalanche scarcely died away before they were awakened by another

the previous days the snow refused to melt sufficiently to enable it to freeze at night and form a crust. It had settled somewhat, but was yet six feet deep. Tramping wearily on through the dry, chaff-like snow, I slowly worked my way downward and again threaded the maze of crevasses and snow bridges now partly concealed by the newly added layer. Midway to the next camping-place I met my comrades, coming up to look for me.

During my imprisonment at the highest camp Mr. Kerr was detained under similar circumstances at the camping-place below Rope Cliff. On endeavoring to rejoin me with the supply of coal oil, so very valuable under



SKETCH MAP OF MOUNT ST. ELIAS REGION. (WESTERN PORTION FROM MAPS BY H. W. SETON-KARR AND H. W. TOPHAM.)

the circumstances, he was caught in the storm and was unable to reach the meeting-place appointed. He reached Rope Cliff in the afternoon of the first day of the storm, climbed the precipice, and found his way through the gathering darkness along the nearly obliterated trail beneath the avalanche cliffs and up the steps cut in the side of a crevasse to the site of our bivouac camp. Finding nothing there, and being unable to proceed farther through the blinding storm, he abandoned the attempt and returned to the camping-place below Rope Cliff. In descending the rope he found that its lower end had become fast in the snow. The taut line, sheathed with ice, was an uncertain help in the darkness. Midway in the descent his hands slipped and he slid to the bottom, but the cushion of new snow broke the fall and prevented serious injury. Alone, without fire,

without blankets, having only a canvas cover and a rubber blanket for shelter, and with but little food, he passed three anxious days and nights before the return of the camp hands.

Deciding that the ascent of St. Elias could not be accomplished through the deep snow, the attempt was abandoned and the descent begun. Our retreat was none too soon. Storm succeeded storm throughout September, and each time the clouds lifted the mantle of new snow was seen to have descended lower and lower. Our last view showed the wintry covering nearly down to timber line.

After an excursion up Seward Glacier nearly to the upper ice-fall, where I was again turned back by a heavy snow-fall, I returned to Blossom Island and there found Mr. Kerr, who had descended immediately after our failure to reach the summit of St. Elias. My stay above

the snow line lasted from August 2 to September 6. Though traveling through rain and snow and sleeping on the ice is uncomfortable, I shall never regret the experience gained and never forget the magnificence of the great mountains when freshly robed in snow.

From Blossom Island Mr. Kerr returned at once to the mission at Port Mulgrave, while I made an excursion out on the great plateau of ice intervening between the mountains and the Pacific, which has already been briefly described. From the level sea of ice into which the mountains thrust rugged headlands the mighty range to the north appears higher and more rugged than from any other point of view. St. Elias rises from the ice in what appears a sheer precipice, fifteen thousand feet high. I doubt if a more impressive mountain face exists anywhere else in the world.

Retracing our steps to the shore of Yakutat Bay, we reoccupied our former camping-place, and in a few days were rejoiced to see the United States Revenue Marine steamer *Corwin* coming up the bay. Captain C. L. Hooper, her commander, did everything in his power to make us welcome, and to him we are indebted for a delightful voyage back to civilization. The morning of our departure was exceptionally bright and clear, thus adding to our joy at finding a ready means of returning to homes and loved ones.

After steaming up the bay nearly to the ice cliffs of the Hubbard Glacier, and giving us a fine view of the mountains and glaciers about Disenchantment Bay, the *Corwin* returned to Port Mulgrave and on September 25 put to sea. After a splendid ocean passage we arrived at Port Townsend on October 2.

During our stay in Alaska not a man was sick and not an accident happened. The work planned at the start was carried out almost to

the letter, with the exception that we did not reach the summit of St. Elias. The results of the expedition embraced geological and glacial studies, and a topographic map of an area of upward of a thousand square miles, previously entirely unknown. The heights of all the principal peaks within a distance of many miles of our route were determined. Although the elevations of the mountains were found to be less than was previously supposed, they are still to be ranked among the most magnificent uplifts on the North American continent. The highest peak in the region explored is St. Elias, which has an elevation of 15,350 feet; next in importance is Mount Augusta, 13,105; Mount Cook, 12,370; and Mount Logan, named in honor of Sir William E. Logan, formerly Director of the Geological Survey of Canada, 12,616; Mount Irving, named for Professor Roland D. Irving, late professor of geology in the University of Wisconsin, 9151; Mount Newton, in honor of Professor Henry Newton, formerly of Columbia School of Mines, 11,387. Other peaks of equal magnificence are too numerous to name. For these measurements I am indebted to Mr. Kerr.

These mountains are not ancient volcanoes, as has been stated by certain writers, but are composed of stratified sedimentary beds which have been broken by profound fractures and upheaved as great mountain blocks. The huge pyramid presented by St. Elias when seen from Yakutat Bay is not a volcanic cone like Mount Shasta or Mount Rainier, as its shape might suggest, but is the end of a roof-like ridge. It is the highest corner of a great mountain block, and furnishes a typical example of a class of mountains formed by the upheaval and tilting of massive blocks of the earth's crust without folding or crumpling.

Israel C. Russell.

THE TWENTY-THIRD OF APRIL.

A LITTLE English earth and breathéd air
 Made Shakspere the divine: so is his verse
 The broidered soil of every blossom fair;
 So doth his song all sweet bird songs rehearse.
 But tell me, then, what wondrous stuff did fashion
 That part of him which took those wilding flights
 Among imagined worlds — whence the white passion
 That burned three centuries through the days and nights?
 Not heaven's four winds could make, nor the round earth,
 The soul wherefrom the soul of Hamlet flamed;
 Nor anything of merely mortal birth
 Could lighten as when Shakspere's name is named.
 How was his body bred we know full well,
 But that high soul's engendering who may tell!

R. W. Gilder.