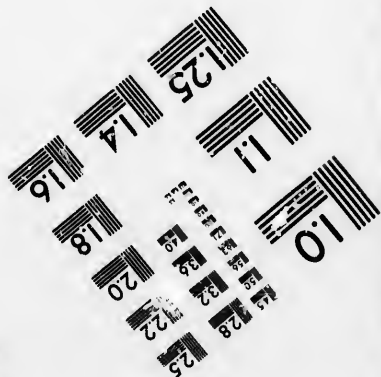
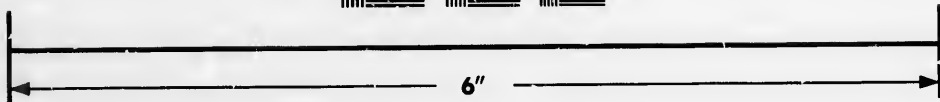
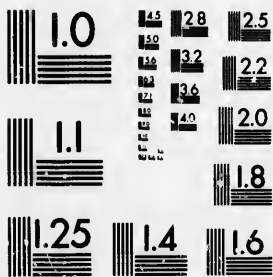


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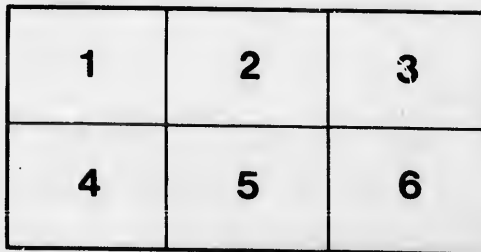
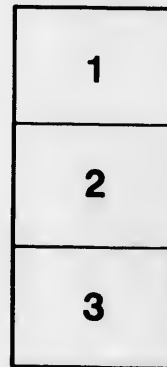
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REPORT
OF A
JOURNEY OF SURVEY,
FROM
VICTORIA TO FORT ALEXANDER,
viâ
NORTH BENTINCK ARM.

BY
LIEUTENANT H. SPENCER PALMER, ROYAL ENGINEERS.

PRINTED AT THE ROYAL ENGINEER PRESS, NEW WESTMINSTER,
BRITISH COLUMBIA.
1863.

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ROYAL ENGINEER CAMP,
NEW WESTMINSTER, BRITISH COLUMBIA,
24th NOVEMBER, 1862.

SIR,

I have the honour to enclose herewith for your information a report, with maps, of my recent journey of survey over the route from North Bentinck Arm to the Fraser.

During a reconnoissance extending over four months, from which I returned to Head Quarters on the 22nd ultimo, the Cariboo and other districts of British Columbia were subsequently visited, and will form the subjects of a future paper as soon as time will admit of the astronomical and barometrical observations being computed and the necessary maps prepared. The reasons for my submitting the report of this portion of my work in a detached shape are given at the end of the paper.

I have the honour to be,

Sir,

Your most obedient Servant,

HENRY SPENCER PALMER,

Lieut. Royal Engineers.

To

COLONEL R. C. MOODY, R. E.

Chief Commissioner of Lands & Works.

&c., &c., &c.

REPORT.

THE voyage from Victoria to North Bentinck Arm, in length about 440 miles, affords those who perform it an opportunity of witnessing some of the most intricate, and perhaps the most wonderful inland navigation in the world. The steamer course winds through an archipelago of surpassing beauty—islands of almost every size and shape, presenting an ever-recurring succession of mountain and valley, headland and bay, and embracing all the beauties of alternate prairie and woodland scenery.

North of Jervis Inlet the mountains which cluster round it and the other Inlets to the south of it, and which, from their detached position, have been spoken of as a distinct Coast range, become blended by continuous chains with the superior crest of the Cascade Mountains which, from this point northward, may be said to run in a general northwesterly direction, parallel, or nearly so, to the coast, and distant from it about 50 miles. This chain, which appears to increase in altitude with the increase of latitude, is here and there partially pierced by the numerous deep-water arms of the sea which form the principal characteristic feature of the whole western coast-line of British North America, and, extending inland to distances of from 20 to 100 miles, have received severally the names of Arms, Inlets, Sounds and Canals.

By the few who, for trading and other purposes, have penetrated these arms of the sea strange stories are told of the grand and gloomy character of the neighbouring scenery. Glaciers, rarely met with elsewhere in the country, are here of frequent

occurrence, and, near Knight's Canal, we hear of a river which flows for 15 miles through a magnificent glacier tunnel 100 feet in height and from 100 to 150 yards in breadth.

In the Seymour Narrows, through which the steamer track passes, occurs the tidal junction of the waters which separate Vancouver Island from the mainland. Here the flood tides from the Pacific, flowing respectively to the southeast through Queen Charlotte Sound and to the northwest through the Gulf of Georgia, meet and form violent, cross, jumping seas, which, especially when aggravated by high winds, cause danger of no small moment to light craft. Tides are said to be of excessive strength throughout nearly the whole of this inland navigation, the winds usually extremely variable and anchorages infrequent, and hence it is reasonable to infer that the passage to the north by the Gulf of Georgia, although peculiarly favourable to steam navigation, should never be attempted by any large vessels without the assistance of steam power.

Passing the north end of Vancouver Island, the course crosses Queen Charlotte Sound and runs to the east of Calvert Island. The Sound thus crossed, about 30 miles broad, is open to the North Pacific, and subject therefore to heavy ocean swells, whose magnitude and consequent danger are heightened by the meeting of the ebb tides which, running along the mainland in north-westerly and south-westerly directions, rush to the ocean through this Sound. Violent gales are at all seasons of frequent occurrence here, and, until reaching Smith's Inlet, no harbour or anchorage interrupts the bold, bluff front of the mainland.

North Bentinck Arm, a mere water-filled indentation in the mountains, some 25 miles in length and from $1\frac{1}{2}$ to $2\frac{1}{2}$ miles in breadth, may be taken as a fair type of the other inlets on the coast. Piles of mountains broken up towards the seaboard in

singularly tumbled though rounded masses, but increasing in altitude and compactness as they approach the centre of the Cascade range, snowy peaks, pine-clad slopes, rugged cliffs and precipices, naked, shapeless masses of trappean and granitic rocks projecting upwards to vast heights, gloomy valleys and picturesque waterfalls; these, in constant succession, form an aggregate of sublime and wild, though strangely desolate and unattractive scenery.

Like North Bentinck Arm, we are told, in these general characteristics, though perhaps even more wild and bleak as the latitude increases, are the other inlets on the northwest coast. In all the manner meets with water of vast depth and rarely encounters obstacles to navigation in the shape of rocks or shoals, though all are alike subject to violent winds and powerful tides and therefore unfavourable to navigation by sailing vessels of large size.

North Bentinck Arm receives at its head the waters of the Bella Coola or Nookhalk river, a rapid mountain stream probably 80 miles in length, which, rising beyond the principal crest of the Cascade Mountains, flows through and drains a portion of that range and, subsequently, the chasm or valley formed by the continuation of the mountain walls of North Bentinck Arm. Another stream of smaller dimensions, called by the natives Taantsnee, flows through a gap in the range to the north of the arm and discharges itself into its northeastern corner. On the 2nd of July 1862, at 1 P.M., the thermometer in the shade standing at 56° Fahrenheit, the temperature of the Nookhalk river was ascertained to be 49°7 Fahrenheit, and the same result was obtained with regard to the water of the head of the arm, which, owing to the volume of the Nookhalk, is fresh for some distance outwards.

The valley of the Nookhalk for 40 miles from its mouth is undoubtedly of estuary formation, low and, in many places, swampy throughout, and to the same process by which, for ages past, the land has been gradually forcing back the waters of the ocean, viz: the deposit of the vast quantities of alluvium and drift which have been brought down by the Nookhalk, is to be attributed the existence of the large, flat mud-shoal which extends across the head of the arm. This shoal, composed of black, fetid mud, supports a rank vegetation of long swamp-grass for about half its distance outwards; it is bare at low water spring tides for about 700 yards from high water mark, and covered at high tide with from 1 to 8 feet of water, and at a distance of 800 yards from shore terminates abruptly in a steep, shelving bank on which soundings rapidly increase to 40 and soon to 70 fathoms. On this shelving bank, where it approaches the south shore of the arm, exists the only available and partially sheltered anchorage in the neighbourhood, and, as instancing the extreme narrowness of the belt of water in which it is practicable to anchor, I may mention that, when here, I was assured by Captain Swanson of the Steamer *Labourchere*, then lying in 16 fathoms water, that nothing but the outward flow from the Nookhalk river prevented his vessel from swinging to the westerly winds which were blowing at the time, in which case, had she remained at anchor, she must inevitably have tailed on the shoal.

Another small anchorage is said to exist at the mouth of the Nomaamis river, about 3 miles down the north shore of the arm, but, as this point is too far removed to be of any importance with reference to the future establishment of a route, I did not lose time in examining it.

From the present anchorage upwards steep, rocky cliffs run

at a high angle into the water of the arm, and, further west, into the low, swampy land, intersected by small *sleuyls* from the Nookhalk river and from the sea, which extends for some distance within actual high water mark. To build wharves and perhaps a few sheds on the rocky shores of the anchorage, and thence a road along the mountain sides to the spot indicated in the accompanying plan as suitable for a town site is the only method I can arrive at by which to meet the requirements of any future traffic that may occur on this route. The site I have selected is, in fact, the only available ground in the neighbourhood, a sloping tract of land of about 1200 acres in extent, covered with a profuse wild vegetation of clover, vetches or pea-vine, grass, and berry-bushes of various descriptions, timbered in places and generally dry, but breaking up towards the river and the head of the arm in low swamps and ponds, and damp, grassy hillocks and ridges.

On the north side of the river much of the land is heavily timbered within the line of high water mark with cedar, cottonwood and some species of fir, but is so singularly dotted with low marshes and damp, steaming ground which encourages a dense growth of the *penae horrida* as to be unadapted to white settlement, though the natives, who dwell in confined areas and derive many of their necessaries from the products of swamp lands, would probably value it highly, and, retaining this, be content to abandon to the whites the drier land on the south side of the river.

Half a mile from the mouth and on opposite sides of the Nookhalk are situated two Indian villages, forming a settlement named Ko-om-ke-otz, and presided over by the chief Poetlas. Two miles further up on the south bank is another large village named Sponohlim, ruled by Annokeetsum, and the whole

population numbered, when I was there, about 1200 souls. The villages are similar in their general character to those met with in the southern part of British Columbia, but remain in their purely savage originality, unmodified by the touch of civilization. They consist of rude clusters of dwellings built of posts and huge, rough slabs of cedar, and some of the lodges, more especially those of the chiefs and medicine-men, are gaudily painted with strange devices, prominent among which is the red hand, the Indian symbol of power. The natives themselves are physically a fine race, tall, robust and active. They, as is usual with the Indian tribes west of the Cascade mountains, subsist chiefly upon salmon and berries eaten fresh in summer and dry in winter, and also on the flesh of the wild animals hunted for the sake of their furs during the winter months; but they possess the usual native characteristic of improvidence, and, in the spring, are frequently reduced by want of food almost to skeletons. The salmon are caught in large quantities during the months of July and August, partly in nets, but by far the greater number in ingenious but rudely constructed weirs, which are built across the river and admit of the escape of few only of the fish.

The arm is navigated by large canoes of the southern pattern, but those used on the Nookhalk are of a different description, and admirably adapted for the dangerous and difficult character of the navigation. The largest kinds of these are about 25 feet in length and $2\frac{1}{2}$ feet in breadth, built of cotton-wood, that wood being more easily worked than the cedar, with flat floors, and sides nearly straight from stem to stern, a form which facilitates the work of poling. On raised platforms in the bow and stern stand the two natives on whom principally depends the guidance of the canoe, and the unerring skill and nerve with which heavily laden canoes are propelled through dangers of no trifling description is worthy of admiration.

Hudson's Bay blankets and shirts are the usual articles of native attire, and they adorn themselves with nose-rings, ear-rings and fantastic head-dresses of wampum. They have not yet come within the influence of Protestant or Roman Catholic Missions and adhere pertinaciously to the old Indian superstitions and customs, maintaining, as regards their religious and other ceremonies, a jealous secrecy which defies the scrutiny of the white man. The language is the most guttural and difficult on the Coast.

In moral character the Bella Coolas are degraded specimens of the red Indian. Prostitution, polygamy, and other worse vices at which civilized men shudder are of frequent occurrence amongst them. Thieving is an art that all attain to perfection, and, in intercourse with them, I had unpleasant opportunities of becoming acquainted with the incredulity, falsehood and avarice which form prominent traits of their character. Sir Alexander Mackenzie christened Ko-om-ko-otz "Rascals' Village," and I willingly contribute my testimony to the justice of the title.

To their immoral habits of life, and partly also to wars with the Hydahs, the bloodhounds of the northwest coast, may be attributed the gradually progressing extinction of the race, clear evidence of which is afforded by the sight, at different points further up the river, of the ruins of deserted lodges, once the habitations of large families of Indians that have gradually dwindled away by death until the few survivors have incorporated themselves with the larger bands.

Smallpox has this year contributed a sad quota of death. During my stay there this disease, which had only just broken out when I arrived, spread so rapidly that, in a week, nearly all the healthy had scattered from the lodges and gone to encamp, by families in the woods, only, it is to be feared, to carry away the seeds of infection and death in the blankets and other

articles they took with them. Numbers were dying each day; sick men and women were taken out into the woods and left with a blanket and two or three salmon to die by themselves and rot unburied; sick children were tied to trees, and naked, gray-haired medicine-men, hideously painted, howled and gesticulated night and day in front of the lodges in mad efforts to stay the progress of the disease.

On the 9th of July we commenced our journey up the valley, the party consisting of Lieutenant Colonel Foster, M.P.P., Sappers Edwards and Breakenridge of the Royal Engineers, a packer and myself, with eight horses. It would be tedious to describe at length the various obstacles that opposed our progress, and the sundry shifts to which we were put in prosecuting our difficult journey. In this report I propose simply to divide the country travelled over into sections in which the leading natural features are sufficiently uniform to admit of one general description for each, and commence, accordingly, by speaking of the FIRST SECTION, some 43 miles in length, extending from North Bentinek Arm to Shtooiht the head of canoe navigation on the Nookhalk.

The Nookhalk river, with its rapids and rocks, its numberless islands, bars and *snags*, whitish clay-charged water and densely wooded banks, bears a striking resemblance to the Lillooet river well known to yourself and to most travellers in British Columbia. Owing to the generally level character of the valley, the main stream and its *sleughs* water a larger area than the Lillooet, though its volume is probably not more than two-thirds as great. The banks, which for some distance back are usually low and flat, and liable in many places to inundation, support a thick growth of cotton-wood (a species of poplar), willow and other trees peculiar to damp soils, and an underbrush of the densest nature

consisting of cranberry, dogwood, crab-apple and many other similar bushes. The river, as is usual with streams flowing through alluvial soils, is excessively tortuous, alternating with great regularity from side to side of the valley, but very rarely approaching the mountains so closely as to render the task of road-making a difficult one. It is almost superfluous to add that the stream is impassable for steamers, but canoe navigation as far as Shtooiht is, I believe, practicable at most seasons.

Countless tributaries, of every size from tiny cascades to impetuous mountain torrents, feed the Nookhalk on its passage through the hills. Prominent among the latter are the Skomahl, the Snoot-elicee, the Noosatsum and the Tcheetsmecltanic from the south, the Tsalloomt, the Tsatleanootz and the Kahylkst from the north, all streams of some size which drain large longitudinal valleys of the mountain system.

The Nookhalk valley, which averages from one-half to one and a half miles in width, opening out considerably at the confluences of the principal tributaries, is walled in by giant mountains of from two thousand to six thousand feet in height, presenting the usual varieties of scenery met with in mountain travels in this country. Some of the slopes, particularly those between Soonochlim and Nooketz, are perfectly devoid of soil, timber, or covering of any kind, and rise very abruptly from the valley, massive, unbroken walls of granite and trap standing in stupendous contrast to the forest scenery on the river banks and islands.

The line of the most elevated crest of the Cascade range crosses the Nookhalk near Nooskultst, 22 miles from its mouth, maintaining apparently a direction parallel to the general coast-line. But although a principal crest, this is by no means a principal watershed, for, in these latitudes, the rains and snows which fall on either slope of the range are quickly conducted to the Nookhalk

and the other similar arterial streams near the coast, and restored by the most direct path to the sea. Two peaks of this range, Mounts Pope and Deluge, standing on opposite sides of the river and respectively about 5000 and 6000 feet in height, attract attention by their massiveness and their superior altitude. The latter, crowned by a cluster of jagged, picturesque peaks, is the subject of tradition among the Bella Coola Indians, for they believe its summit to have been the abode of an ancient chief of their tribe and his squaw, who climbed there at the time of the Deluge and were saved to perpetuate their race.

Other magnificent mountains and clusters of mountains are met with on the journey, embracing most of the elements of grandeur that can be imagined in scenery of this description, and the numberless waterfalls which are seen in many parts, though more particularly towards the upper end of the valley, and which, on the melting of the snow, precipitate themselves in considerable volume down the crannies and crevices of the mountain sides, are worthy of notice, as adding much to the sublimity of the scenery.

The valley abounds with the natural features usually met with at low altitudes in this country; tracts of heavy forest and dense underbrush, such as we see in the valley of the Lower Fraser, succeeded here and there by groves of alder, willow and swamp woods; occasional open patches of low berry-bushes, forests of smaller timber with a comparative absence of brushwood, large alluvial flats, abrupt mountain sides, poor gravelly soil, patches of swamp land, innumerable brooks and *steughls*, and large quantities of fallen and, occasionally, burnt timber; these are the prominent characteristics of the Nookhalk valley, and will at once be recognized as incidental to the valleys of most of the mountain streams on the coast.

An Indian trail of the rudest description winds up the valley, usually following the river in all its sinuosities, and also offering great impediments to travel. It was found to be impracticable to pack the horses over this section on account of the extreme narrowness and frequently miry nature of the trail, the fallen timber, the absence of bridges, &c; and the baggage was transported as far as Shtooiht in a canoe. At three deserted Indian village-sites we found sufficient grass growing to afford temporary subsistence for the animals. These deserted sites are named Nookectz, Asananny and Nooskultst, distant respectively ten, sixteen and twenty-two miles from Ko-om-ko-otz, and, at the latter, the trail crosses from the left to the right bank of the river at a spot apparently as well suited for that purpose as any that could be found. Another large village, at present inhabited, exists at Nootkleia, thirty-four miles from Ko-om-ko-otz, at the confluence of the Kalyklst and the Nookhalk, and here also we found fair feed for a day or two for our small band of horses:

Although the present trail passes through a great deal of swampy land, there is nothing to prevent a good bridle-path or waggon-road being carried the whole way to Shtooiht, care being taken to hug the mountain sides where it is necessary to avoid low, soft ground, a measure which would also shorten the distance materially. If a road of any kind be made, I think it cannot do better than follow the left bank to the Indian crossing at Nooskultst, thus avoiding two bluffs on the right bank at Soonochlim and Asananny respectively, then cross and continue as far as Shtooiht on the right bank.

Happily in this valley there is a comparative absence of rocky bluffs running sheer into the river, which necessitate the task of blasting, for the stream rarely approaches the actual bases of the

mountains, and "canons" or "passes" nowhere occur.

There is an unavoidable slide of fragmentary rock, half a mile in length, at 27 miles from Ko-om-ko-otz, and rock *in situ* would be met with at a point about 2 miles above Nootkleia, but neither difficulty is likely to prove of a serious nature. A good mule-trail from North Bentinck Arm to Shtooiht should not exceed 35 miles in length and £1400 in cost.

At Shtooiht, a small Indian village situated in the heart of piles of majestic but strikingly bleak and forbidding mountains, the trail leaves the Nookhalk and travels up the Atnarko, a large, clear-water tributary, here nearly equal in size to the Nookhalk. The latter river, which from this point upwards receives the Indian name Talchako, runs in a south-southeasterly direction, its course being traceable for about ten miles, and the Atnarko takes a general east-northeasterly direction as far as Cokelin or the Great Slide, fourteen miles distant, at which point will terminate the SECOND SECTION of the journey.

Although the Atnarko valley is similar in many general characteristics to that of the Nookhalk, as its stream is ascended so do the difficulties of progress increase. The valley, which near its mouth is about one mile in width, gradually contracts, and the mountains, although diminishing sensibly in apparent altitude, become more and more rugged, and frequently jut out in low, broken masses into the stream. The Atnarko receives two tributaries of some size from the north, viz; the Snookhalk at six miles, and the Cheddeakulk at ten miles from its mouth; it gradually contracts in volume, soon losing the proportions of a river and dwindling, beyond the Cheddeakulk, to a mere brawling torrent with a very rapid fall and hemmed in by steep and continuous cliffs.

Here the first serious obstacles to road making are met with.

From the crossing of the Cheddeakulk to the foot of the Great Slide mountains crowd closely in upon both sides of the stream; frequent extensive slides of fragmentary trap rocks of all sizes run either directly into the river, or into the low, swampy lands bordering it, which are liable to inundation at the freshets, and the Indian trail which winds along their faces is difficult and almost dangerous for travel. These slides vary from 300 to 600 feet in height, and are capped by rugged cliffs extending to an average altitude of 1500 feet above the river, and, since they are unavoidable, the labour of trail-making between Shtooiht and the Great Slide will be considerable and entail a probable expense of £1000.

Thus far the journey of 57 miles from North Bentinck Arm, owing to bad weather, trouble with the natives (which on one occasion nearly cost us our lives) and the difficulties of advancing, had occupied eighteen days. From Shtooiht to Taparn-towoot, a distance of eight miles, the baggage had been packed on the horses, the difficulties having been such as our small party were able to overcome in six hours, but an inspection of the trail beyond the latter point convinced me that it was desirable to push on without the animals, and to prosecute the remainder of the journey to the Fraser on foot. This was done; Indians, who did me the honour to accept gold instead of blankets in payment, were with much difficulty procured to pack the baggage, the horses were left in charge of the packer, and at noon on the 27th of July we commenced the **THIRD SECTION** of the journey, 16 miles in length, extending from Cokelin to the summit of the Precipice.

At Cokelin, 1110 feet above the level of the sea, famous among the natives for its raspberries, which grow in great profusion, the trail leaves the Atnarko running about southeast,

and strikes to the northward, directly up the face of the Great Slide, at a high angle of elevation. The slide, similar in character to those frequently met with in the mountains, though perhaps the stones composing it are smaller than is usual, is simply a mountain side of disintegrated trap rock about one mile in length, forming the northern slope of the valley of the Atnarko, and only separated from the slides lately passed by the glen of a mountain torrent. The height of the actual loose rock, as indicated by barometric measurement, is about 1120 feet, the trail barely even winding up this portion, but wriggling almost directly up the face in would-be zigzags bitterly trying to pedestrians. Above this it is lost among cliffs and hollows dotted with small timber, and rises more gradually until, 5 miles from Cokelin, an altitude of 1780 feet (2890 feet above the sea) is attained.

Corresponding to this increased elevation is the change in the character of the vegetation and the scenery. The trail now emerges on an elevated, rolling district, where the mountains, with whose summits we are nearly on a level, seem of inconsiderable height and lose much of their rugged appearance. Small, stunted firs take the place of the large pines and cedars of the valleys, the trail, though here and there rocky, improves, the soil becomes sandy and light but firm, brush less plentiful, and grass, though of poor quality, appears in patches. Down by a gradual descent of 500 feet to the brook Hotharko, a tributary of the Atnarko, and up its valley 7 miles in an east-northeasterly direction to its forks, meeting with no serious obstructions but fallen timber and occasional small rocky slides. The space between the forks of the Hotharko, which run in southeasterly and west-northwesterly directions, is occupied by a peculiar mountain mass of basaltic rock, 1350 feet in height, which

has received the name "The Precipice." The ascent of this mountain is excessively steep, the trail at first running up the backbone of a singular spur, further up winding among crumbling fragments of rock, and, finally, reaching by a dizzy path the summit of the perpendicular wall of rock, 100 feet high, which crowns the mass, and from which it derives its name.

The cliff is composed of blocks of columnar basalt in the shape of multangular prisms averaging, in their perfect state, about two cubic feet in size, usually stained of a dull red colour and somewhat vesicular. The blocks are fitted together as perfectly as if by human agency, and the layers are horizontal; thus, on the summit, which is perfectly level, patches are met with in which, the scant soil having been washed away, the jointing of these singular stones, almost resembling Mosaic pavement, is clearly visible; and, towards the edges of the cliff, large portions of the rock have crumbled away, leaving standing in many places abrupt, columnar masses of as much as fifty feet in height, which, viewed from a short distance, almost assume the appearance of massive artificial and battlemented structures.

If a trail be made over the North Bentinek Arm route, the two serious obstacles spoken of in this section, viz: the Slide and the Precipice, may be easily avoided,—the former by not leaving the Atnarko until reaching the mouth of the Hotharko, the latter by following the south fork of the Hotharko, and attaining the level of the Precipice at an easy inclination.

The actual lines to be followed in such cases as these will be decided on when the trail, if any, is made. I had neither the time nor the means to perform minor explorations of this character, and did not think it necessary on this occasion to delay for such details. Possibly, if settlement take place in the Nookhalk valley, it will be discovered that available passes to the

high land exist by the valleys of the northern tributaries of that or of the Atnarko river, among which I would mention, as likely to afford such, the Kahylkst, the Snookhalk and the Cheddeakulk. Thus the bad road from the Cheddeakulk to Cokelin would be avoided, and the level mountain plateaux be sooner reached,—obvious advantages. The experience of this country has shewn that the first road through an uninhabited forest district is rarely on the best line, and that it is only when settlement affords opportunity for detailed exploration that the most favourable route in detail can be discovered. I do not, therefore, speak positively on these points, but confine myself to making suggestions where it appears reasonable to do so.

The FOURTH descriptive section embraces sixty miles of the route, viz; from the Precipice to the Summit Lake. Arriving at the top of the Precipice, 3840 feet above the level of the sea, the traveller enters on the level of the great elevated plateau which intervenes between the Cascade mountains and the Fraser. Looking eastward the plateau presents but few objects to attract attention, and the eye grows weary in wandering over a vast expanse of waving forest, unbroken save by the lakes and marshes which are invisible from the general level. To the west the towering peaks of the Cascade range come clearly into view; its limits, which we have now reached, being indicated by isolated clusters of hills to the south of us, here and there soaring up into great, massive, lonely peaks, but preserving no distinct arrangement.

Again with the increased altitude is noticed a characteristic change in the vegetation, and the verdure of the plateau seems to grow thinner and inferior as we travel eastward. Shallow, meagre soil, consisting chiefly of decomposed granitic and trappean rocks, supports a dense forest growth of stunted firs

rarely exceeding fifteen inches in diameter, and an inferior grass, which becomes poorer and poorer after passing Suttle Lake; kinni-kinnik or *uva ursi*, the native tobacco, is almost universal; here and there wild strawberry plants and, occasionally, a scant underbrush of wild roses appear, and a thin growth of cotton-wood fringes the banks of the running streams.

The altitude of the trail to the east varies slightly with the undulations of the country, and the summit ridge, near which water flows respectively to the sea and to the Fraser, is crossed at a distance of about fifty-five miles from the Precipice, and a height of 4360 feet above the sea. The extreme elevations of the rolling plateau are very inconsiderable, seldom more than 800 feet above the general level.

Embosomed in the low, extensive hollows formed by the gentle swells of the country are numberless lakes, ponds and marshes fed by the frequent showers which fall at these high altitudes, and forming the homes of vast quantities of beaver, to whose industrious labour is in a great measure to be attributed the extensive nature of the swamps.

The drainage of these lakes and marshes, often forming long continuous chains, is usually, owing to the generally level character of the district, very slow, sometimes scarcely perceptible, for the water often oozes from lake to lake through swamps of loose, porous soil forming the necks of land which divide one from another.

The lakes are of every area from ten square miles downwards, their shores in some few instances dry and rocky, but usually marshy, particularly at the ends, and abounding with coarse-bladed swamp grass of inferior nutritive properties. The swamps give rise to the existence of myriads of mosquitoes, the traveller's most inveterate enemy. They, with the small black blood-

sucking fly, prevail in greater or less abundance during the summer months the whole way from the Slide to Alexander, the coldness of the nights in no way appearing to hinder their existence, and, in the worst places, they can only be described as forming a dense living cloud which covers the country to a height of twenty feet from the ground. All the waters of the plateau abound in fish, particularly salmon-trout and suckers, and are frequented by varieties of water-fowl, as loons, wild duck, teal, &c.

But one of the most singular characteristics of this part of the country is the comparative absence of land-birds and animals, an absence which heightens the generally desolate nature of these extensive wilds. Three descriptions of grouse, viz: the stone-grouse peculiar to high altitudes, the ordinary willow-grouse of the forest and the prairie-fowl of the grass plains, a few gray jays and wood-pigeons and an occasional hawk or eagle or sand-hill crane were, with the exception of wild-fowl, the only birds we saw in a journey of 200 miles; animals were even more scarce, two varieties of squirrel, some water-rats, musk-rats and field-mice being the only animals encountered. But it is understood that the plateau is the resort in the winter months of some larger descriptions of wild animals, such as the marten, the bear and the deer, and, in the grassy districts near Chilcotin river, the silver fox highly prized for its fur. Of reptiles, frogs and toads abound in the swamps, and harmless snakes are met with in the rocky parts of the forest.

Small migratory bands of Indians, named after their chiefs or classified by the Indian names of the districts they inhabit, but all known as "Atnayos," make the plateau their home, roaming at successive seasons of the year to the various hunting and fishing grounds from which they can best procure their food, and trading their furs with the Bella Coolas, who prohibit their

passing to the coast and preserve a strict monopoly of the trade with the whites.

Our journey lay along a narrow Indian trail of varied character, sometimes passing over smooth, level tracts excellent for travel, sometimes traversing rocky districts and boulder beds, winding a great deal to avoid as far as possible the swamps, and crossing them, when obliged to do so, almost invariably at the narrowest part. In the woods a great deal of fallen timber was met with, and our path frequently lay for miles through dreary tracts of naked trunks, scorched and blackened by the passage of the forest fires, which are frequently started by lightning or the negligence of the natives, and sweep over immense areas.

In travelling over a portion of this section the Indian guides, desirous of visiting the village "Sussotah," took us by rather a long detour, but, as regards the object of this paper, the deviation is an immaterial one. This is the only occasion during the entire journey on which a deviation from the main trail was made.

The belt of country lying between the Summit Lake and the Chilcotin river, and forming the FIFTH SECTION of our journey, presents more attractive features than any other portion of the route. Ranges of rolling hills of as much as 1000 feet in height enclose broad, open valleys, watered by gentle streams, and embellished with chains of picturesque lakes. Although considerable tracts of dense forest are met with on the heights and on the mountain slopes, this gives way in the lowlands to an open-timbered, grassy country, such as is met with in the Similkameen and other well-known districts of British Columbia, and the valleys also embrace numerous comparatively level, open prairies of various extent, which afford bunch-grass pasturage in

fair abundance and will probably be found to be convenient wintering posts for some of the animals of the upper country. But the soil cannot be said to possess properties favourable to agriculture; it is cracked and sandy and excessively dry, and the bunch-grass, nowhere growing thickly, is mixed with large quantities of *artemisia* peculiar to poor, unproductive lands.

At Puntzee, signifying in Carrier language "Small Lake," thirty-nine miles from the Summit Lake, my Indians left me, and I was detained six days in efforts to procure other means of transport for the remainder of the journey. From an elevated point in its neighbourhood a fine view was obtained of the surrounding country. Looking back to the west the cloudy outlines of the Cascade range, distant from 60 to 100 miles, and bounding half the circle of the horizon, presented an almost unbroken front, a solitary gap in the southeast disclosing the probable entrance to the valley of the Homaltho river flowing to Bute Inlet. In the northeast and east the view was limited by the high mountainous districts of the Quesnel and Swift rivers, and the terraced ranges bordering the valley of the Fraser, the intervening districts on all sides being occupied by a great, waving forest plateau, embracing high, dry ridges, swamps, lakes, valleys and prairies, such such as have formed the subjects of foregoing descriptions.

As regards routes from the coast, the impression conveyed by this glimpse at a very large tract of country is that, on emerging from the Cascade range, the principal difficulties of travel are passed, and that, thence, there is no impracticability in making a road across the plateau to strike the Fraser valley at almost any point south of the fifty-third parallel. The determination of the best line through so extensive a district would necessarily be a labour involving weeks or even months of exploration, the main object of course being to avoid as far as possible the lakes

and swamps, and, guided by the relative geographical positions of the termini, to lay out as straight a road as the natural features of the country admit of.

At Puntzee the Indian trail from Bute Inlet, said by the natives to be distant five good days' travel, (probably 125 miles) joins that from North Bentinck Arm.

Fortunately we were here within reach of the favourite fishing and hunting grounds of the Indians, and, as Sapper Breckenridge, R.E., who travelled 37 miles to their encampment at the site of old Fort Chilcotin, was successful in procuring horses and a guide, we resumed our journey towards Alexander on the 9th of August. Eleven miles travelling brought us to the ford of the Chilcotin river, 10 miles below the lake of that name, the valley preserving at this part a general south-southeasterly direction. The stream here is about fifty yards wide, clear, shallow and, in places, swift. In wading it the water reached our middles, and it is therefore a question whether the ford would be practicable for laden animals at the highest stages of the river.

Leaving the Chilcotin and mounting a steep, grassy hill, about 300 feet high, which forms the eastern slope of the valley, we again attained the general level of the plateau and entered on the SIXTH and last section of the journey, extending to Fort Alexander, a distance of about eighty-seven miles,

To describe this in detail would be merely to recapitulate what has been said of the fourth section. The general features of each are almost identical in character, though, perhaps, in this section the country is more tumbled, the swamps more numerous and extensive, and the route, if possible, a shade more dreary and monotonous than hitherto. Frequent immense tracts of burnt forest were passed, some of which had been completely devastated by the fires, leaving the trail much en-

cumbered with fallen timber and plantations of young green firs of small size, and it was noticed that, over some large districts, nearly the whole of the standing timber was perfectly rotten, and would therefore be useless for any future requirements of road-making.

It was a relief to emerge from this bleak succession of forest and swamp and, twenty miles from Alexander, to welcome once more the sight of a brawling stream, the * Sananorrhlee, skirted by forests of large timber and terraced hills of bunch grass. Twelve miles down its valley, noticing at each stage of our progress indications of a gradually decreasing altitude, after which a walk of eight miles over the basaltic range bordering the valley of the Fraser led us to Fort Alexander.

We reached the Fort on the evening of the 13th of August with one meal left. The trip from the Slide had thus occupied $17\frac{1}{2}$ days, but 6 of these were spent at Puntzee waiting for horses, leaving $11\frac{1}{2}$ days as the actual travelling time.

A reference to the figures of the report itself, or of the table at the end, shews the estimated distance from the Slide to Alexander to be 213 miles, but it must be remembered that the estimate applies simply to the present Indian trail and has no reference whatever to air-lines or possible improvements. Undoubtedly modifications, not only of minor details but frequently of large portions of the present line, would be desirable and necessary in the event of a trail or road being established, and it is reasonable to infer that an improved route from Cokelin to Alexander would not exceed 180 miles in length.

Attempts were made in Cariboo to disguise the real distance by the present trail, and to throw discredit on my statements, but I

* The main branch of the river Narcoslee, which empties itself into the Fraser about twenty miles above Fort Alexander.

may remark that astronomical observations admit of no comment, and that the foregoing figures are the results of careful estimates based on almost daily astronomical data.

Fort Alexander, a half ruined cluster of log dwellings roofed with mud, stands on the right bank of the Fraser, on a bench about fifty feet above the river and 1470 feet above the level of the sea. The river in the neighbourhood is, at its half stage, from 250 to 300 yards in width, and the velocity of its current $5\frac{1}{4}$ statute miles an hour, the extreme depth of the channel is 20 feet at low water, and the rise at the freshets from 18 to 20 feet. At 11 A.M. on the 16th of August, the temperature of the air in the shade being $70^{\circ}5$ Fahrenheit, that of the Fraser water was 58° Fahrenheit, and at 10 A.M. on the 29th of September, the temperatures of air and water were respectively 58° and 46° Fahrenheit.

The valley of the Fraser, running south-southeast for a considerable distance below the Fort and varying from two to three miles in width, is enclosed by basaltic ranges of hills about 1000 feet in height, timbered with yellow pines and dotted with small prairies. The level intervals of the valley are usually occupied by terraced, grassy benches of various heights, but the pasturage at Alexander cannot be pronounced good. It is also to be regretted that, just at this part, the soil affords but meagre qualities of productiveness, for, though tracts of well-irrigated, rich land are met with further up the valley, the benches round the Fort are strangely sterile and parched.

August is the hottest, January the coldest month of the year at Alexander. In the former the thermometer in the shade averages 70° Fahrenheit, and countless grasshoppers and other insects swarm in the valley. In the latter the river is closed with ice, and quicksilver freezes frequently. Snow falls to a depth

of about eighteen inches, usually appearing at the end of November and lying on the ground four months, but the duration of winter is extremely variable. There is no regular wet season, though June is usually the rainiest, August, September and October the driest months of the year, and, as the night frosts prevail far into the summer, the crops are invariably late.

The natives residing at Alexander and in its neighbourhood are portions of the Carriers, a large, scattered tribe who, in small bands, occupy an extensive district, of which Mud Lake may be called the southern, Stuart's Lake the northern boundary. As a race they are the best Indians I have met in British Columbia, intelligent, obliging and comparatively honest, and many of them anxious, apparently, to avail themselves of the advantages of intercourse and trade with civilized men which are yearly becoming and more more within their reach. The Carriers are seen in various stages of life, those round the forts speaking Canadian French fluently, and being well versed in the customs of the whites; others who dwell in the mountains, such as the Chilcotins who occupy the country traversed by the fifth and sixth sections of our journey, are seen in a purely savage state of existence, clothed in furs, armed with bows and arrows, in the use of which they are singularly expert, and devoid of all resources but those which the lakes, rivers, prairies and woods supply.

The Fort is named by them "Stella-yeh," signifying "the end of navigation," the title originating in its having been in former days the southern limit of the Carrier district.

Recurring once more to the route across the plateau, I must notice, as one of its most prominent features, the almost entire absence of hills between the Precipice and Alexander, the valleys of the Puntzeako and the Chilcotin, and the final descent to

the Fraser being the only points where hills worth mention occur, As will be gleaned from previous descriptions, swamps are very general, so much so that, after leaving the summit of the Precipice, we never encamped with dry feet. Probably, in all, the actual extent of swamps traversed, in pieces of from 20 to 400 yards in length, does not exceed ten miles, but, to ensure this immunity, frequent long detours were made in gaining the narrowest crossing points of the marshes. I estimate that the construction of a good bridle-road from the foot of the Slide to Fort Alexander would involve an outlay of £6000.

Of the climate of the plateau I can not give any reliable data, though it is probable that, owing to its great altitude, which from the Slide eastwards nearly everywhere exceeds 2000 feet, and reaches to more than 4000 feet above the level of the sea, the snow lies on the greater part of it for at least seven months of the year, viz; from November to May inclusive; and it is not likely that it will in this respect compare favourably with the elevated districts traversed by the routes lying east of the Fraser, where the open nature of large tracts of the country favours the early disappearance of snow to an extent not likely to obtain in the dense forests of the Atnayo and Chilcotin plateaux.

Another route, branching from the main trail to the west of the Precipice and reuniting with it near the Alexis Lakes, 67 miles from Alexander, runs to the north of it, passing through the Nacoontloon district, a chain of lakes and swamps whose waters flow into Dean's Canal at Kemsquit, five miles from its head. White men have travelled by this route from Alexander to the Nookhalk, and pronounce it forty miles shorter than that traversed by myself and party, though they admit that swamps are more numerous, and Indian information ascribes to

it a higher level. If, on the future development of this colony, mining or agricultural settlement should extend to the neighbourhood of Fraser Lake, it will yet have to be ascertained whether the unknown districts lying between it and the head of Dean's Canal afford facilities for a communication which, from a glance at the map, seems likely to be highly advantageous.

I have only to add that the trail from Taparntowoot to Alexander has, since I passed, received slight improvements at the hands of a Mr. Hood and his party, who brought a train of laden animals through from the coast to the Fraser. These animals, as well as my own, landed at North Bentinck Arm on the 2nd July, and reached Fort Alexander on the 31st August.

From the above descriptions I trust you will be able to form your own opinions on the feasibility of a route from North Bentinck Arm to the Fraser. It but remains for me briefly to sum up the various advantages and disadvantages which the report is intended to illustrate, and to submit them respectfully for your consideration.

Apart from the questions of sea or river transport, the actual amount of land travel from North Bentinck Arm to the mouth of Quesnel river compares favourably with that by the other routes which at present conduct the trade to Cariboo. Quesnel is undoubtedly the point to which a line of road from the Slide would be directed, inasmuch as, at a cost of about 10 miles more land travel, a point forty miles nearer to the mines than Alexander is would be reached,* and since, it is highly probable

* An impression has hitherto been prevalent that the valley of Swift river presents a favourable communication from the Fraser to the present Cariboo mines, and that, therefore, a road from the coast should be directed to its mouth; I have ascertained that the mouth of Quesnel river deserves the preference with regard both to its geographical position and to the character of the country to be subsequently traversed.

that an improved road from North Bentinck Arm to Quesnel would not exceed 240 miles in length, it and Lillooet may be considered as approximately equidistant from Cariboo. The country under discussion also presents many features favourable to road-making, such as the generally easy gradients, small timber, scarcity of brushwood and comparative absence of rock *in situ*.

On the other hand, the formidable slides in the valley of the Atnarko, the number and extent of the swamps on the plateau and the small size of the timber (which, though favourable in one respect, is a serious drawback where much corduroying and bridging are required) are obstacles deserving attention.

But, in discussing the practicability of a projected highway of commerce to an extensive and populous gold region, the graver questions of soil and pasturage claim attentive consideration, and in these two highly important respects it is impossible to speak favourably of the Bentinck Arm route.

You will have gleaned from a perusal of the report that the country traversed after leaving the Bella Coola valley is excessively sterile and unproductive, and usually destitute of interesting and attractive features. I cannot say that I passed on the entire journey a single tract of land likely to afford encouragement to settlers, though perhaps, as a desperate resource, it might be possible to reclaim at considerable outlay portions of the swamp lands which, it can scarcely be doubted, possess properties of productiveness.

Again, you will have noticed that the fifth section of the journey, 50 miles in extent, is the only portion that affords good bunch-grass pasturage. On the remainder there is either no feed at all, or merely the poor innutritive grass that prevails in ele-

vated, thickly-wooded lands. Indian horses can and do subsist, and even work and keep fat on this food, but practical men will bear me out in the assertion that it is not sufficiently nourishing for mules and horses foreign to the country.

It may be urged that natural feed along a route is a comparatively unimportant item, for already we learn that the magnificent passtrage which skirts the roads from Lillooet and Lytton northward is not sufficient to satisfy the requirements of the rapidly increasing Cariboo traffic, and can no longer be depended on as the sole subsistence for the animals. But these roads pass through favoured and highly productive districts, where civilization is steadily on the increase, and where active steps are now being taken to grow barley and other cereals in quantities sufficient to meet the increasing demand; it is found that, in the sheltered valleys east of the Fraser, the soil which yields an abundance of rich, luxuriant grass can be turned to improved account by the growth of more substantial and nutritive descriptions of forage.

After what has been written of the country traversed on my journey, it is scarcely necessary to add that the soil of the sterile plateau between the Cascades and the Fraser admits of no resources such as this.

It is the province of the navigator to discuss at length the merits of North Bentinck Arm as a harbour, and to weigh the relative advantages as ports for foreign commerce afforded by it and by Victoria or New Westminster respectively; and the latter question has, in all probability, received ere this the attention of officers of Her Majesty's Navy. Apart from these considerations, as well as from the questions of climate and road-making, my own impression is that, viewed simply with refer-

ence to land travel, the Bentinck Arm route is, from its high continuous elevation, and from the general absence of good soil and pasturage in the districts which it traverses, unlikely, for the present at least, to acquire importance as an arterial highway to the established gold mines of this country.

Bute Inlet appears to possess far greater advantages of geographical position, and we learn from the Admiralty survey that there is a passable anchorage at its head; but, without pausing to consider this question in detail, I will simply observe that the same grave objections of altitude, soil and pasturage which obtain in the case of the North Bentinck Arm route will, in all probability, apply to that from Bute Inlet, since similar and, for a large portion, identical tracts of country are in each case traversed.

Glowing accounts of both have from time to time been received, many men emerge from the obstructive forests of the valleys in the Cascade region and hail with pleasure the sight of open country and grass of any kind, but do not stop to consider the quality of the pasture or to study the reproductive powers of the soil that yields it. Similarly, the tides and winds of the ocean are matters which do not occupy general attention; the casual traveller arrives at North Bentinck Arm, and pronounces it a splendid land-locked harbour, easy of access, without, perhaps, bestowing a thought upon the difficulties of his recent voyage, or inquiring the depth of the water which surrounds him.

Partly to causes such as these, and, in a great measure, to the forgetfulness and, perhaps, the careless remarks of men who have travelled without pausing to make notes of their journey may be attributed the highly favourable impressions of the coast route prevalent last summer in Cariboo and industriously kept afloat by interested people, and, since the general idea in the upper

country seems to be that but one highway to the mines can ever prove remunerative to those settled on it, there have been engendered a wavering and unsettled state of the public mind, and a general disinclination to settle or to invest property on the routes already in full operation that have had any but a beneficial effect on the country.

Hence it is inferred that a truthful report on the North Bentinck Arm trail will have some effect in settling a public question of importance, and I therefore hasten to submit this paper as likely to throw light on the matter.

At an early date I trust to have the honour of forwarding a report of my subsequent reconnaissances of the Cariboo and other districts of British Columbia.

I have the honour to be,

Sir,

Your most obedient servant,

HENRY SPENCER PALMER,

Lieut. Royal Engineers.

APPENDIX.

TABLE I.

SHEWING THE APPROXIMATE ASTRONOMICAL POSITIONS OF SOME PLACES ON THE NORTH BENTINCK ARM TRAIL.

STATION.	MEAN LATITUDE.	APPROXIMATE LONGITUDE.
Encampment half-a-mile west of Ko-om-ko-otz,	52° 22' 36" N.	126° 47' 31" W.
do. at Nooketz (ruined village),	52 23 21 ..	*126 35 07 ..
do. at Asanamy (ruined village),	52 24 40 ..	126 30 07 ..
do. at Nootkleia (inhabited village), ...	52 25 37 ..	126 14 57 ..
do. at Shtooiht (Spring's).....	52 21 36 ..	129 5 16 ..
do. at Taparntwoot,	52 24 27 ..	125 57 43 ..
do. at Cokelin (foot of Great Slide),.....	52 22 41 ..	125 50 24 ..
do. two miles east of the Precipice,	52 26 01 ..	*125 30 57 ..
do. at Nimpoh,	*52 22 51 ..	125 13 48 ..
do. half way along shore of Lake Towteestsan,	52 16 53 ..	125 06 29 ..
do. one mile west of the Summit,.....	52 09 29 ..	124 47 33 ..
do. at the head of Lake Chant-hopeen,.....	52 08 53 ..	124 30 43 ..
do. at the crossing of the brook Puntzeako,.....	52 12 52 ..	124 11 25 ..
do. at Puntzee,.....	52 12 10 ..	124 02 24 ..
do. at crossing of first stream east of the Chilcotin,	52 14 44 ..	123 40 52 ..
do. near east end of Lake Tahartee,.....	*52 24 32 ..	123 02 49 ..
do. at western crossing of the brook Nantuelkyok,	52 29 14 ..	122 46 54 ..
do. at Fort Alexander,	52 33 40 ..	122 26 56 ..

NOTE. The results marked with an asterisk are derived from estimates, not from observations.

By observations taken at North Bentinck Arm on the 7th of July, 1862, the variation of the compass was found to be... 26° 7' Easterly.
 At Lake Towteestsan, on the 30th of July, it was..... 26° 45 do.
 At Fort Alexander, on the 15th of August, it was..... 27° 41 do.

H. S. P.

SHE
 Nook
 Asan
 Noosh
 Nook
 Shtoo
 Atnar
 Summ
 Summ
 Hotha
 Summ
 Nimpo
 Lake T
 Summ
 Summ
 Lake C
 Lake C
 Fort A

NOTE. A
 C

APPENDIX.

TABLE II.

SHewing THE APPROXIMATE ALTITUDES ABOVE THE SEA OF SOME
POINTS ON THE NORTH BENTINCK ARM ROUTE.

STATION.	APPROXIMATE HEIGHT IN FEET ABOVE THE SEA LEVEL.
Nookeetz (ruined village)	107
Asananny do.,	227
Nooskultst do.,	316
Nootkleia (inhabited village,)	392
Shtooiht (Springs)	464
Atnarko river at Taparntowoot,	923
do. at Cokelin (foot of Great Slide,)	1110
Summit of the Great Slide,	2230
Summit of the mountain above the slide,	2890
Hotharko brook at the foot of the Precipice,	2490
Summit of the Precipice,	3840
Nimpoh,	3601
Lake Towteestsan,	3580
Summit altitude of the trail on the plateau,	4360
Summit Lake,	4020
Lake Chantslar,	3820
Lake Chant-hopeen,	3780
Fort Alexander,	1470

NOTE. An accident to the barometer prevented any observations for altitude being taken between Lake Chant-hopeen and Fort Alexander.

H. S. P.

APPENDIX.

TABLE III.

SHIEWING THE ESTIMATED DISTANCES BY THE EXISTING INDIAN TRAIL BETWEEN CERTAIN POINTS OF THE N. B. A. ROUTE.

FROM.	To.	ESTIMATED DISTANCE IN MILES.
Ko-om-ko-otz,	Nookeetz,	10
Nookeetz,	Asananny,	6
Asananny,	Nooskultst, (crossing of Nook- halk)	6
Nooskultst,	Nootkleia,	12
Nootkleia,	Shtooiht,	9
Shtooiht,	Taparntwoot,	8
Taparntwoot,	Cokelin, (foct of Great Slide), Top of the Precipice,	6 16
Cokelin, (foct of Great Slide) Top of the Precipice,	Nimpoh,	21
Nimpoh,	Sutleth,	3
Sutleth,	Summit Lake,	36
Summit Lake,	Head of Lake Chant-hopeen, Puntzee,	11 28
Lake Chant-hopeen,	Ford of Chilcotin River	11
Puntzee,	Alexis Lake,	20
Chilcotin River,	Lake Tahartee	29
Alexis Lake,	Lake Tahartee	29
Lake Tahartee,	Western crossing of Sananor- ringlee,	20
Sananorringlee,	Fort Alexander,	18
	TOTAL.	270

Fort Alexander bears N. 86° E. from Ko-om-ko-otz, and is distant from it about 183 miles in a single air-line, the value due to a degree of longitude or the parallel 52° 28' N. being adopted as a mean in the computation. Similarly the mouth of Quesnel river bears N. 78° E. from Ko-om-ko-otz, and is distant about 183 miles. The aggregate of the absolute distances between the various astronomical stations (twenty in number) on the route is about 197 miles; the estimated distance by the trail, as seen above, is 270 miles, the proportion being very nearly that of 3 to 4; that is to say that the Indian trail, between points which are three direct miles apart, traverses, according to the estimate, about four miles of ground.

H. S. P.

