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Report of
Henry Custer, Assistant
of Reconnaissances
made in 1859 over the
routes in the Cascade
Mountains in the
vicinity of the 49th
parallel.

EXTRAORDINARY

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Washington May 1866

Archibald Campbell Esq. r U. S. Commissioner¹

N. W. Boundary

Sir.

The topographical work executed by me, while in the service of the U. S. Northwest Boundary Commission, may be properly divided in 2 classes: Namely, first the Topographic of the country on and in the vicinity of the 49th Parallel extending from the western Coast to the western Slope of the Cascade Mts, across the Cascade Mts, to their Eastern Slope, across that, to the beginning of the western Slope of the Rocky Mts. The second Class extending from the beginning of the Western Slope to the Main Crest of the Rocky Mts and across the Main body of the Rocky Mts to the foot of their Eastern Slope, or the plains of the Saskatchewan.²

The Character of these Mt Systems is so strikingly different that this difference would not fail to strike the most casual observer, and may therefore be properly used to classify the series of topographical excursions made by me. I shall here not go into detail as to what these differences consist in, but shall speak of it when in the course of my report or narrative I can properly dwell upon it. Properly speaking this difference in Climate, vegetation, formation, etc., begins already as soon as the traveller descends the Eastern Slope of the Cascade Mts; but for the sake of simplicity & uniformity I shall assume that the above stated differences are simply the very prominent & characteristic features of these great mountain systems of our continent.

Topographical work may be said to consist of two principal branches. First, it comprises the geodetical work of the Topographer, or the definition

by mathematical instruments of the geographical & (mutual?) topographical positions of the topographical features of a country. Second, the descriptive portion of the work, which has the purpose to reproduce by a certain adopted method the shape or form of the topographical features of a country on paper either in preliminary sketches on the field or on final maps. I shall here only make a few general explanatory remarks about the method of the topographical work performed by me; but shall enter more in detail at the end of my report when I shall devote some space for this purpose.

Once the method of the topographical work indicated and its detail described, little need to be said of it in the following reports because the same or similar operations are continually repeated. On this account reports of the excursions made by me must be necessarily more simply of a descriptive nature, descriptive of what was seen & experienced. To do this truthfully & intelligibly was in fact the object I had in view.

The reconnaissances made by me were based upon a sistem of triangulation points, for which the numerous & sharply defined peaks gave an excellent opportunity. No pains were spared to make these points as numerous & corect as the nature of the work demanded & as the nature of my geodeatic instruments permitted it. Numerous ascensions to heigh points gave me an oportunity to test the corectness of these points in many ways & to continually increase their number. It enabled me to study the nature of the country & the conections of the features of the different portions of it so thoroughly that, in my later reconnaissances, guides could be entirely dispensed with & to range effectively & corectly together the different isolated sketches made upon such points of a large area of the surrounding country. Numerous observations were also taken, which will be the means to define the altitude

of many hundreds of points. With these a correct profile of the country along the 49th Parallel may be construed as also they serve to reproduce correctly the form or shape of the different mountain masses.

The triangulation points obtained in this way were in turn connected with numerous points of the survey made along the line, or with well established astronomical points on the line, or others in Camps & depots. A number of stations were also partially defined by latitude observations with a good sextant. Numerous topographical sketches & Mountain profiles were drawn in the field without regard to any (particular) scale. But invariably it was attempted to bring every thing seen on the paper. With portions nearer to the station, a much larger scale was adopted than for those farther of.

After these triangulation points had been carefully laid down on the paper & their mutual relations correctly defined, it was easy to fit the detached sketches and points of reconnaissances between them. Much which was formerly unclear & not understood was easily explained & arranged in this way. The result of this method was to produce very correct & minute maps over the whole extent of the Boundary line. Part of these reconnaissances, in fact all those on the Western Slope of the Cascade Mts and in the Cascade Mts itself, were made on foot, with the help of Indians belonging to the various tribes of the vicinity, (such) as the Semiamocs, the Loomis, the Sumas, the Uihiloweyuks, the Somonas, ect. ect.³ The services of these Indians were very valuable, as portions of the Interior of these Mountains are absolutely impenetrable except on foot.

Localities where trails had to be made were first explored with the help of Indians, who acted as carriers, some times also as guides. By

employing them, we secured the good will of these tribes, so necessary to our success. Most all the first information of the topographical features was also obtained by & from Indians, who all may be said to have a geographical Range, some a small, some large, of none is it very extended, while they possess all, & the most minute topographical knowledge, of a certain portion of the country generally well defined.

Outside of these limits, the country is a perfect tierra incognita to them, which they neither need or care or have the curiosity to explore. One of the Indians in my employ (Jhinsoloc) a Samona Chief, had the most extended geographical Knowledge of any Indian I ever had to deal with. By request he made me a map of the extent of country he was well acquainted with.⁴ It was bounded by the Fraser river to the North, by the Skagit River to the East, by some tributary of this river to the South & by the Noo Khsahk & Chiloweyuck Rivers to the West. Within these limits his knowledge of the country was most minute & reliable. The map he made of it, although in the most primitive stile, was remarkable for its correctness & completeness. In this way we gained most of our first Knowledge of the country, as also many of the names of its mountains, smaller streams, & lakes.

Reports of the principal different reconnaissances in the vicinity and on the Western Slope of the Cascade Mts were written while in the field & have already been handed in. One report of a reconnaissance extending to the Interior of the Cascade Mts in the vicinity of the 49th Parallel, & embracing the country from the astrom. Station on the Sweltiha Lake to the Sanisseh River, as distance of 22 miles on the Parallel, has been handed in lately.⁵ Four more reconnaissances were made to develop the Country along the Parallel, extending from the Sanisseh to the Skagit River & to the Watershed between that river & the Columbia River, or to the point from whence

the Eastern Slope of the Cascade Mts properly begins. These 4 Reconais-
sances were made partly by Canoe, partly by foot, & with a partial assis-
tance of a party of Indians of the above mentioned tribes. Part of this
report shall describe what was seen & experienced during those 4 reconnaissances.

On the 12th of June (1859), I received orders to explore the vicinity
of the Parallel near its intersection with the Ensan Kwatch Creek & some
of the head branches of the Claheih Creek, both tributaries of the Chilo-
weyuk River.⁶ The former is one of the streams which, coming from the
South, flow parallel with the already mentioned streams: the Layomsen, the
Tumeahay, & the Samiseh.⁷ The parallel runs here almost completely along
the Watershed between the Nooksahk & the Chiloweyuk Rivers, flowing on both
sides of a vast Mountain spur which connects with the main Cascade Range
somewhere near the headwaters of the Klahel Stream, which flows in its turn
between the main range and this spur & which may be considered as the main
feeder or head of the Chiloweyuck river & lake.

On the 14th of July I had my party together, consisting of 11 Indians,
2 white men, Mit/c/hly & Cavanaugh, ready to start, every one of the Indians
loaded with a Pak of about 50-60 lb.⁸ 70-80 lb is the maximum weight which
these Indians engage themselves to carry. Some delay was caused by the dis-
charge of one of the Indians, Tuk-Tuk, who would not proceed without his
better half. Knowing, however, the disturbance which these Indian damsels
produce in a party by their willfullness and extent of influence over their
stronger companions, I insisted to proceed without this addition to our party.
Another Indian was engaged in place of the reflective one.

We started along the regular trail to the Chiloweyuk-lake, formerly
a Hudson bay brigade trail but now improved by our party & the English,
the main route, to reach portions of the Parallel.⁹ The trail & Country

is so well known to all that I shall not attempt to describe it. The former is generally good & well located. We camped this evening near the Chiloweyuk river where the trail touches this river again, after having passed what was called the first summit of the trail (which is however only the summit of a foot slope). The Chiloweyuck river, still very much swollen by the melting of the snow in the mountains during these months, rushes passed here with almost ferocious impetuosity, a fine clear stream of ice cold water. We met here a small party of English employees improving the trail, taking it leisurly. Our english colaborers policy seems to be to do their work by small detachments widely scattered about; while generally our forces are concentrated upon certain points where most labor is needed. Our camp would have been a good one but for the multitude of the most hungry musquitos which, while they hardly touched the Indians, gave us white men no rest.

Next morning we proceeded on. Our journey was made disagreeable by a most persistent rain which made the trail bad & shrouded the fine Mountain scenery along the stream with an impenetrable curtain. We camped to day on a little river bar, some time during the season used as a Indian camp for fishing purposes. There are several huts here; the place is known as the Samonac village.¹⁰ The Samonas being an Indian tribe which is mostly domiciled in these mountains; they are true Mountain Indians.

From observation of the barometer, we found the River to have a fall of about 14' per mile, which is imense for so large a body of water. What an oportunity for millsites, manufactories, ect. There is also a fine growth of timber covering almost every visible spot of ground. But as a general thing the River valley is narrow & the mountain slopes come down imediately to the River bank. Next morning we pursued the same trail, country the same, the weather clearing up toward noon. After having crossed 2 tributaries from the North, coming from the Kletlakeh Mts, we reached a level

plain of a considerable extend, thinly covered with timber. On the oposite side of the river, we espied a wide gorge in the Mountain masses bordering the stream, which our Indian guide declared to be the Valley formed by Ensank-watch Creek.¹¹ We found here again a little side establishment consisting of 2—3 english employees living in one of their small & uncomfortable tents.

When examining the Stream in the vicinity of the mouth of the Eusankuateh Creek, we found no suitable foot log to cross the river by. I therefore concluded to camp here (in order to) establish a bridge whereby to cross the River. After several unsuccessful attempts, we finally managed to fell a tree sufficiently large to reach the oposite bank & to afford us a good crossing. From here I sent Setwahn, a Sumass Indian chief, with a written message to Mr Gardner, then occupying an astronomical station on the Chilowey-uk lake.¹²

And let me here say that nothing pleases an Indian more than to be sent as a messenger with a letter or written message; it increases his importance in his own eyes more than twofold. To be sent forth with a paper, which always possesses in his eyes something misterious & inexplicable, elates him. The mark of confidence which he thinks you bestow on him stimulates his pride. You need not to tell him to take care of it; he will do so untold. Without any intimation on your part he will preserve it on the safest spot & will take anxious care of it.

Next morning we crossed the Chiloweyuck river & soon began to ascend the Valley of the Ensawquateh. This is a stream of the size of the Jumeahay creek, flowing in a narrow valley bounded by high & very precipitous mountains, which increase in height as we ascend further up. Our march was a most tedious one, winding our way along the steep slopes of the Mountains bordering the stream, or breaking our way through dense tissues of bush vegetation always found in the bottoms of these streams. They are the vine maple & another bush whose name I do not know. They extend along generally the margins of the Creek clear up to the Mountain summits: and there is no

alternative but to break your way through it. To do so, you have to work with hand and foot to break or hold away the very elastic twigs of the bush which, if not careful, will give you such a lesson you will not soon forget. Add to this a most disagreeable thorny plant with large leaves & red berries, which obstructs itself continually in your way; a boggy ground in which now & then you leave your boots behind; and an intolerable swarm of mosquitoes which obstinately, without fear or favor, make use of your helplessness; and you have a description of the obstacles which come in the way of the traveller in the mountains.¹³

Higher up we found the valley very narrow. The stream forms here & there falls of some considerable height, which make the scenery picturesque. The mountain, composed of whitish granite or cianite, are exceedingly broken & steep near their sumits, which seem to (be) inscendible. Now & then our way is completely obstructed by large masses of snow, which in form of avelanches had come down from the hillsides & which had left a broad bank of destruction where ever they came through. Trees (and) large masses of rocks were swept away with resistless force by these thundering snow-masses & lay now piled up, either in the stream or some level place near it. The Mountainsides were generally free of snow; only here and there were patches of it visible. The higher we ascended the cooler we fortunately found the air, which was intensely hot & close lower down, & the lesser in number we found our tormentors, the musquitos, which never seem to lose themselves in these higher & cooler regions. One good thing which to the exhausted traveller never fails is a plentyful suply of the most delicious clear & cool water, of which we availed ourselves constantly.

About 4 Clock P. M. we reached a level spot, which I selected for our camp. Owing to the many difficulties of our route, some of the Indians

came in late to the camp; & some of (them), moving on the opposite bank, missed it altogether. A few shots & shouts finally brought the whole party together. One must have pioneered over such a difficult route as ours to understand & appreciate the luxuries of a pleasant & cool camp, of a good fire, a good pipe, & a simple but hearty meal; man realizes then a few moments of almost undisturbed enjoyment.

While sitting in our camp, our "dolce farienty" was rudely interrupted by a most serious and unexplicable occurrence, fortunately without any serious consequence. A dry tree of considerable size fell down without further notice, with a great crash, in the midst of our peaceful camp, some of its branches playing havoc with our cooking arrangements & the main trunk smashing one of our most valuable tin kettles. Fortunately nobody was hurt; although the escape was narrow. There was at the time not the slightest wind stirring. Up to this point numerous side streams had emptied into the Creek, but none of any large size.

The next morning saw us early on our way. The day was fair & the weather delightfully cool, as the altitude where we are is already very considerable. After a march of an hour or so, we reached 2—3 little marshy prairies of a circular shape; this is a feature which is often seen near the headwaters of these Mountain streams. From here to the 2 principal head forks of the Creek is but a short distance. One of these 2 branches heads in a SE direction; the other one comes from the Southwest and takes its rise, as we subsequently ascertained, in a small lake laying in a rocky basin nearly on the summit of the Ridge to the West of us.¹⁴

To obtain a correct idea of the formation of these Mts & the corresponding watershed of its different draining streams, I concluded to leave the stream, the head forks we had already reached, & to ascend the Mts to our left.

We had much hard climbing to do but, fortunately, the higher we reached the more the timber became clear of underbrush. Higher up near the summit, even the former gave out also & our progress was quick. After having proceeded some distance on the summit of the Ridge, we were compelled to descend again by some ravine lateral to our course. After a somewhat difficult descend, we finally reach the valley of a little tributary of the main creek coming from the Northeast, & here we concluded to camp.¹⁵ It was a most lovely spot, sunny & free of snow; the grass had grown luxuriously; rare flowers of many different colors & the brightest hues were seen every where— a fine alpine pasturage. To recognize the country generally I concluded to ascend a prominent peak on our left, nearby. Mitchell & myself & the Indian chief went underway, & after an hour's tedious climbing finally reached a high peak in the Ridge NE of the Main Creek.¹⁶

The height according to Bar. was about 7000 feet & the average altitude of the Ridge about 6500 feet. We found ourselves to be on the dividing ridge between the Waters of the Ensanquatch & those of the Klahieh. The principal forks of the latter were plainly visible; the southwest fork of it heads immediately with the SE form of the Ensanquatch, and the Klah is separated from the former only by (a) thin low Ridge. We found also that the SW fork of the Klahieh stream could be easily reached by following down of its tributaries heading at the foot of the East side of the ridge we had ascended. The view from here was fine & extensive to all directions of the compass. I leave it to a better pen to describe the sublimity of true Mountain scenery in the Cascade Mts as seen from a point of such altitude; it must be seen it can not be described. No where do the Mountain masses & Peaks present such strange, fantastic, dauntless, & startling outlines as here. Whoever wishes to see Nature in all its primitive glory & grandeur, in its almost ferocious wildness, must go & visit these Mountain regions. The angry billows

of a storm tossed ocean, thousands of times magnified in height & size and seen from the masthead of a vessel, would give you a somewhat adequate view of it.

Toward the East the Mts reach a considerable altitude; & for the first time glaciers (which until now were not known to exist in these Mts) were seen to cover the Mountainsides to a considerable extent, dazzling in the reflected light of the sinking sun. To the southwest, Mt Thuskan & Mt Baker elevate their hoary & icy sumits, beautiful & majestic from whatever pt you may contemplate them. To the Northwest & West, the Layomsen, Tumeahay, Sanisseh, & Ensanquatch Mts show their rough, rugged, & broken sumits, vast masses of whitish rock—steep, perpendicular, & inascendible. These Mts are about 8000—9000 feet heigh & were still partly covered with snow. To the East, in the vicinity of the Parallel (we are here considerably to the South of it), we notice a imense fire consuming the adjacent woods & sending up vast colums of smoke several 1000 feet high. Altogether I was very much satisfied with the information obtained on this point & went back to camp highly pleased, where I found a corresponding spirit to prevail. Every body was satisfied & comfortable.

July 18th, my intention was now to reach one of the principal forks of the Klahelh Creek, the SW fork, & to follow its course to the junction with the main Klahsch stream. Accordingly this morning every body was up early & ready to proceed on our journey. The fair weather & the pleasant, cool, & exhilarating air produced a willingness & cheerfulness among the whole party. After having ascended the dividing Ridge, we found by closer inspection soon a place which permitted of a descend to the Creek flowing at the foot of its eastern slope. We found here the slope covered with snow & a moderate inclination downward on it. The whole party soon

began to descend; sitting astraddle of our mountain sticks, we slid down with great rapidity, every body delighted with the fun. Very soon we reached the Creek which was here a southerly course to reach the main fork (SW) some distance further down. I concluded to camp & to occupy the afternoon with the ascend of a mountain on the South side of the Southwest fork of the Klahneih.

Accordingly, at noon Mitchly & myself went on our way to ascend this mountain, which we accomplished after a fatiguing climbing of several hours.¹⁷ It was about 7000 feet high. We found here the limit of the snow region & timber region the same as already observed, the former about 7000 feet, the latter about 6500. As subsequent observation proved, these estimates remain the same through the entire section of the Cascade Mts visited by me, and only change when having passed well to the Eastward of the main ridge of these Mts. The view from the point we had reached was also very fine, similar to the one already described &, beyond, some better insight into the nature of the Southwestern tributaries of the Klahneih creek. No information new was obtained, but many valuable bearings were taken. Mts Baker & Thuskan were also visible. The latter appears from here not as an isolated peak, but as an immense rocky perpendicular wall, many thousand feet elevated above the massive pyramidal base of the Mts. Both of these peaks, as I plainly saw from here, do not belong or lay in the main body or ridge of the Cascade Mts. This latter from here can now plainly be defined to be composed of the high Mts seen to the East of us, extending nearly North & South but in one of the Westerly spurs jutting out from the main ridge.

While up here, & through these Mts generally, we were continually in hearing of a shrill piercing whistle coming now from one, now from another, direction. This we found out to be caused by an animal very frequent in these Mts, the Whistler or Marmotte. Whether it is their usual cry or meant

to be a signal of approaching danger which these animals give to each other, I could not decide. Several specimens of this animal were shot by our Indian hunter. What has been said of the vegetation or flora of those Mts in a formal report is also true of this region. Although the season was more advanced, we found in Altitude of 6000—7000 ft. only very few specimens of plants, grass very sparse. The small shrubs bearing red & white flowers were also here predominant; they belong to the Erica family or Heather, I believe. After a tiresome descend of some hours, we finally reached our camp thoroughly tired.

This morning found us on our way descending down to the SW Fork of the Klahieih, which we soon reached. This creek was of the size of the Ensan-Quatch. It runs in a very narrow ravine, densely covered with timber. On our march we met similar obstacles, already described. But lower down the valley widens out & our progress was materially enhanced, as also the timber was clear of underbrush. About 2 PM we reached the main Klahieih stream, a stream of some considerable size flowing in a comparatively wide valley, densely timbered. This stream, like all the rest of them, was very much swollen by the continued melting of the snow in these Mts. This stream, as well as the rest of them, brings down water masses now far beyond the usual average volume during the rest of the year.

Following the course of this fine stream, we soon Crossed the vista of the Parallel, with its piramidial monuments hidden away in the solitude of these primitive forests. After having passed the remains of the encampment at the astrom. station Chiloueyuck, lately occupied by Mr. Gardner, principal asst. U. S. NW B. Commission, we finally reached the shore of the beautiful Chiloueyuck Lake, from whence a canoe brought us to the Lake Depot situated on the NE Shore of the lake, where we found several members of the Commission. During my stay at this place, I ascended two of the most prominent peaks,

close together, on the westerly shore of the Chiloueyuck Lake. It took a whole day to perform this ascend, as we found the altitude to be over 7000 ft heigh, the heighest points we ever had reached until now. But the view was uncommonly fine, & many valuable bearings were taken from its sumits.

On the 25th of July, I received orders to explore the vicinity of the 49th Parallel to the North & East of the Astr. Stat Chiloweyuck. To accomplish (this) it was thought best to follow one of the tributaries from the north of the Chiloweyuck River to its head & reach by this route, if possible, the Kleguan num Creek, a stream which has a westerly cours & empties itself into Fraser River near Fort Hope; to follow this stream (Kleguanum) to its head & by some means reach the Skagit river; & to return by the Whatcomb trail which was thought to cross the Skagit river in this vicinity to our point of departure.¹⁸ The information previously received about this portion of the country was very vague & meagre, & a great deal was left to the decision of myself to act and peruse a course as I would think best under existing circumstances.

On the 26th of July, I had my party assembled. It consisted out of 10 Indians, the same two white men, & myself. The Samona Chief Thiussolue was left behind and an other young Indian of the same tribe engaged, who pretended to know something about the country to be explored, which knowledge however proved to be very slight. In the afternoon of the 26th, we crossed the lake with our flat boats and after a short march reached the stream Koechehlum, near its junction with the Chiloueyuck river; this is the stream which we intend to follow.

Next morning early found us on our way ascending this stream, which is about the size of the Layomsen stream. It flows in a Ravine of considerable width &, owing to the peculiar nature of the timber here which was nearly free of underbrush, our progress was rapid. There were traces

of an Indian trail through it; our young Samona Indian followed its faint traces with remarkable expertness. It is a peculiar skill which these Indians have, to select the best route in a given direction, a quality which to the white man, unused to travel in these woods, completely fails & who is sure to select always the most awkward place of the route. After a few hours travel we reached a small lake with clear blue water, completely surrounded by dense timber & the steep slopes of the Mountains. The creek which we hitherto followed forms the outlet of it. On its northerly end we found an other small stream forming the inlet of the Lake; this we follow. From here the ravine widens out considerably, & there is level space of some extent between the Mountain slopes on both sides, heavily timbered, over which we progress rapidly.¹⁹

After some hours travel, the Cours of the Creek leads into the adjacent Mts to our right, where it undoubtedly arises. Following the unchanged direction of the Ravine, we soon reach the shore of an other much larger lake of similar description to the first one. Its length estimated to be $1\frac{1}{2}$ miles its widge $\frac{1}{2}$ mile. It is surrounded on three sides by high & perpendicular cliffs, formed by the steep Mt slopes of the adjacent Ridges.²⁰ Finding it impossible to reach its northerly end on Foot, except by nearly ascending to the sumits of the ridge on our left, I concluded to make a raft of the many dry logs which were scattered on its southerly shore. By dint of great exertion on the part of all, we soon had a large raft constructed, whose parts were bound together with a tough & elastic branches of the fir or with our pak ropes. The raft was large enough to accomodate all hands and loads, and on it we soon reached the oposite shore. But here an almost perpendicular wall rocky bank of some 50 feet in height had to be ascended before we could resume our march again. Very soon also this

difficulty was overcome; every body had by this time become expert in climbing.

On the top of the bank we found the ravine considerably widened out again & fine level space greatly inviting to camp. We found a small creek here, which however ran in the opposite direction from the one we had followed, proving this place to be on the divide of the Chiloweyuck & Kleguanum rivers. As I rightly judged from here the Ravine extends downward in the same direction as before. The lake, which we have just passed, has neither visible in- or outlet. Pep Kwai-Kwit name of lake. It being already late I concluded to camp here. This suited everybody, & the next $\frac{1}{2}$ hour saw everybody comfortably seated around a good & cheerful fire, the Indians singing & conversing freely.

The following (morning) found us early on our way pioneering down the valley of the Creek (Pip Creek), which gradually increases in size as it receives the numerous, small tributaries which come down from the Mountainsides. The usual obstacles of travelling in these Mountain solitudes were encountered & overcome, & in the afternoon we finally reached the mouth of this stream. It empties into a much larger one which, from its course & size, I immediately pronounced to be the Kleguanum. The ravine which we had followed since we had left the Chiloweyuck River has an uniform course & may be said to be a regular Mt defile or pass in which a good trail would be easily located. In fact it is, as we subsequently ascertained, the usual route which these Mt. Indians take to reach Fort Hopes from the Chiloweyuck lake, which they make sometimes their habitation during the winter.²¹ This pass is very low & intersects completely one of the westerly spurs of the Cascade Mts, which terminates at the banks of Fraser river. From here

the valley of the Kleguanum extends in a NW & SE direction, widening out apparently to the SE. It is bordered on both sides by high Mts.

I concluded now to follow the upward cours of this stream in a SE direction. The place where we camped has about the altitude of the Chilo-wayuck Lake, & the Character of the wood & timber vegetation, which we found here, coresponds with that found on its banks & is well known therefore. On the morning of the 29th we were pioneering our way through the dense forest of the Kleguanum valley which, as it was free of under brush, we found not difficult. The valley has a considerable width here & still widens as we go along. About 10 A M the forest grew thinner & thinner until finally our eyes were gladdened by an entire clearing. It proved to be a series of marshy lakes extending considerable distance a head. Up to this point the valley had greatly increased in width and amounts, I should think, to 1 mile or $1\frac{1}{2}$ miles. The Mts on our left have lofty sumits and are still partly covered with snow. We concluded now to cross the stream & to proceed along the foot of the Mts bordering the valley to the left.²² After proceeding for some distance, we came to a deserted Indian hut surrounded by the growth of majestic Cedars, a delightful & cool & convenient spot (such as only an Indian could select) on the borders of these marshy lakes which extend here across the valley. From here the Mts rise abruptly and in steep inclinations.

It was about noon when we reached this spot & I intended to occupy the remainder of the day by ascending one of the high sumits which form the northern limit of the valley. Accordingly, Michly, myself, & an Indian set out in the afternoon. The ascend was very steep & (a) tedious one, & our route lay through a portion of burned timber lately on fire. The ground was still intensely hot & the sun (was) shining intensely on the steep hillsides. The air was close, hot, & almost suffocating. Farther up,

the Mt sides were so steep & rocky that our progress was necessarily slow & dangerous.

We were glad when after 4 hours most fatiguing climbing we finally reached the elevated summit, where we also fortunately found a plenty full supply of snow still existing to quench our burning thirst with. The view was a very fine & extensive one. But the time before sunset was so short that all of it was fully occupied with sketching & taking the necessary bearings, & none was left to contemplate & enjoy the fine mountain landscape.²³ From here we observed that the valley of the Kleguanum still extends to a considerable distance to the SE, & that it is intersected by a large lateral valley which I judged to be that of the Skagit river. Numerous streams come down from the mountains to the South, which evidently are the feeders of these marshy lakes; some of it are the outlets of small but beautiful Mountain lakes. The bar. gave the altitude of this peak about 7000 feet high, which seems to be the average altitude of all the Mt Peaks in this Vicinity. About dusk we began our return trip & after a most fatiguing descend of over 2 hours, which tested my endurance to the utmost, we finally reached our camp, completely exhausted by thirst, heat, & exertion.

This morning, while on our march to this camp, we had noticed signs of the presence of beavers. This afternoon the Indians succeeded to kill 3 of them, 1 large one & 2 small ones. The Indians had eaten the meat as usual during one meal but had preserved the skins, which they sell usually to the Hudson bay company for a small gratification. In former reports I have spoken of the habits of this peculiar animal & I shall not repeat it here.²⁴ The rock of which these Mts are composed are principally the

granite or rather the different species of cianite, the /tlafe/, & on some localities the slate. As these are all amorphous rocks, they must present but little interesting to the Geologist & mineralogist, who must become tired of their monotonous uniformity.

Next morning we were engaged to break our way through the dense forest of the Kleguanum valley. We found our way sometime very difficult, as it was boggy & full of underbrush. After some walk of 5-6 miles, we struck a small stream flowing in a direction oposite from that of the Kleguanum, namely SE, & we found that we crossed unknowingly the here almost imperceptible divide between the Fraser & Skagit rivers. About 4 clock P M, a general hurrah of the Indians indicated the occurence of some very desirable event. Coming up I found that we had struck a broad & well travelled trail, which I concluded must be the Whatcomb trail, which we had expected to intersect somewhere near the Skagit. Following the trail to the Southwest, we soon reached the Klesilkwa Creek, here quite a considerable stream with sliggish course, the same creek we had already met with before. After crossing this stream, the trail leads into the entrance of a wide Ravine, in which we found an other considerable stream, the Manselpanic, coming from the SW. These two streams unite close by. It being already late, I concluded to camp here, this being used as a general camping place.²⁵

Next morning we followed the trail to the NE. It goes through the valley of the Klesilkwa, which has here a width of a mile or more and bordered by high Mts on both sides. About 1 mile from our camp, we met a small prairie, which formes a pleasant relief to the monotonous ever present forrest of this locality. About 4-5 miles from our last camp we finally reached the Skagit, which is here already a stream of considerable size, with beautiful clear water & gentle fall, aparently fit for large canoe navigation.²⁶ It flows in a valley about 2 miles wide, which however

becomes narrower to the North or farther up River. We crossed the river on a fine footlog. On this side of the stream we found the whole forest burned by late fires, ignited by persons lately encamped here. Smoke was still arising in all directions from numerous footlogs & trees ect. Fires are very frequent during summer season in these Mountain forests and are often ignited purposely by some of the Indian hunting in these Mountain regions, to clear the woods from under brush & make travel easier. Once ignited, they generally burn the whole summer, and only the drenching rains of the fall are able to check their further spread.

The Indians were highly delighted to have reached so far. The river was to all of them a novel feature of which they had no previous knowledge, as none of them ever had reached as far as this. As this was considered the eastern terminus of my reconaissance, I concluded to camp here & to spend the rest of the day in exploring the vicinity of camp.

I ascended the hill in the vicinity of our camp, but the view was limited on account of the smokiness of the atmosphere & the want of altitude of my situation. From here the Skagit flows almost due South in a broad valley densely timbered. Lately a trail had been cut by the US Comission to the Intersection of this valley with the 49th Parallel, some 14 miles from here. No serious obstacles were encountered, as the valley is level. To the West are high Mts which may be properly considered the main back bone of the Cascade Mts. The Skagit intersects the Cascade Mts lengthwise in 2 separate Ridges, which unite again at headwaters of this stream, & where it breaks through the Mountains to find its way to the Pacific ocean.

This peculiar feature of a lengthwise intersection of Ridges by streams so often seen in these Mts on a small scale, & which always occurs when a Ridge, a Range, or a Sistem of Mts becomes so broad & bulky, that nature

finds herself at a loss to arrange lateral drainage conveniently, presents itself on a large scale; & is repeated on a still larger scale in the Columbia River, which intersects the rocky Mts in 2 almost parallel Main ridges.

And we may say it is this wonderful quality of nature that topographical features of the most minute description seen to exist over acres of ground of the smallest extent, are seen to be continually repeated on a larger or largest scale over sections of a country or even continents.

Here in these woody regions of the Cascade Mts, continually swept over by the moisture laden winds of the West or Northwest, an immense quantity of water is continually originated, which produces an enormous drainage; & we can safely assume to be a law, with hardly any exception, that every ravine, almost every indentation in these Mt regions, contains a living stream or a stationary reservoir of water. The drainage of the latter is & must have been an important element to produce the topographical features peculiar to these Mts. (Several almost stereotype). Of these, several of an almost stereotype Character which, judging from their frequency and invariable similarity of topographical arrangement, have proved themselves to be almost topographical laws or necessities, might be cited here; of the several I will mention only one: "Whenever two streams drain in a directly opposite direction they do this in a comparatively low altitude, or better, the cours of such 2 streams lies in a continual gap or pass through the Mts with only a comparatively low and thin saddle or dividing ridge between them." The valleys of the 4 streams through which we have just passed is an excellent exposition of this topographical law or necessity, whatever you may called it, and which I have never seen to fail in the section of the Cascade Mts which came under my observation.

As already observed, the Klesilkwa & Kleguanum valley form an almost perfectly straight defile through these Mts to the banks of Fraser river, intersecting the main Mt ridge and forming a very low pass through it. A bar. observation at the mouth of the Klesilkwa gave 28.008, indicating an altitude equal to that of the Chiloueyuck lake. A good trail could be located through this pass from the Skagit to Fort Hope, connecting this with the upper and lower Skagit, and would have been, from a topographical point of view, far preferable to the now existing Whatcom trail, but would have certainly gone entirely through british Territory. As a general thing the information received from officers of the Hudson bay companie was very meagre and scanty; and is almost incredible how little information of the Country they possessed even of the nearest vicinity of their forts, aside from their usual lines of communications.²⁷ We found an Indian trail leading through the Klesilkwa valley, faint though as all these trails are, & observed subsequently its continuance through the entire length of the Skagit valley explored by us.

My plan was now to return to the Chiloweyuck lake, our point of departure. Accordingly next morning we set out to retrace our steps toward our former camping ground near the junction of the 2 streams.²⁸ From here, the trail ascends rapidly through a wide ravine, densely timbered, & continues to do so, intersecting many tributaries coming from the adjacent Mountain ridges, until we reached the summit. This is a low point in the main cascade Mt. ridge, & was on that account selected for the location of this trail. Before reaching it, and on it, we found the fire still raging in the forest portion of this locality, barely admitting our going through it. This fire has been burning now for nearly a month and originated, I believe, at the station Chuch-che-chun, where it was ignited by the carelessness of

some of the working men. It caused no little disturbance in our operations at that point; and at one time threatened to destroy some of our public property at that point. The summit is about 4000-5000 feet high; we found it level for a considerable extent, the Mts rising however to considerable altitude to the North & South of it.²⁹ Our party had made a shorter trail. From the one commonly used & known as the Whatcomb trail, it goes through a narrow Ravine, which however had to be reached by a steep & rocky descend; after the bottom of the ravine was reached the trail was good & only gently descending.

We camped to day near a small lake of singular blue color, the intensity of which is remarkable. The water tests slightly alkaline, & a white sediment was observed at its bottom, which proved to be tasteless. This blue color may be due to the effusion caused by this white sediment, probably carbonate of lime. It was fed by a small stream, the waters of which had a similar color, which originated in a glacier nearby, which reached nearly to the bottom of the ravine. This singular blue color was afterwards ascertained to be peculiar to all streams which originate in glaciers, & this peculiar phenomena, awaits the explanation of scientific men. Here as well as on the Skagit we were tormented by a swarm of hungry mosquitoes, which did not fail to make our stay very unpleasant here. We found this pestiferous insect every where below the altitude of 5000 or 6000 feet; higher than this they do not ascend. And these named heights seem to constitute the mosquito as well as the timber limit.

Thursday the 2nd of August. Today I concluded to ascend one of the Peaks in the neighborhood to get a better understanding of the country around here. Accordingly, Matchly & myself went out early in the morning on our way. We ascended to the summit by the new trail & found the smoke,

which had been very dense in the valley, much thinner here. Higher up, the summits of the adjacent peaks were entirely clear.

Up here the air was beautifully cool & bracing, & in our vicinity we found the Mt sides green & covered with meadows of excellent pasturage. Here and there, clumps of balsam fir are observable, the usual habitant of these altitudes. Two little lakes, of clear & limpid water, are nearby, & contribute to make this fine alpine scenery still more picturesque. I selected one of the Peaks to the Northwest, the highest in this direction & vicinity.³⁰ From here the ascend to it is not difficult & leads partly over fine meadows covered with an unusual number of flowers, some of it very fragrant, & partly higher up over snowfields, which I suppose will never entirely disappear. About 11 A M, we finally reached the highest point, or summit of the Mt, which was flat, quite extensive in surface, and free of snow. It was formed by an isolated rocky wall which stood perpendicular upon the broad granit foundation of the Mt itself.

We found here the view most extensive & fine, a complete Panorama of the Mt. regions in all directions of the Compass. To the East, deep down in the valley, the Skagit wends its peaceful course through the dark masses of the woods adjacent, its clear & limpid waters glittering & glistening in the reflected light of the sun rays. The Mts to the East of the Skagit rise to considerable height. In the first Ridge we observe 2 Peaks especially prominent, the Shanatan & the Hozomeen. The latter is a huge mass of grayish black rock ending in 2 sharp points of considerable altitude. The height of the Mts toward the South & Southeast increases greatly; at some distance from Hozomeen peak, the Nokomokeen rises its broad & bulky summit far up in the air, covered with eternal snow & ice. The Mts toward the South & SE keep the general Character of the Cascade Mts; while to the East

& North East, glimpses of Mt form are caught entirely at variance with those hitherto observed. The sharp, frightful, fantastic outlines of the Cascade Mountains have changed into the tame & gentle outlines appertaining to Mts with broad & flat sumits, of a table land Character.

Immediately to the South of us, the rocky, whitish, masses of the Chuch-check Mts elevate themselves far above the surrounding Mts, covered with ice & broken up in a thousand peculiar forms; castles, columns & walls. They are broad & massive & seem properly to constitute the main matrix of these Mts. Toward the West, we observe a vast sea of Mts, Peak on Peak, valley on valley. Mt Thuscan & Mt Baker (Jako-meeh) loom up gloriously grand as ever, the latter with his usual companion — a little cloud covering its sumit; (it) may be due to the vapors which arise, or seem so, out of its crater-like sumit.

No mortal pen could be found to describe their grand & glorious scenery properly & justly. This endless variety of shapes and forms, these thousands of different shades and colors — here the green & black of the endless forest & the lovely mountain meadow, here the gray in all its endless nuances, the blue, the Red, the daseling white of the snow & ice masses reflecting & breaking the steady rays of the midday sun, & the whole wonderful landscape covered by a light mist, which chastens down the colors & gives the whole matchless view an almost fairy like aspect. For hours & hours the observing spectator could sit here, contemplating the wonderful works of nature without becoming tired, the eye luxuriously feasting in the matchless diversity of forms & colors, ever changing, never alike, the mind overawed by the sublimity of the works of the creator. Not less than 9 lakes were seen from this point, most of them forming the heads of these Mt streams, which we had seen & passed. After completing

my work up here, we reluctantly started on our return trip, having enjoyed for some hours the exquisite playsir of contemplating this uncommonly fine alpine view.

The morning of the 3rd saw us early on our way; following the trail through the narrow ravine we soon reach the astronom. Station Chuch-che-chum, occupied by Mr. Gardner last fall. We found here a party occupied in cutting the vista of the 49th Parallel through the dense timber which surrounds the station. We soon reached the 2 stony piramids, indicating the line itself. This latter runs here almost directly over what was called the sumit somewhat to the South of it. From thence it crosses the Skagit valley, somewhere in the vicinity of Hozomeen peak. After a while we reach a small prairie, on the banks of the Chuch-che-chum Creek, whose main branch arises in a small lake situated in the roky basin on the Western slope of the Chuch-che-chum Mts, fed by numerous glaciers & snowfields. This creek is followed by the trail which, after a few additional miles of travel through dense & monotonous forests, finally emerges from this and reaches the shores of the Chiloueyuck lake at Lake depot. Here we found a numerous party, and my intention is to rest here previous to our departure for a new Exploration trip to the headwaters of the Klaheih Creek.

A few days rest were sufficient to enable us to start out again on our new Exploration up the main branch of the Klaheih river. Accordingly on the 8 of August my party, consisting of 9 Indians (one old one had been discharged) (and) 3 white men (Mitchly & Williams & myself), was ready to take its departure from this place.³¹ The plan of this reconaissance was to follow the Klaheih stream up to tis headwaters, thence to cross the divide between the Chiloweyuk & Skagit rivers, to descend one of the

tributaries of the latter river to its mouth, thence to follow the Course of the Skagit river upward to its intersection with the 49th Parallel, where the astronomical station Skagit was located in charge of Asst.

T. Harris.³²

The flatboat brought us over to the South shore of the lake, or to the mouth of the Klahel Creek. From here a trail leads to the astr. Stat. Chiloweyuck and to the vista & Monuments of the Parallel. From this point the trail ceases, & we had to take our usual way of pioneering through the woods. The valley of the stream is of considerable width; the stream has a gentle fall, and an almost due North course. As the river bottoms are wide & the timber as usual on such altitudes free of underbrush, our progress was rapid, & we were enabled to make a good distance this afternoon. At 4-5 Clock PM we encamped on the Riverbank.³³ The principal forest tree of this valley is the Cedar tree, which grows to considerable size & height. One of the striking peculiarities of this tree is that when having attained considerable size it begins strongly to lean sometimes as much as 10° - 20° ; this is probably due to a want of firmness in the roots in the loose soil, as also the immense weight of its bulky trunk & to the great number of branches, which give wide surface for the wind to act upon. This tree as generally observed is never seen above an altitude of about 3500-4000 feet.

From here the ravines of 2 principal westerly forks of this stream are plainly visible. The openings are wide & they are separated by a Mt spine of gently ascending summit, which ends in a conical Hill standing out boldly into our valley & forming a very prominent Landmark in this locality.³⁴ The Mts on the West side of the valley are (comparatively) low in comparison

to those to the East, which are high & rocky. They are in fact the main ridge of the Cascade Mts.

Next morning we continued our journey up stream & soon reached the turbulent waters of a stream which breaks its way through deep gorge in the Mts. to the East. According to my Indian map, this is the Skaln. It united its waters close by to those of the Klah. Nature of the river valley continues the same. Besides this stream we met with several smaller tributaries. The westerly ridge, owing to its want in size & bulk, sends no tributaries, or at least only very insignificant ones. Toward noon we cross another large stream from the East, probably the Nezahomel-panic. It is larger than the former (Skaln) & intersects the Mts deeper & wider. From here the River valley begins to contract rapidly. The stream has a very tortuous course, which makes frequent crossing & recrossing necessary. Farther up, the valley widens somewhat. The stream forms numerous side channels with bars between them, over which we can pass easily. About 4 clock we selected camp near a Indian hut made of the bark of the Cedar.

To recognize our present position & to determine what future course should be taken, I determined today the 10 of August, to ascend a high Pt. to the West of us.³⁵ According at daybreak Mitchly & myself set out. After some hours climbing, we reached a point somewhat below the summit, sufficiently high to oversee the country. About $\frac{1}{2}$ mile below our camp a 3th tributary empties into the Klah from the East, which we had passed unnoticed yesterday. This must be the Skeolsten. This 3 streams form the 3 principal tributaries from the East forming wide gorges or intersections in the high Ridges to the East. To the South we notice a Mt with a peculiar, sharply defined, pyramideal summit. It lays nearly at the head of our stream, as near to it, it spreads itself fanlike into many branches. This Mt, I concluded to be the Speeh Mt, of which I have spoken in former reports.

It lays in a tripple divide between the Chiloweyuck, the Nooksahk, & the Skagit rivers.³⁶ At the foot of this Mt a head branch of the Klahaih str is visible coming from the NE. This is nearly the direction I intend to proceed. I concluded therefore to ascend the Mts situated on the Easterly bank of the Klahaih & from there determine again our future course.

The Mts to the East drop off in height to the Southward & form a gap, where this above mentioned Creek arises. This is nodoubt a point from whence tributaries arise flowing in different directions. Mt Speeh, which lays close by, may be therefore properly considered one of those centers of upheaval from whence the waters flow radiating in all directions. Such centers are often met with in these Mts. Mt Baker is another, less important, one. Mt Speeh is the most prominent one in this section of the Cascade Mts.³⁶ After having completed my work on this point, a quick but tiresome descend brought us bak to camp. The altitude of this station was perhaps 6000 ft.

A short time was necessary to put everybody in readiness to proceed on our march. After having proceeded a mile or so in the Creek bottom, we leave it & begin to ascend the ridge to our left keeping well to the SE. The Mt sides become very steep but every body is animated by a spirit of curiosity to see where our future course would bring us to, these being now explorations in entirely unknown territory. Higher up, the timber gave out. At 3 PM we finally reached a point near the sumit of a Mountain covered with meadows of the most beautiful alpine pasturage. Here and there a cluster of dwarfish balsam firs, & scattered over the whole (a) gently inclined plain of vivid green, (and) numerous small ponds of perfectly clear

& cold water fed by the melting snow masses which still lay here & there. To the satisfaction of all, we selected our camp here in one of those green meadows near a small pond.³⁷ Altogether this was one of the cosiest & comfortable camps we ever had.

A short ascend over a gentle incline brought us finally to the summit of the Mt. The summit is broad & roomy, covered with fine pasturage, a regular alp such as one sees in the Mts of Switzerland or Tirol. The view was unusually fine although the point was not very high. From here then we had a good view to the NE. To my great satisfaction I found that a gorge, doubtlessly containing a stream extended from the northern foot of this Mt clear through to another lateral Valley into which we can see some distance, & which can be no other than the Skagit valley. Toward the East we notice the valley of (doubtless) another tributary of the Skagit, which arises in the gap close by to the South.³⁸ Farther in the same direction there is the Valley of a stream running SW (the Takens) intersecting the spur which contains Mt. Baker & Mt Thuskan lengthwise. Immediately to the South & East of us, the mountain on which we stand ends in precipitious cliffs, at the foot of which one of Head tributaries of the Klahieh flows - a small stream only. To the Southwest & West we notice the Ridge bordering the Klahieh intersected, comblike, into many spurs, between which flow the head branches of this stream. Between the Westerly & Easterly Ridges bordering the Klahieh, stands the beautiful Speeh Mt forming the connection the 2 Mountain masses. To the NE, the Mts are high, rocky, & with broken sumits, inascendable, of reddish rock hitherto unobserved; the western slopes are abrupt & steep & partly covered with large glaciers extending over miles in surface, often extending as low as the foot of the Mt.

Altogether the view was interesting & instructive. A great deal of information was collected & many valuable bearings were taken. While coming up we had noticed the tracks of many goats; & when descending we met small flocks of them rapidly taking flight, after having yielded to a momentary curiosity and taken a good look at us. One fine specimen however, not satisfied with a casual observation, stood at some distance quietly awaiting our arrival, even after we had fired several missing shots. It did not leave the spot, as if paralyzed by fear. Only after (our) having shamefully missed it at a distance of not more than several yards, it bounded away with surprising agility. During our whole descend we caught occasional glances of this animal, which seems to be frequent around here. Henceforth I shall call this Mt Goat Mt.

When returned to camp, its stillness was soon afterward interrupted by a tremendous hurrahs of the Indians, which brought in a fine specimen of male goat, which our young Samonan Indian had succeeded to kill on the NE side of this Mt. It was a large and splendid specimen with short white hair, owing to the advanced season, and a pair of stout horns. This desirable event of course clapped the climax of our good humor. The Indians had their usual feast, which ended only with the ending night. Their songs, mirth, & frolik, accomanied by music with a stick aplied vigorously to a tin kettle, ... (ceased only) then.

To reach the mouth of the gorge, which Extends NE & SW, we have first to descend into the valley of a Creek runing Westward into the Klahieh. From there this gorge can be easily reached. Next morning we were early on our way to reach the above mentioned Creek. After having successfully overcome a very steep & dangerous descend of some 2000-3000 feet, we finally reached the Ravine of this stream, which I shall call Red Mt Creek (having

obtained no Indian name for it) from the peculiar color of the surrounding Mts. It is this a small creek heading in the snow fields & glaciers of the Mts to the East.³⁹ After ascending it for a while, we loose sight of it, as its bed is covered by a thick crust of snow and ice. This natural bridge extends as far as the foot of the glaciers of the Mts to the East of us. Here a small tributary from the NE joins it, forming a pretty Cascade of some 20-30 feet high. This is also the mouth of the NE Gorge which we intend to follow. Having entered it, we found it wide & gently ascending; the Mt sides to our left are covered with granit bulders of smooth & square surface, over which we found stepping easy.

After a march of a mile or 2 we finally reached the headwaters of the NE fork of Red Mt Creek, formed by numerous small creeks arising in gently inclined plains of fine Mt meadows, over which are scattered now & then snow masses as jet unmolten.⁴⁰ These beautiful meadows are similar to the ones already described, although the grass is of vivid green. The flora is altogether scanty. This may be well called a characteristic feature of these Mts generally, not counting the grasses which to the botanist may be fully as interesting as flowers. The absence or scantiness of the number of species of the latter must strike every observer who has seen the varigated flora of Mt regions elsewhere. For the last time, specimens of the 2 minute shrubs bearing white & red flowers were observed in bloom at this advanced season, many of them are already in seed, which consists in a small insignificant capsulae, hardly noticeable after you have seen the pretty flower.

After proceeding over this fine meadows for some distance, we finally reached the brink of a deep precipice some 2000-3000 feet deep. Below it we discerned the waters of a creek wending its way in a due NE course through

a wide gorge in the Mts. This is then undoubtedly the sought for tributary of the Skagit.⁴¹ Presently also our attention was attracted, by one of the most magnificent sights I had the good fortune ever to behold. It was this immense glacier which covered the Mt side (on our left) bordering the stream on our right. It extended uninterrupted over nearly a square mile of surface.⁴² Its foot was close to the borders of the stream, which originates in it. From thence it rises, forming a solid wall of pure ice, to a height of over 5000 ft to near the summit of a very high Mt. This Mt, which has the Indian name Wila-Kin-ghaist, is one of the highest and most prominent peaks in this Section of the Cascade Mts. Its altitude I judge to be from 9000-10,000 feet high. It is formed by a comparatively small pyramid of solid rock, which stands isolated upon the level, & snow covered extensive basis of a lower sumit, about 9000-95— ft high. Up to this lower sumit, as already stated, this glacier extends a vast, unbroken mass of solid ice.

Nothing ever seen before could compare to the matchless grandeur of this feature in nature. All the glaciers in the surrounding Mts to the East of us, & there are many of them, vanish before it into insignificance in comparison with this coloss of glaciers. Imagine the Niagara Fall tens of times magnified in height & size, & this vast sheet of falling water instantly cristalized & rendered permanently solid, and you have a somewhat adequate idea of the imensity of this natural phenomena. I could not estimate its thickness as there was no means as to get underneath it. But judging from the convexity of its outline, it must be considerable & may be amount to hundreds of feet. Besides, from the twisted, rounded, & uneven apearance of its surface, it may with certainty be concluded that the process of forming ice must be continually going on. Water running from the sumit over the icy surface becomes solid before reaching the foot of the

glacier. This addition may be said to be continually going on & it is perhaps only interrupted during the hottest summer months. Even then, the sun, owing to the situation of the glaciers in a narrow valley shaded by dense forest, can not long act upon its surface, except near its summit where in summer it must decrease considerably but must be more than again replaced during the long winter, & in this way secure the perpetuity of this splendid creation of nature.

As above stated, the surrounding Mts to the East, which are high & exceedingly broken, are covered at intervals with glaciers which, we may say, extend in an almost unbroken continuation over an area of many square miles. Altogether this section of the Cascade Mts is worthy to stand beside the most famous Mountain parties in the Alps of Europe visited by thousands of admiring travellers. To reach these Mt solitudes, the traveller has to undergo considerable hardship, as we are here considerably beyond the limits of hotels, guides, & other luxuries of the civilized world. But whoever will take the pains to reach the heart of these Mts will be amply repaid by the many interesting & uncommon sights he will behold.

While I am describing this fine locality, I may also mention a peculiar phenomena often observed here & elsewhere in these Mts. This consists in peculiar spots upon the surface of the snow, some of a reddish, others of a purple color. By close observation these spots are found to be caused by a fine powder-like substance strewn over the snow. Where it comes from or what it is I could not ascertain. This is quite a common phenomena, and often seen through these Mt regions. I do not know what explanation scientific man will make of it.⁴³

We found by nearer inspection that the descend from this plateau, where we stood & which forms the divide, to the Creek bottom was over 3000

ft., & from its almost perpendicular inclination almost unpracticable. No alternative could be found but to risk it, or to make a long circuit to our left by ascending the Mts on this side & to continue along their summit until a easier descend to the Creek bottoms could be found. As it was already late, I concluded to risk the steep descend. By keeping well to our left we succeeded to overcome the difficulties of this descend, the steepest & most dangerous I ever have made. Had it not been for the bushes and small trees, which gave us an occasional point of (?), we would have found it impracticable. As it was, it could only be overcome by the utmost caution on our part, by using our hands, arms, legs & sticks freely in a multitude of novel positions. Once to have lost foot hold here, nothing would have been left to the unlucky climber but to resign himself to the inevitable fate of being dashed to pieces on the sharp & frightful rocks below him. By a piece of good luck, which did not desert us here as well as in other localities of a similar nature, we all reached the valley of the Creek without encountering any accident.⁴⁴

Below we found a creek of considerable size originating as already observed in the adjacent glacier. It has this creek, as all the waters originating immediately in glaciers, a most peculiar sky blue color which increases in tensity as we descend the Creek valley. (It) becomes finally dark blue, resembling almost the blue liquid coming from a dyers vat. We found a good camp near the banks of a creek in an open forest. Oposite us is the magnificent glaciers. Below it, we see numerous cascades hundreds of feet high, sending their dust-like waters over the roky precipitious cliffs of the adjacent Mts, all intent to increase the volume of the creek near us.⁴⁵

Next morning all hands were ready to continue our voyage downstream. The Course of the Creek, which I named Glacier creek (but) whose Indian name however is (blank).

Up here (it) is very tortous, and its valley is closed in by high Mts on both sides. We found the usual obstacles already met with on Mt streams (and) of a similar nature, namely dense tissues of Wine maple & other bushes with which the whole Hillside was overgrown, & through which (a) traveller breaks his way with the greatest difficulty. Some times we preferred to wade Kneedeep in the waters of the Creek (than) to encounter the difficulties of the winemaple, the alder bush, or the thorny large leafed plant which grows everywhere. Toward noon the valley widens out & the nature of the vegetation and forest becomes different. Bottoms are met with along the Creek, over which we pass rapidly. After having reached the Easterly turn in the Cours of the Creek we found it was too late to proceed further and we encamped.

Until now we have not met with tributaries of any size; but this morning (13th of August), our further journey brought us in sight of a large tributary from the WNW, which unites itself to our stream some distance further down.⁴⁶ This stream heads in the main cascade range, probably interlocking with the headwaters of the Skaln Creek, an Easterly tributary of the Klahieh. Owing to the many tributaries, large & small, which we found now to join the Glacier creek at short intervals, coming from North & South, probably also owing to the rapid decrease in fall, Glacier creek begins now to assume the proportions & stately & gentle course of a river. Its waters are here already of dark blue color, which mingle but reluctantly with the green or dark green waters of its numerous tributaries.

The river valley is widened out considerably. We have left the Main backbone of the Cascade Mts behind us and are now following the direction of 2 of its Easterly Spurs between which the River flows.⁴⁷ The river now has uniform Cours of about N. 60 E and flows in a wide valley bounded by two Mt spurs of not considerable altitude. Our route of march is now on the convex side of the River & is alternatively easy or tedious, the latter when we have to break through Winemapple tissues. We camped this evening oposite a mountain of considerable altitude, which has a spur jutting out considerably to the SE forming a small valley between it & the main mountain; this spur we mistook, farther up, for the Mts on the East side of the Skagit valley. From this fact I called the Mt, now oposite our camp, Disappointment Mt.⁴⁸

This evening the cook communicated the startling news to me that 4 more meals was all we could expect from our exhausted larder. This was serious news to me, as neither did I know how far we were from the Skagit nor was I acquainted with distance from the mouth of this stream to the (?) Skagit. To be without food in these Mountain wilderness is certainly one of the most serious predicaments, as beyond a few berries & perhaps an occasional mess of fish nothing can be found to restore the inner man which, after the fatiguing journeys one is compelled to make, never fails to be in want of it. At daybreak of the 14th of August Mitchly & myself started out to ascend the Mt oposite to our camp to ascertain & recognoitre our position. We found the ascend steep, owing to the roky nature of the Mt sides, but we were repaid for our labor by a fine view to East from a point somewhat below the sumit. Before us then lay at a short distance the long expected valley of the Skagit. In it we saw plainly the waters of a large stream with an

uncommonly tortuous course in the dark masses of forrest which covered the valley. This was indeed gratifying.

Very soon the Mountains began to be covered with rain clouds, making our further ascend unessessary. When coming bak to camp we found all hands ready to start on our further journey. After having crossed the stream, which now begins to break its way through a rocky canyon, dashing through it with impetuous rapidity forming rapids & small falls (most all the mountain streams join a larger one in this way, breaking through rocky canyons situated near their mouth), it is this a topographical feature very often observed. After a short march, we finally reached the banks of the Skagit.⁴⁹ Here a considerable sise &, unlike the one we had been following just now, of a dark green color with a gentle course and filled for a great distance with rafts of fallen trees. The rain had now set in good earnest & made our progress still less favorable.

Still we preserved &, about 4 oclock, we reached a comfortable camping place in the level River bottom on the banks of the stream, thoroughly tired out. Next morning we set out early, I computed the distance to the astronom. station Skagit to be about 4-5 miles. My estimate proved correct for, after having crossed the river, we soon struck an Indian trail which (we), after having followed it for some hours, emerged finally into the clearing of the astro. Station Skagit, where we were cordially received by the members & employees of the Comission.⁵⁰

Orders were left for me by Mr Parke, Chief Astr. & Surveyor of the Comission, to explore & meander the Skagit river for 10 miles to the North of this station & for the same distance to the South of it; also to explore

the Vicinity of the divide between the Skagit & the Smilkameen, a stream
⁵¹
 running East into the Columbia. To carry out this order with the proper
 effect it was thought best to construct a light canoe, which could be used
 to meander & explore the river. Fortunately there was among my Indians one
 Nooksahk Indian, a middle aged man, who understood the construction of a
 river canoe perfectly. A river canoe & one used in Salt water are of some-
 what different construction, though the difference does not amount to much.
 The other Indians, mostly young boys of 17-19 years old, did not understand
 much of the construction of this contrivance. With the help of 2 white men
 and our good tools, a light serviceable canoe was constructed in a few days.
 The process of canoe making peculiar to these Indians has been described
 by other members of the commission, and I shall therefore not mention any
 description of it.⁵²

On the 21 of August the canoe was ready as also the party, consisting
 of 9 Indians, 2 white men (Mitchly & Williams) & myself.⁵³ My plan was
 to send a walking party in charge of Mitchly by the trail, to a point
 where this latter leads along the river bank, about 5-6 miles from here.
 There to encamp. While myself & 2 Indians in the canoe would reach the
 same point by river. We were soon comfortably seated in the canoe, just
 big enough for 8 persons, & started on our journey northward, upstream.
 The river from here has a tortuous course but in the main flows south.

The courses of the 2 different bends were taken with a Small Kald
 compass, which is the best suited instrument for this purpose. Owing
 to the continual change in the rate of travel, the distances between the
 courses were only estimated and not determined by time & rate of travel,
 as it could be assumed that the distances would be equally as much over,

than underestimated. I trusted that long distances would be sufficiently correct; experience proved this, for not only did the distance but also the general course of the river come out remarkably correct when platting these reconaissances. As a general thing distances were overestimated in the morning & underestimated in the evening.

The river is a fine clear stream of an average width of about 50-60 yards. The country on both banks is densely wooded. A short distance from camp we sprung a leak in the bottom of the canoe which delayed our progress somewhat, but was soon repaired by the Indians. After a while we found the river completely blocked up by numerous accumulations of fallen trees or rafts, over which we had to haul or carry our canoe, which owing to its lightness could be done easily. These rafts or blockades in the River are due to the continual changes which takes place with the river chanel, particularly in freshets caused by heavy rains or the rapid melting of the snow in the summer months. At such time, portions of the River banks, with the never failing timber on it, are swept away; the trees are floated down until some obstruction prevents their further course.

Further up, the river is divided in different chanel, all of which (we) explored & indicated in the runing sketch I made of the river and its nearest vicinity.⁵⁴ Many bearings were also taken to the adjacent peaks in the Range bordering the East side of River valley. This Mt Range contains the 2 prominent peaks; Shanatan (and) Hozomeen.⁵⁵ Bearings of these well defined peaks gave excellent checks for my river work, some time determining the latitude, at other times the longitude of a point.

About 4 PM we reached the party under Mitchly encamped on a pleasant spot on the river bank. Distance made today (was) about 6 miles by river & 4 miles by trail.⁵⁶ Our Indians were engaged in fishing & the result was a fine mess of black spekkled trouts, which seem to be in abundance in the

river wherever its waters are deep & the current slow. These fish are truly delicious & formed an very acceptable addition to our meal, which consisted ordinarily out of the staples: Coffee, bread & salt pork or bacon. Beside obtaining fish, the Indians also killed a large beaver with the Canoe pole; it was a very old animal with an enormous head, & most powerful teeth.

Next morning Mitchly was sent ahead with orders to select camp near the Crossing of the River some 6-8 miles from here. Myself & the 2 Indians went upstream in the canoe, exploring the River. Course of it the same as yesterday, also the topographical features of its vicinity. Several spurs, coming from the Mt ridges East & West of the River valley, jut out on the River where they form steep and rocky banks. We also passed the mouth of a large tributary from the West.⁵⁷ Several rafts obstruct also here the River navigation, which however may be termed slight obstacles. About $\frac{1}{2}$ -1 mile from our Camp at the Crossing, the river is again completely blockaded for a long distance, & we had some difficulty to bring our canoe through this portion of the River. About 6 PM, we reached our camp.

Next morning, I attempted to follow the River farther up, but soon found out this to be entirely impracticable as most of its river bed was blockaded for a considerable distance farther up. The Crossing of the trail may be properly called the place where canoe navigation ends.⁵⁸ It was now my intention to send 2 Indians in charge of the canoe back to the astro. Station Skagit, & to proceed with the rest of the party along the trail to a point from which one of the peaks in the Ridge East of us could be easiest ascended. I selected for this purpose Shawatan peak, as being the highest & most isolated peak which would promise from its peculiar position the most extensive view.⁵⁹ We pushed on very briskly and, after a few hours travel, reached a good camping place on the river where

the trail passes over the back of a Mt spur, descending down from Shawata Mt which lay oposite to our camp. This spur forms here a bold promontory on the River bank & presents an excellent oportunity to ascend the above-mentioned mountain.

To ascend a Mt in the easiest & best way, is just as much a matter of good judgement as any thing else. The following rules should guide travelers in the Mts. If starting from the foot of a Range or Sistem of Mts, you wish to penetrate to its Interior, always select the largest stream, arising in this Range or Sistem of Mts in the vicinity & follow its cours. If however your intentions are simply to ascend a peak, on the foot of which you stand, always select the longest leading spur following the direction of its summit, will secure you an easy & gentle ascend. Never select a ravine or watercourse coming from the peak to be ascended; if you should follow one of these, you will find many difficulties in your way, consisting in sudden drops, dense bush & brush vegetation, and an increasing steepness, sometimes amounting to impracticability as you get nearer, or approach, the summit. These rules I had reason to find it well to always adhere to during all my extensive travels in the Mts, in ascending to as well as descending from a Summit.

Next morning we started our journey (Mitchly, myself, and an Indian) by following the summit of the leading spur already mentioned. We found the ascend easy & progressive until we reached a locality, where the Mt sides were covered with extensive patches of Hookle berries, the largest & finest of peculiar brownish blue color that could be seen. They are of excellent flavor. To withstand the temptation of a large tract literally covered with these delicious berries goes beyond the moral strength of a white man, much less that of an Indian. To halt & eat & to eat & halt

is all you can do under these circumstances; and if, during an hour or two, you can manage to bring yourself & particularly your Indians through one of these belts where these berries grow exclusively, you may say you have done well.

Washington territory may be properly called the country of berries, because nowhere I saw such endless number of different species of berries, each species again with many different varieties. The different varieties, are each more or less dominated over certain localities or certain altitudes. Of the Huckleberry alone I counted at least 4 or 5 different varieties. The red one grows lowest down in the forest, up to an altitude of 2000-3000 feet, beyond which it is not seen. The one seen by us today is exclusively found on Mt sides in altitudes from 4000-5000 feet, and it may be said of it that it forms a regular belt around those Mts occupying the space between the above mentioned altitudes. Further up, I noticed a smaller variety with a smaller berry, of deep blue color; and in an altitude of 6000-7000 feet a variety is found, rarely though, of small growth & berries not larger than the head of a comon pin.

Among the numbrous species of berries I will only mention the Service berry which grows where the Huckleberry with the large brownish blue or black color, grows; the raspberries, red & yellow; the blackberries; blue berries; whortle berry; cranberry; Gooseberry, as excellent berries.

The ascend, when having passed the timber limit, becomes somewhat steep. Still in the main no difficulties were encountered to reach the rocky isolated sumit. The bar. indicated here a height of about 6500 ft. Beyond occasional patches of snow the sumit saw free of it, the temperature cool & pleasant. Owing to the altitude & isolated position of the Peak, the view was very fine in all directions. To the west, the rocky & steep sumits of the Chuck-check Mts were the most prominent feature in the Land-

scape before us.⁶⁰ Numerous streams arise on their surface, sending their waters to the Skagit, flowing between spurs (and) coming down in bold outlines to river valley. To the South the high & icy summits of No Komokean Mt is visible.⁶¹ To the North, almost in Range with it, lay the steep & rocky cliffs of Hozomeen Mt, rising far beyond the average height of the Ridge in which it is situated. From here excellent bearings, determining the longitudes of these Peaks, can be taken. To the SE, a vast sea of peaks, ridges, & valleys is observable, apparently thrown about in utter confusion. But by closer study, the features explain themselves.

Here the peculiar Character of the Cascade Mts is kept intact, even East of the Dividing Ridge. To the East & North East however the aspect is entirely changed. The Mts have lost in altitude; their outlines are tame and characterless; straight lines are exchanged for curves; point-like summits for table, or plainlike ones; the woods are thin; and many bare open places are seen. The prevalent color of this Mts is a whitish yellow instead of the blueish gray as observed in the Mts West of us. The Country has a dry desolate look, somewhat similar to that observed in the territory of Arizona; this is however a mistake, as further explorations to the East fully proved. The view would have been still finer & more extensive, but the Country was shrouded partially in a smoky, hazy air, due to the excessive fires in the River valleys; and many peaks & Mts were only dimly visible.

After a few hours descend, we finally reached our camp again greatly exhausted by heat & fatigue. Next day we reached Camp Skagit after a few hours march over a good trail. We found here Mr Parke, & Asst. G. C. Gardner.⁶¹ These gentlemen had returned after a successful trip to the South Kameen valley, into which they had succeeded to find a practicable route for the location of a trail.⁶² The 2 Indians, while coming down, had broken the

Canoe. But Mr. Harris,⁶³ in my absence, had kindly set 2 white men & the 2 Indians to work to construct a new one. This was completed this afternoon.

Saturday the 27th of August. This morning the party was ready to start on our new trip down the Skagit river. The walking party under Mitchly received orders to proceed down the River valley & to encamp on one of our former Camping ground, some 5-6 miles from here.⁶⁴ Myself & 3 Indians will reach the same point by river in our new canoe, which of larger size & more substantial construction. The vicinity of the River, & this itself observed while sliding down rapidly over its clear & placid waters, is the same as already described on our northward trip. Some distance from the astro. Station, the river is blockaded by large rafts, over which we haul our canoe with some difficulty. From there the river was clear, with a few exceptional places, as far down as our camping place, which we reached toward evening.

Next (the 28 of August) morning, we proceeded on our journey downstream. The walking party was told to encamp on some convenient place on the River bank 6-7 miles from here. A $\frac{1}{2}$ mile from our camp we met with considerable difficulties. The river is here divided, into 3 different channels, all of which are completely blocked up by large rafts, the shortest one extending over several hundreds of yards in length. The 3 Indians worked faithfully to overcome these obstacles, sometime carrying the heavy canoe on their shoulders and climbing with it over the numerous logs which obstructed our way. The portion of the river, which we explore today, is filled with similar obstacles almost through its entire distance.⁶⁵

On several places, the river is divided in numerous channels, all more or less obstructed, & we had hard work to pass through them. About 2 PM we passed the mouth of Glacier creek,⁶⁶ which sends its dark blue waters into the greenish floods of the Skagit, only reluctantly mingling with the latter. After a while we perceive that the waters of the Skagit have perceptibly changed in color by the admixture of the waters of Glacier creek. Beyond the mouth of this creek, we find the river navigation materially improved; beyond a few occasional rafts of short length, the river was clear of obstructions. At 4 PM we reached the vicinity of our Camp, but would have missed it but for some accidental fortunate shouting of one of my Indians. This was of course immediately joyfully responded to by the Indians in camp, which they only had reached a few minutes ago.

To give the walking party a considerable start in advance of the Canoe party, to prevent any missing of the 2 parties in the evening, I concluded to ascend a foot spur of the Mts on the East side of the Skagit valley.⁶⁷ As the altitude of my position was not very great, the view was correspondingly imperfect. The course of the river valley is very uniformly due South. It is here, as elsewhere, densely timbered. Numerous ravines intersect the Mts to the West. The spurs between them have bold and steep outlines. Seen from this point, they appear in eschelow & resemble the arrangement of the scenes in a theater. A few bearings were taken from here to Hozomeen & Nokomokeen Mts & to lesser peaks.

About 10 AM, we went on our way again. The river is here almost entirely free of any obstacles of any kind; & our progress is therefore rapid. Nothing can be more pleasant than to glide down a stream like this; the motion is so gentle; the air on the water cool and pleasant; & the

scenery, which is continually shifting, occupies eye & mind pleasantly. Toward noon the river becomes larger & wider and has an almost straight course due south nowhere impeded by obstacles. We passed the mouth of a large tributary from the East, which appears to come from the vicinity of two peaks, of a prominent Character (and) composed of whitish Rock, which according to Indian information must be the Kakoit Mts.⁶⁸ We are here nearly opposite to them. Further on the velocity of the stream rapidly increases; occasional rapids occur, through which we dash with great swiftness. About 4 PM we are opposite the bulky form of Nokomokeen Mt with its snow & ice covered summit.⁶⁹ Between it & the Kakoit Mts a stream issues, flowing in a deep & narrow gorge in the Mts; this stream of course joins the Skagit.⁷⁰ About 5 PM we overtook the walking party, still in motion, some distance farther down. We found a comfortable camp.

From our camp we plainly see of a large Valley extending to the East, lateral to the Skagit valley, about 8-9 miles distant. This I concluded to be the Valley of the East fork of the Skagit, a stream said to be of considerable size.⁷¹ Although I had no positive orders to extend this reconnaissance so far southward, still I thought the opportunity to add this further topographical information to the one already acquired, too favorable to miss it. It was clear that from here the rapids of the river would begin, and that only a short distance was between us & the point where the river breaks in cañons through the Cascade Ridge, & where navigation is impossible.

I concluded to leave the walking party in camp, to select 3 of the most expert Canoe Indians, & with those to pursue the downward course of the River in the canoe, as far as practicable. Accordingly next morning

we proceeded on our way downstream. The Nooksahk Indian, builder of the canoe, was selected for steersman, & 2 Chiloweyuck Indians, one for the midship paddleys & the other for the bow paddle. These 2 Indians had been with me when navigating the swift waters of the Chiloweyuck river, and I knew I could rely on their expertness. Our downward cours was with the speed of about 5-6 knots and more, the Indians delighted to steer through the swiftest of rapids - doing so, nothing can secure your safety but the most vigorous plying of the paddle. This the Indians did with a will, shouting & singing at the same time. Our canoe sped on with the rapidity of an arrow.

The river valley begins to narrow gradually; the mountains shut in closer and closer; the stream is however clear of all obstacles. After a few hours navigation, we passed the mouth of a large tributary from the West, forming a wide Ravine which extended to the foot of Main cascade Ridge.⁷² This stream (Jseh-neeh) must take its origin somewhere in the gap in the Vicinity of Spech Mt., & its headwaters interlock with those of the Zakeno & the Klaheih streams.⁷³ From here the river bed assumes rapidly the Character of a Cañon, its waters dashing forward with great impetuosity. Nothing equals the pleasant excitement of thus rapidly dashing through the waves of a swift stream with a good canoe & skillful men. The swift & gentle motion of your conveyance & the continual rapid change to scenery affect senses & mind most charmingly.

After another $\frac{1}{2}$ hour navigation, we rapidly enter the begining of a cañon. The river flows here between rocky banks, with a swiftness & impetuosity which even makes my expert Indian canoe men feel more or less uncomfortable. From the anxious looks they cast around, I conclude that

it is about time to look out for a secure harbor for our canoe. When we had reached a little eddy, in a convenient little nook of the rocky River bank, forming a cosie little harbor, the Indians gave vent to a yell of satisfaction, in which even Join the fat Indian boy joined with a short grunt, whose imperturable and stoical temper under ordinary circumstances nothing could disturb.

From here we could also reach the top of the rocky River bank. When having climbed up to it we found by nearer inspection that we had stopped our onward course not a moment too soon; for within a distance of only 100 yards from our harbor, we found the River forming a small perpendicular fall of some 12-15 feet which, if we had dashed over it, would have engulfed the whole party & sent us inevitably to our last accounts.⁷⁴ This fall it was impossible to perceive, except in its nearest vicinity, when all oposition against the terrific swiftness of the stream would have been found unavailable.

We found that we were only a few hundred steps from the East fork, which is a considerable stream & flows in a wide valley bordered by high Mts.⁷⁵ Its course so far I could see is about West North West. It joins the Skagit by breaking through a high rocky ledge in a similar way as already observed at the junction of 2 of these Mt streams. Its high rocky banks are bridged over by a small fir tree, from a foot to 6 inches in diameter; its height above the stream may be about 150 feet. Over this primitive bridge one of the Indians was rapidly crossing & recrossing, looking with perfect coolness in the dissy chasm below where the waters were dashing & roring in their onward cours. He invited each of us to join him in turn, but with little sucess.

From here the Skagit takes a considerable turn to the West, and forces its passage through the Cascade Mt Ridge in a direction rectangular to its course. Having gained the opposite (westerly) embankment of the Stream, I made an observation for altitude and, as it was nearly noon, made also a preparation to take the suns meridian altitude, the first one of which record was made in my note books; the instrument was a good Sextant (by Wünderman), reading the angle to 20° & with an Index error from $3' - 4'$. A good meridian altitude was obtained, making the latitude for this place to be about $48^{\circ}, 43, 37''$, a result which corresponded exactly with my previous estimation of distance.⁷⁶

After having completed my labors here, we went on our return trip. Going downstream over rapids & going upstream over the same is a quite different thing. Hard labor is required to stem the swift current of the stream; the paddle is exchanged for the pole; & the canoe is propelled by a series of vigorous pushes, which give it a rate of about 2 miles per hour. The distance of about 10 miles, which we had travelled this morning in about $1\frac{3}{4}$ of a hour, occupied us on our return trip more than 5 hours, giving me ample time to sketch the river & take the necessary bearings. Coming downstream 2 days ago, I had already elected the Kakoit Mts as the most feasible locality from which to make our further explorations eastward to the divide between the waters of the Smilkameen & those of the Skagit.⁷⁷ My plan was now to send the walking party up-stream to a point on the foot of this mountain from whence, following the sumit of a leading spur, the sumit could be easily reached, while I was to proceed the same way upstream by Canoe.

This morning I made observations for time to regulate my watch which, however only an ordinary wellgoing time piece, I found it amply sufficient. For all observations whatever they may be for time or altitude, taken with a Sextant on the Suns disk subsequent computations gave very satisfactory results from all my observations. Found watch fast 1' 10", rate of watch out 5" fast.

After having dispensed with the services of Mitchly, who acted as recorder, he started upstream in charge of walking party; (while) my intention was to stay here until noon to take a meridian altitude, which I obtained sucessfully. It makes the latitude of this camp about 48° , $48'$, $47''$.⁷⁸ Having terminated my labors here, we started upstream in our canoe, & at 3 PM met the walking Party, which were encamped on a place somewhat below the one I had intended for camp. To reach this we all set out on foot. The canoe which had done us so good service was abandoned on the banks of the stream to benefit maybe some passing Indian in these wild regions. Going through the dense timber everywhere present, Mitchly missed his footing, fell, & broke our barometer irreparably, an Instrument which he had carried successfully over the most dangerous & difficult places during this sumers excursions. This was indeed provoking since it was particularly desirable to get the height of the divide between the Skagit & Smilkameen. After a short walk we reached a desirable place on the River bank from whence a spur leading up to the Kakoit peaks can be easily reached.

Today, the first September, the party started out early to ascend the Mt ridge containing the Kakoit peaks. By following the summit of a leading spur, we made rapid progress for some distance; but later on in

the morning we found it hot & dry work as no water could be found. The numerous patches of berries of an endless variety on our route retarded our progress rapidly as nothing could induce the Indians to proceed steadily while berries were about. The heat & berries had increased our thirst to an intense degree; we white were hastening to find a place to cool our parching lips. Whoever has suffered intense thirst in Mt regions will appreciate our relief when we finally reached a small patch of snow on a little Meadow meadow, with which we hastened to quench our burning thirst. As we had to wait a considerable time for the Indians I concluded to camp here as the place was pleasant and inviting.

This afternoon I ascended one of the Kakoit peaks from which I had a good view, which would have been still more instructive had the air been free of smoke.⁷⁹ But this arising from the numerous fires in the river valley shrouded the scenery more or less. The country as seen from this point seems to be an intricate mass of spurs, ridges, and valleys. The dividing Ridge appears to form a vast semicircle, one end of it leaning on Hozomeen Mt. the other one resting upon a point some distance East Nokomokeen Mt.⁸⁰ East and North of this secircular Ridge the waters flow East, partly in the Pasayton & partly in the Methow.⁸¹ Inside of this same Ridge the Waters flow West to the Skagit. The numerous small Creeks & rivoulets which flow in & from this Sistem of Ravines & Spurs are absorbed by 3 principal Creeks. The most northerly of the 3 is a stream of considerable sise; its mouth we noticed while coming down the Skagit. It branches out in numerous head branches from all directions; its Indian name is Skweh-Kway-et.⁸²

The point which I had ascended today is the lower of the 2 Kakoit peaks; they stand close together $\frac{1}{2}$ miles distant & can be easily reached⁸³ by following the summit of the spur on which our camp lay; it terminates to the north in steep rocky precipices which come down into the valley of the Skweh-kway-et Creek.⁸⁴ The whole Mts except near the summits are covered with fine pasturages of fine grass.

Next morning by daybreak, I ascend the second & higher of the Kakoit peaks to complete my labor, which had been left unfinished yesterday on account excessive smokyness of the air during the evening.⁸⁵ This morning it was clear & the work could be easily completed. During my stay up here, Mitchly had orders to move camp to some point higher up further east, about 3 or 4 miles from the last camp. This new Camp was in altitude of about 6000 feet, the highest point we ever have encamped on. Timber was here reduced to as bush and many patches of snow lay about even at this advanced season. I reached camp toward noon just in time to take a good meridian altitude, which gave for this place the latitude of $48^{\circ} 49' 46''$.⁸⁶ From here extends a Ridge to the main divide to the East, forming the dividing Spur between 2 streams runing westward to the Skagit.⁸⁷ Near our camp, a high peak rises to a considerable altitude, maybe 1500 ft above this. This peak I ascended this afternoon. Nothing new was seen but many valuable bearings were taken—intersections to numerous courses taken this morning from Kakoit Mt. These stations form an excellent base to determine many points in this vicinity.

From here a low saddle could be distinctly seen in the valley of the stream to the South of us, plainly indicating the divide. Somewhat to the

left of this saddle a high Peak is prominent, evidently lying in the semi-circular dividing Ridge of which I have spoken above.⁸⁸ This peak it is my intention to ascend tomorrow; by following the Ridge extending due East it can be easily reached. We found the night very cold up in this altitude, as a violent (wind) rose during the night which blew the tent down, adding to the uncomfortableness of our position.

By daybreak it was calm again, & Mitchly, Myself, & the Indian boy Tom carrying the sextant, were on our way to reach the peak to the East of us. By keeping the Ridge extending due East to the foot of this peak we found it easy to proceed. The air was cool & fresh. After alternatively descending & ascending, we finally reached the foot of the peak in the vicinity of the Saddle. The whole Mt surface is covered with splendid meadows of the finest alpine pasturage, room & food for extensive herds of cattle. We soon reached the summit of the peak & we were amply repaid for our trouble by a fine view all around only somewhat marred by the smokyness of the atmosphere.

We are here then undoubtedly on the divide of the waters flowing East & West. Eastward of the Saddle, nearby, we observe a Creek flowing East South East probably into the Methow, a tributary of the Columbia.⁸⁹ To the East of our point a creek flows North to reach the Paysayten.⁹⁰ The West side of the Mt on which we stand is formed by steep rocky cliffs, partly covered with snow. Riviulets arising in these Snow masses, flowing NW, form the headwaters of the many headed Skweh-Kway-cet Creek.⁹¹ At noon I took an observation for meridian altitude which makes this place to be: $48^{\circ} 49' 46''$ in Latitude.⁹² The Altitude of this peak may be about 6500-7000 feet.

Descending the South side of the Peak we reached the Valley east of the saddle. The waters runing S.E.S. from here head in 3 beautiful little lakes of clear & limped water surrounded by the finest Mt meadow we ever have seen.⁹³ Altogether this (is) one of the most lovely spots we ever visited. We returned, taking pretty much the same route as this morning. We arrived late to camp, which had been moved to the former locality farther down during the day.

Early in the morning all hands are ready to comence our descend to the Skagit valley, as I considered the program of my orders more than completely carried out. After having overcome the somewhat difficult descend, we soon reached the banks of the Skweh-Kway-eet Creek, quite a considerable stream of the size of the Sanissaih creek, which we crossed by wading through it.⁹⁴ And now began a long tedious march through the Skagit valley, over fallen logs, through bush & dense timber. This portion of the River valley is covered with almost impassable forest. We camped today on the River bank. Next morning the same toil begins. Toward noon the forrest becomes easier to pass through; it enables us to reach the astron. Stat. by noon. This station itself is deserted, but we met here Harris, a former employee of the Commission, & a Samona Indian, with a new barometer & a fresh supply of provision sent at my request by Mr. Parke Chief for the purpose of making use of it during the ascend of Hozomeen Mt. which I planed previously. (Mr Parke was notyified of the want of these articles by a letter written down the Skagit valley, & sent to him by this Samona Indian.)

But just now the whole country is covered with clouds & smoke. To comence under such circumstances the long & maybe dangerous ascent would

be useless & labor thrown away; it was therefore not attempted. Here we received information that Mr. Parke and Mr C Gardner were encamped at a place called the Cache, some 4-5 miles from the intersection of some trails. We were soon on our way to reach this point, with Harris leading the way. After a short but brisk march we reached this encampment & were cordially & hospitably received by Mr Parke, Mr Gardner, & the rest of the party.

This finishes the series of reconnaissances made by me on the Western Slope & in the Interior of the Cascade Mts, extending as far as the divide between the Skagit & the Columbia. The actual number of miles travelled over amounts to over 300, & the number of square miles, more or less reconnoitered & made suitable to be mapped, to more than 1000 square miles. The instruments used while making these reconnaissances were a small french compass with a light stand or thripod, a small Kalder compass, & a poket compass. To take the altitudes a listern barometer was used, & for the purpose of taking the latitude of a place a good Sextant was used.⁹⁵

In these reports which I have the honor to lay before you, many observations, descriptions, ect. not strictly belonging to a topographical report were made: this might be found objectionable by many. In defense against such objections, I would beg leave to say that as many localities have only been visited by myself, a great deal of instruction & valuable information would have been lost had I acted differently. To give a corect idea of the nature of these Mt. regions, as far as seen, was the object of the writer of these reports, & nothing was omitted which in my eyes could promote this object.

While staying with Mr. Parke at the Cache, he communicated to me a plan for further exploration on the Eastern Slope of the Cascade Mts, to

the North & Eastward of the Parallel. The proposed route was by the Whatcomb trail which crosses the Cascade Mts at some Pt northward of the Parallel and afterwards joins the Hudson bay trail, which leads further into the Interior of the Country.⁹⁶ As over this route travel with Pak animals was feasible, the service of Indians could be dispensed with. In consequence of this arrangement all the Indians, with the exception of one, a Samona Indian which was retained to carry the sextant, were discharged.

Some of these Indians had been in my special service several months; some had been with me last year already. It would be unjust in me would I here not testify to their uniform good conduct (and) to their faithfulness during this summers hard work. By uniform good treatment & honest dealing with them, their confidence may be easily gained; & almost incredible amount of labor may be gotten out of them. Even now, although anxious to return home, most of them would have been ready to do further service had such been required of them.

Mr C Gardner shortly left this place, his train having arrived in the meantime, to continue his survey to the Eastward from here along the new trail. A few days after, a train arrived in charge of A. Lower,⁹⁷ consisting of 7 animals, bringing me some very necessary new clothing, the missing notes (and) letters & paper left at the lake. This train, with 2 additional white men (Mitchly & Williams) & an Indian will constitute my new party with which I left a few days after for my new expedition North of the boundary line, in British Territory.