GEOLOGICAL SURVEY OF CANADA
G. M. DAWSON, C.M.G., LL.D., F.R.S., DIRECTOR

REPORT

ON AN EXPLORATION

OF THE

FINLAY AND OMENICA RIVERS

BY

R. G. McCONNELL, B.A.

OTTAWA
PRINTED BY S. E. DAWSON, PRINTER TO THE QUEEN'S MOST EXCELLENT MAJESTY
1896

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GEORGE M. DAWSON, C.M.G., LL.D., F.R.S.,
Director of the Geological Survey of Canada.

SIR,—I beg to present herewith a report, accompanied by a map, on the Omenica and Finlay Rivers, based on field-work carried out by myself, and by Mr. H. Y. Russel who acted as my assistant, during the season of 1893.

I have the honour to be, sir,
Your obedient servant,
R. G. McCONNELL.

Geological Survey Office, 30th Nov., 1895.

NOTE.—*The bearings given in this report are all referred to the true Meridian.*

REPORT

ON AN EXPLORATION OF THE

FINLAY AND OMENICA RIVERS

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R. G. McCONNELL, B.A.

The following report on the Omenica and Finlay rivers is based on an exploration carried out during the year 1893. Quesnel, on the Fraser, was selected as the base of operations. That point was reached on the 24th of May, but owing to the scarcity of competent canoemen, and to delays in obtaining transport for supplies to Fort McLeod, we were detained there until the 9th of June. The party consisted, besides myself, of Mr. H. Y. Russel, who acted as topographer, and four canoemen (two Indians, one half-breed, and one white man). From Quesnel we proceeded up the Fraser River to the Giscome Portage, where we arrived on the 23rd of June. A portage-road here, seven miles and a half in length, connects the Fraser River with Summit Lake, one of the sources of Peace River. The portage was made in two days and a half. From Summit Lake we followed a chain of small lakes connected by small, crooked, and at times exceedingly swift streams down to Fort McLeod, which we reached on the 28th of June. Our supplies, which had been sent overland by pack-train from Quesnel, were delayed owing to the flooded condition of the rivers, and did not arrive until a week later. On the 6th of July we started down McLeod Lake River and the Parsnip, carrying our summer's supplies, in two Peterborough canoes, and a canvas canoe which we had fitted up while waiting at Fort McLeod. The mouth of the Parsnip, our objective point, was reached on the following day.*

Preparations for the journey.

Route followed.

The Parsnip, coming from the south, and the Finlay from the northwest, meet near the western base of the Rocky Mountains, and the united streams, bending to the east, break through that range and traverse the great central plain of the continent in a northerly direction under the various names of Peace, Slave and Mackenzie rivers.

*The route followed from Giscome Portage to the mouth of the Parsnip, was examined by Dr. A. R. C. Selwyn in 1875, and is described by him in the report of the Geological Survey for that year, pp. 37-41 and 64-67.

Rivers explored.

Peace River was descended as far as the foot-hills bordering the Rocky Mountains on the east, and a hasty examination of the structure of the range and of its various geological components was made. After returning to the Parsnip-Finlay Forks, the latter stream was ascended to the mouth of the Omenica, the first considerable tributary which it receives. An ascent of the Omenica was then made to a point above the Omenica-Sitleka Pass. On the way up visits were made to the Germansen Creek, Manson Creek, and other old gold mining camps of the region, all now nearly abandoned. A traverse was also made of one of the passes leading from the Omenica River to Tacla Lake.

The examination of the Omenica River occupied about three weeks. After completing, it we returned to our câche which we had previously constructed at its mouth, and on the 5th of August commenced the ascent of the main branch of the Finlay. Fort Grahame was reached on the 8th, the forks, or the junction of the Qua-da-cha (white water) with the Finlay, on the 21st, and the Fishing Lakes above the long series of rapids at the "Bend," on the 28th of August. The latter part of the journey was made on foot, owing to the almost unnavigable condition of the river.

A couple of days were spent in climbing the mountains in the vicinity of the Fishing Lakes, after which the return journey was commenced. The mouth of the Finlay was reached on the 14th of September and Quesnel on the 1st of October.

Character of exploration.

The exploration was necessarily carried out in a somewhat hurried manner, owing to the shortness of the season available for work, and the time occupied in making the long journey from Quesnel to the field of operations. About nine weeks in all were spent on the Finlay and its branches, but as considerable time was lost in making return trips over the same routes, and on account of bad weather, barely six weeks were left for effective work.

Mountainous nature of country.

The region drained by the Finlay and its branches is characterized throughout by its mountainous character; with the exception of the narrow flats bordering the principal rivers, no plains of any magnitude were anywhere observed. The eastern branches drain the western slope of a portion of the Rocky Mountains proper, while the western branches head in a confused medley of nameless ranges, lying to the east of Tacla Lake and its feeders. The mountains have a fairly uniform height of about 4000 feet above the bottoms of the main valleys. Glaciers occur at the head of the Qua-da-cha River in the Rocky Mountains, and also on the Peak Mountains west of the Fishing Lakes. The rivers, as a rule, are swift and interrupted by frequent

rapids, but gently flowing lake-like expansions of considerable length occur on both the Finlay and the Omenica. Coniferous forests, unvarying in their monotony, extend over hill and valley throughout the district, up to a height of about 5200 feet above the sea. The principal varieties observed were the white and black spruces *(Picea alba and Picea nigra)*, the balsam fir *(abies subalpina)*, the black pine *(Pinus Murrayana)*, and the larch *(Larix Americana)*. Broad-leaved trees are represented by the aspen *(Populus tremuloides)*, the balsam poplar *(Populus balsamifera)*, the birch *(Betula papyrifera)*, and varieties of willow and alder. Forests.

Description of Routes.

Omenica River.

The Omenica River was brought into prominence by the discovery of gold on Silver Creek, one of its branches, by Ezra Evans, "Twelve-foot Davis" and a party of prospectors in 1868. On the announcement of the discovery of gold, miners flocked into the country by hundreds, and for some time the population of the district was estimated at from 1200 to 1500. It reached its maximum about 1879, and has since, as the creeks became exhausted, gradually declined. At the present time there are scarcely twenty whites in the whole country. Omenica River.

Very few accounts by actual explorers have been published on the Omenica country. Captain (now Sir W. F.) Butler ascended the lower part of the river in 1873, and describes it in his book entitled the *Wild North Land* (p. 274-309), and Mr. Horetzky explored the part between Hogem and Germansen Creek in 1879 (Report Canadian Pacific Railway, 1880, p. 82-83). In 1891 a party sent out by the British Columbia Government attempted to ascend the river, but turned back near the mouth of the Oslinca. Previous exploration.

The Omenica joins the Finlay from the west, about fifteen miles above the junction of the latter with the Parsnip, and is by far its largest tributary. From its mouth to the Black Cañon, a distance of five miles, its course is about 30° south of west. The stream is shallow in this reach and its current is extremely swift, the slope of the bed exceeding ten feet to the mile. Numerous gravel bars and islands, covered in places by huge drift-piles, obstruct the course of the stream, and divide it in places into several channels. Character of river.

At the Black Cañon, the Omenica cuts through a ridge of gneiss. The Cañon is about half a mile in length and varies in width from Black Cañon.

one to two hundred feet. Its walls are usually nearly vertical and in places exceed 150 feet in height. In low water, the navigation of the Cañon is reported to be easy, but in seasons of flood the swoollen stream is partly dammed back, and its effort to force a way through the narrow channel is attended with the production of such whirlpools and billows that its passage with large boats is exceedingly difficult and with small boats is impossible. The Omenica was still high when we reached the Cañon, and after an examination it was decided to make a portage. A trail was cut along the north bank, and the portage was made in less than a day. The ridge through which the Omenica cuts at the Cañon increases rapidly in height to the north, and develops into a mountain range the peaks of which exceed 5000 feet in height. Southward the ridge soon dies away.

Omenica above the Black Cañon.

Above the Black Cañon the valley is closed in for a mile or more by steep cliffs of sandstones, clays and conglomerates between which the stream rushes with torrential speed. Further up the stream bends to the north-west and follows parallel to the direction of the mountain ranges of the district, the rocky walls disappear, and the river, freed from confinement, enlarges to twice its former width. Above the bend the river follows a wide valley between the mountains as far the mouth of Tchutetzeca, a distance of ten miles. The Omenica in this reach is wide and swift; no rapids were met with, but short and strong "riffles," exceedingly difficult to ascend, occur every few hundred yards. A notable feature of the river here is the great drift-piles of logs which have been heaped up by the rapid current at all the bends, and on the heads of the numerous gravel-bars and islands around which the stream divides. The Tchutetzeca, a rapid stream about 150 feet wide, comes in from the north-west down the same valley occupied by the Omenica above the Cañon. It has not yet been explored.

Rapid character of Omenica.

Above the mouth of the Tchutetzeca the Omenica leaves the longitudinal valley followed below, and bends to the west. The declivity and current increase, and for some miles the river is simply a wild torrent plunging in a succession of rapids from bar to bar. The ascent of this portion of the river proved a matter of no ordinary difficulty. The tracking-line could not be used owing to the beaches being covered by high water, and the strength of the current rendered poling in many places equally impracticable. At the worst places wading in the ice cold water and pulling the canoes up foot by foot against the foaming stream, at the risk of stumbling on hidden and slippery boulders paving the channel, proved the only practicable means of ascent. Our progress here was very slow, and for some days

we scarcely averaged five miles per day. Five miles above the mouth of the Tchutetzeca, the Oslinca the largest tributary of the Omenica, comes in from the north. This stream is nearly equal in size to the main branch. It drains a large area of mountainous country lying between the Omenica and the south branch of the Finlay, all of which is practically unknown.

Little Cañon.

Above the mouth of the Oslinca, the Omenica cuts through a gneissic band, and for some miles lofty ranges of mountains press close down to the banks of the river. Six miles above the Oslinca, a contraction in the valley occurs, which is known as the Little Cañon. At this point the river makes a sharp double bend and strikes with its whole force against two points of gneissic rock which jut out in succession from either bank. The Little Cañon is comparatively easy to ascend, as the tracking-line can be used all the way by crossing the stream between the two rocks, but is dangerous to run at high water. It was at this point that Pete Toy, the Cornish miner (see Wild North Land, p. 291), who so efficiently assisted Capt. Butler at the Black Cañon, afterwards lost his life.

Current diminishes.

Above the Little Cañon the current of the river sensibly diminishes. Riffles are still numerous, but they occur at longer intervals, and with few exceptions are of inconsiderable fall. Nine miles above the Little Cañon quiet water was reached, and we were able for the first time to proceed with paddles.

Grade of Omenica.

From the mouth of the Omenica to the head of the swift portion of the river, is a distance of about thirty-five miles. The difference in elevation of the two points is approximately 425 feet, giving the river an inclination in this reach of about twelve feet to the mile, an exceptionably high grade for a stream of this size.

From the head of the rapid water to Germansen Landing at the mouth of Germansen Creek, a distance of twelve miles, with the exception of a few small riffles the current is easy, from two to three miles an hour. The river has a width of about 100 yards, and for part of the way becomes very tortuous, winding from side to side of the wide flats which now border it. Before reaching Germansen Creek the Omenica turns almost due west and continues in this direction for many miles.

Germansen Landing.

Germansen Landing, in the old days was a place of considerable importance, as most of the supplies for the Germansen and Manson Creek camps were brought from Tacla Lake across to the Omenica, floated down the stream in boats and landed here for distribution. In recent

years this route has been abandoned, and such supplies as are needed for the few remaining miners are brought in by pack-train.

Trail to Manson Creek.

A trip was made on foot from the Landing to Manson Creek. The trail, once trodden deep by gold-seekers, is now scarcely distinguishable in places, and in others is badly blocked by fallen timber. It leads across a burnt plateau for a couple of miles, and then descends into the deep valley of Germansen Creek. Extensive mining operations were once carried on at this point, but have long since ceased. A few deserted houses and some decaying flumes remain to tell the story of a brief activity and a sudden death. A mile farther up, the trail crosses Germansen Creek, at a place where the stream is closely confined between two rocky walls, by a dilapidated-looking bridge consisting of a single half rotten stringer bent downward under the weight of a number of dependant fragments. From the bridge we followed a rough trail along the east side of the stream to a mining camp which still preserves some signs of life. Three white men and one Chinaman were found here. Gold on Germansen Creek has been obtained both from river-flats and bars, and from gravels underlying the boulder-clay and referred to the early part of the glacial period. The flats have been worked out, but extensive areas of the auriferous glacial gravels are still untouched. Some work was being done on the latter at the time of our visit, but on too limited a scale to afford satisfactory results. Above the mining camp, the trail leaves Germansen Creek, crosses a ridge about 1300 feet high and then descends into the valley of Slate Creek, a tributary of Manson Creek. Two miles farther on we reached the town of Manson, situated on Manson Creek, formerly the richest creek in the district.

Gold on Germansen Creek.

Gold on Manson Creek.

Gold was first found on Manson Creek in 1891, and for two or three years the bars proved exceedingly productive, but since then the yield has been gradually diminishing, and at the present time the little work that is being done barely pays expenses. Gold was found in paying quantity along the bed of the creek for a couple of miles, and also in two of the tributary valleys. The glacial gravels here, as in Germansen Creek, are auriferous and have been worked to some extent, and it is highly probable that a large proportion of the gold found in the bed of the stream is concentrated from these deposits.

Trails.

Manson Creek is connected by trail with Quesnel by way of Stuart Lake, and with Hazelton on the Skeena by way of Tom's Creek and Tacla Lake, but the former trail, and the latter for part of the way, are in a bad state of repair, and mining operations are greatly hampered by the high freight charges on supplies. The rate from Hazelton, the cheapest route, amounts at present to 17 cents per pound.

We returned from Manson Creek by the same route and continued up the Omenica.

Above the mouth of Germansen Creek the Omenica occupies a wide valley, bottomed in places by marshy flats, behind which appear ranges of high mountains. The current for a considerable distance, except for a couple of short riffles, is easy, and in places the stream has a lake-like appearance. The change in the character of the river from the high grades and rocky bottoms which prevail in the lower reaches, to the slight inclination and basin-like alluvium-filled depression which it occupies here, point to crustal movements of some magnitude for their explanation. Character of river changes.

Slack current on the Omenica continues nearly to New Hogem, a distance, measured along the valley, of about twenty-three miles. The length of the river is fully one-third more, as in places it becomes very tortuous. Above New Hogem the Omenica enters a granite area and a rapid current is again encountered, which continued to Old Hogem, a distance of eight miles.

The character of the country through which the Omenica flows, with the exception of a few miles at its mouth, is everywhere mountainous. A range culminating in peaks exceeding 5000 feet in height, crosses the river a few miles above the cañon and extends far to the northward. West of this range the elevations are lower and have a more irregular distribution, but long before reaching Tacla Lake high rocky peaks again dominate the landscape. Mountains

From the eastern edge of the Rocky Mountains west to Tacla Lake (the western limit of the exploration), with the exception of the longitudinal valleys of the Finlay River and Tacla Lake, no flat lands of any importance are met with. The whole region is ridged up into a succession of lofty ranges. The valleys and the lower slopes of the mountains are, as a rule, densely timbered with the monotonous evergreen forest so prevalent in the north. The principal varieties are the white spruce *(Picea alba)* and the black pine *(Pinus Murrayana)*. The latter is usually found on dry sandy and gravelly flats and ridges. The smooth- and rough-barked poplars *(Populus tremuloides* and *P. balsamifera)* occur in some abundance locally, but are usually confined to the valley. The summits of all the higher mountains are bare, as the forest seldom ascends in this region beyond an elevation of 5200 feet. Absence of plains. Forest.

Above Old Hogem the Omenica bends more to the north and runs nearly parallel to the strike of the rocks. As little geological information was obtainable by following the river, it was decided to leave Trail to Tacla Lake.

it and to make a traverse on foot to Tacla Lake across the strike of the rocks. The old trail from Hogem to Vital Creek is still in good condition. From Vital Creek to Tom's Creek the trail is little used, but for the remainder of the distance on to Tacla Lake a good trail has been recently built by the Provincial Government in order to facilitate communication with the mining camp at Tom's Creek. The trail leaves the Omenica at Old Hogem and follows up the valley of Silver Creek to Vital Creek, a tributary of the latter, passing over sandy and gravelly flats, forested with black pine, most of the way. Before reaching Vital Creek the trail leaves the wide valley of the Omenica and enters the mountains. Vital Creek is a rapid mountain stream twenty or thirty feet wide and four or five miles long. Gold was discovered on it in 1869, and it has been worked more or less ever since, but latterly with but little profit.

Vital Creek.

Gold on Vital Creek.

Three white men, including Mr. Vital the discoverer, and some Chinamen, were engaged on it at the time of our visit, but they did not speak hopefully of their prospects, and the stream may be regarded as worked out. A considerable quantity of silver amalgam (arquerite) has been found with the gold in the alluvial washings on Vital Creek. It has not been found *in situ*.

From Vital Creek the trail follows up Silver Creek for a couple of miles, and then turns westward up a branch running parallel to Vital Creek. Three miles from Silver Creek the valley widens out, and for some miles its bottom is filled with a succession of small lakes connected by short winding streams. Nine miles from Silver Creek we reached Tom's Creek, a small mountain stream coming from the south. Tom's Creek, as an auriferous stream, was not discovered until 1889, and was practically worked out during the years 1890–91–92. In 1892, about a dozen white men and Indians and a few Chinamen were at work on it, but few of the claims did much more than pay expenses. The discovery of an auriferous stream like Tom's Creek, close to Vital Creek, twenty years after the finding of gold on the latter, shows what a small proportion of the country has yet been thoroughly prospected.

Tom's Creek.

From Tom's Creek we followed up the wide valley of Kenny Creek for nine miles, passing several small lakes on the way, to the summit of the pass between the Omenica and Tacla Lake. The elevation of the summit is approximately 1644 feet above Tacla Lake, or 3915 feet above the sea. After crossing the summit, the track followed for a short distance a stream flowing towards Tacla Lake; then, after crossing a spur from the mountains, it descends rapidly towards Tacla

Lake, reaching the latter about half a mile below the old landing. Three miles from the landing a sharp descent of 700 feet was made over the face of an escarpment running parallel with the lake.

Tacla Lake is one of those long narrow bodies of water so prevalent throughout British Columbia. It occupies a great longitudinal valley, running parallel with that at the western base of the Rocky Mountains which now holds the Finlay and Parsnip. The two valleys are separated by about eighty miles of rough mountainous country. Tacla Lake.

Tacla Lake was not examined except for three or four miles south of the landing. It is from two to three miles in width, and is bordered on both sides by heavily timbered flats several miles wide. It is separated from Babine Lake, which occupies a somewhat similar valley farther to the west, by the Fire-pan Mountains.

The most notable feature of the country in the latitude of the Omenica and Finlay rivers, or from latitude 55° 30′ to latitude 57° or beyond, is its universal mountainous character. In this latitude, the whole country from the eastern edge of the Rocky Mountains westward to the Pacific Ocean is destitute of plains of any considerable extent, and with the exception of the breaks where the region is crossed by the valleys mentioned above, is covered with a succession of mountains and mountain ranges varying in height from 3000 to 5000 feet above the valleys. In no other part of British Columbia is the country so persistently mountainous across the whole Cordilleran belt. Mountainous country.

Finlay River.

The Finlay River is named after John Finlay, who ascended it in 1824 in the interests of the North-west Company. The journal kept by Mr. Finlay on this journey has never been published. It is now at Cumberland House in the possession of Mr. James McDougall of the Hudson Bay Co., where it was seen and some extracts taken from it by Mr. J. B. Tyrrell in 1894. Miners are also reported to have ascended the river to varying distances during the Omenica excitement, and in 1891 an exploring expedition sent by the British Columbia Government ascended it to Fort Grahame a distance of about forty-five miles. Finlay River. Previous exploration.

The Finlay River is much the larger of the two streams which form Peace River, and is practically the upper part of that river. It has a General character of Finlay River.

total length of about 310 miles,* and ranges in width from thirty yards, where it issues from the expansion at the Fishing Lakes, to 300 yards near its mouth. The Finlay drains a region which is everywhere of a mountainous character and is itself bordered throughout the whole of its course by lofty mountain ranges. Its navigation, for two hundred miles above its mouth, with the exception of one cañon half a mile in length, is easy, the current seldom exceeding five miles an hour, but farther up, its course is interrupted for many miles by a long succession of cañons and rapids. Its branches interlock with tributaries of the Skeena, Stikine and Liard rivers, and low passes through the mountains from one basin to the other are not uncommon.

Current and width.

The Finlay River from its mouth to its junction with the Omenica, winds through a wide flat, skirting the western base of the Rocky Mountains. It has a width in places of 300 yards or more, but is usually divided into several channels by islands and gravel bars. The current is easy, averaging about three miles an hour at a medium stage of water. The bars along this stretch of the river are all auriferous, and one of them, called Pete Toy's Bar after the discoverer, yielded a large amount of gold in the early days of mining in the country. The gold in this reach is probably mostly derived from the Omenica.

Auriferous bar.

The Omenica River contributes about one-fifth of the whole water of the Finlay, at its confluence. A mile above the Omenica, the Ospica joins the Finlay from the east. It enters the latter in two branches each about a hundred feet wide. The Ospica was ascended and prospected by a party of miners some years ago, but no paying bars were discovered. It runs in a southerly direction, and cuts off a long rounded ridge from the main range of the Rockies. Above the Ospica, the Finlay runs, with the exception of one bend, in a nearly straight direction for twelve miles. It has a width here of about 200 yards and a current of scarcely two miles an hour, the slowest in the whole course of the river. It occupies a depression about four miles in width, bounded on the west by a gneissic ridge which commences at the Black Cañon on the Omenica and runs northward with gradually increasing height, and on the east by the rounded ridge which

Ospica River.

*The total length of the Finlay-Peace-Mackenzie watercourse is approximately 2362 miles, made up as follows :—

	Miles.
Finlay River	310
Peace "	757
Slave "	240
Great Slave Lake	90
Mackenzie River	965
	2362

separates the Ospica from the Finlay. The latter is overlooked, farther to the east, by the peaks and ridges of the main range of the Rocky Mountains. Finlay Valley.

The depression in which the Finlay flows, is floored with a varying thickness of sands, clays and gravels, forming a forested plain, in which the river has cut a valley to a depth of about a hundred feet. No rock is exposed along this part of the river. The material shown in the banks of the valley contains numerous scratched and polished pebbles and boulders, and is evidently of glacial origin, but appears in some instances to have been redistributed. Above the straight reach just described, on to Fort Grahame, a distance of about twenty-one miles in a straight line, the Finlay becomes more tortuous and is obstructed by islands and bars, the river being frequently divided into half a dozen different channels. Absence of rock exposures.

Drift-piles are everywhere present. They occur at the heads of all the bars and islands, and, alternating from one bank to the other, form in places an almost continuous line along the river. The drift-wood is derived from the washing away of the forested flats bordering the river, and the enormous amount carried down during high water each year measures the destructive power of the stream. Rapid changes in the course of the river are notable features in this reach, the main channel of one season being often represented in the next by a scarcely used slough. Drift-piles.

Near Fort Grahame, the mountains on the west, approach close to the river and sections of limestone and gneiss are exposed. An ascent of the range east of the fort was made on August 10th. The river is bordered on the east by a series of scarps and terraces rising up to a height of 275 feet with a width of about three miles. The main terrace has a height of 175 feet above the river and is thickly wooded with black pine. Near the mountains the pine is replaced by white spruce. The lower slopes of the mountain are well forested up to a height of 2000 feet above the river, but above that elevation the trees gradually thin out, and a thousand feet higher up they cease altogether. The elevation of the timber-line in this district is approximately 5200 feet above the sea. From the point ascended, the valley of the Finlay could be followed southward to the mouth of the Omenica and northward could be seen stretching out in a nearly straight direction for over sixty miles, or as far as the eye could pierce the haze. In all this distance it preserves a nearly uniform width of from four to six miles. Looking up the valley, the most striking object in view was a range of mountains about forty miles distant, Ascent of mountain at Ft. Grahame. Elevation of timber.line.

which appeared in the evening light to be almost pure white. They were afterwards examined and found to be composed of a much altered compact limestone. Westward, range after range of nameless mountains, running nearly parallel to the valley of the Finlay, extended to the horizon, while eastward the view was soon obstructed by the higher peaks of the central ranges of the Rockies. Patches of snow cling round the summits of most of the higher mountains, but no flowing glaciers were seen. The heights of the principal peaks range from 7000 to 7500 feet above the sea.

Trails.

The range bordering the valley on the west is broken through opposite Fort Grahame by a small stream flowing into the Finlay, up which a trail leads which can be followed through the mountains to Bear Lake, a distance of sixty or seventy miles. A second trail from Fort Grahame is stated to run eastward to the Liard.

From Fort Grahame to the Ingenica, a distance of sixteen miles in a straight line, and about twenty miles following the curves of the river, the Finlay is characterized by the same features which prevail below. It is divided into numerous channels by islands and bars, and holds a nearly straight course along the centre of the great depression it occupies, never touching the mountains on either side and seldom even cutting into the bordering terraces. The current is rapid, averaging fully five miles an hour.

Ingenica River.

The Ingenica is the first large stream which enters the Finlay from the west above the Omenica. It is a clear, rapid river fifty to sixty yards wide, and is reported to be navigable up to the forks, a distance of about thirty miles, above which it is filled with rapids.

An Indian trail to Bear Lake runs along its bank. The Ingenica is well worthy of being prospected, as it must cut through the same band of green and dark schists from which the gold in the Omenica country is derived. Fine gold was found in the wash at the mouth of the river.

Fourteen miles above the Ingenica, the Finlay is narrowed in by a cañon named Deserters' Cañon by Finlay. For part of the distance the stream presents its usual characteristics, but five miles below the cañon the islands and bars disappear and it is confined to one channel varying in width from to 200 to 250 yards. Above the Ingenica the Finlay bends slightly to the west, and at the cañon it approaches the base of the range bordering the valley on the east. On the west the space between the river and the mountains is occupied by a plain five to six miles in width wooded with poplar, spruce, and black pine.

Deserters' Cañon is situated about ninety miles above the mouth of the Finlay River, and is the first interruption to its navigation. This cañon is about half a mile long and in the narrowest places scarcely exceeds a hundred feet in width. It is cut through hard conglomerate and sandstone. The walls, except at the lower end, where there is a steep conglomerate cliff, are not very high. The channel is crooked and is interrupted by several bad riffles. Deserters' Cañon can be run at certain stages of water but its navigation is dangerous. A good portage-track half a mile in length has been cut out by the Indians along the west bank. Deserters' Cañon.

Above Deserters' Cañon, the Finlay makes a couple of great bends to the west, above which it receives the A-ki-é River from the east. At the bends high cut-banks of boulder-clay, silts and gravel, are exposed. The white limestone mountains seen from Fort Grahame are now directly west. This range commences west of the Cañon and extends north-westward. It evidently, from its condition, marks a line of disturbance and probably of faulting. The range immediately east of the valley is still composed of gneiss and mica-schists, but farther back, bare sharp crested mountains come into view, which are probably built of limestone. White mountains.

The Akie River has not been explored. It enters the Finlay in two branches, the larger of which is one hundred feet wide; its valley is wide and cuts straight back into the mountains for a distance of about twelve miles; it then bends to the north, but sends a branch southward. The wash in the bed of the Akie is principally limestone and does not contain gold. Above the mouth of the Akie, the Finlay pursues a very tortuous course as far as Paul's Branch, a distance measured in a straight line of about twenty-one miles, but following the course of the river for thirty-five miles. In several points of this reach, the river is bordered by high gravel and boulder-clay banks, in some cases exceeding 250 feet in height. The valley maintains a width of from five to six miles for part of the distance, but six miles below Paul's Branch, a range rises up west of the river which narrows it in to about three miles. The ranges bordering the valley on both sides have a height in this latitude of about 3000 feet above the valley. Akie River.

Paul's Branch is a small stream about thirty feet in width. Its valley is narrow and cañon-like where it breaks through the gneissic range that borders the Rockies on the west, but widens out when it reaches the softer rocks behind. No gold was found on Paul's Branch, but good prospects were obtained from a couple of streams which enter Paul's Branch.

Lower mountains.

the Finlay from the west, a few miles lower down. The mountains east of the bordering gneissic range of the Rockies are comparatively low in this latitude, and are separated by wide wooded valleys often holding lakes of considerable size. Their lower elevation is due to the relatively softer and more easily eroded nature of the argillites and calc-schists of which they are composed. Farther back, near the centre of the range, the calc-schists are replaced by hard limestones, and higher and bolder-looking mountains again prevail.

From Paul's Branch to the Qua-da-cha, or Whitewater, a distance of eleven miles, the Finlay runs in a nearly straight direction, skirting the base of the range bordering it on the east. The width of the river here is about 250 yards, and its current has a rate of about four miles and a half an hour.

Quadacha River.

The Quadacha, or Whitewater, as it is appropriately termed on most of the maps, is the largest stream which enters the Finlay from the east, and is usually referred to as "The Fork," although its volume is scarcely one-sixth that of the main river. It is a deep rapid stream about one hundred feet wide. Its water is filled and whitened with fine sediment, evidently derived from glaciers, and presents a strong contrast in this respect to the clear blue water of the main stream. The two streams flow side by side for several miles before commingling. The Quadacha follows the western side of the same valley which the Finlay has occupied for so long, for several miles, and then turns eastward into the Rockies. It is reported by the Indians to fork soon after entering the mountains, one branch coming from a large lake, while the other heads in a glacier near the centre of the range. At the Quadacha, the Finlay bends to the west, and three miles further on receives the Tochieca, a stream about seventy-five feet wide. Soon after, still turning westward, it leaves the great valley which it has hitherto occupied. The valley extends northward with undiminished size, although it now holds only an insignificant tributary of the Finlay.

Great valley.

The great Inter-montane valley referred to above, and of which mention is so frequently made in this report, forms one of the most important topographical features of British Columbia. It crosses the international boundary about longitude 115° 10′ W. and runs in a direction N. 33° W. along the western base of the Rocky Mountains, separating the latter from the Selkirks and other ranges on the west, for a distance of over 800 miles. It is entirely independent of the present drainage systems of the country, as it is occupied successively, beginning at the boundary, by a number of rivers belonging to distinct

systems, among which are the Kootanie, the Columbia, Canoe River, the Fraser, Bad River, the Parsnip, the Finlay and the Tochieca. The link between Bad River and the Fraser has not yet been surveyed, and its extension, if any, beyond the Tochieca is still unknown. Its width varies from two to fifteen miles, and it is everywhere inclosed, except for some distance along the west bank of the Parsnip, by mountain ranges varying in height from 3000 to 6000 feet or more above the valley.

Width of valley.

The width of the valley does not depend on the size of the stream which occupies it at any particular place. It is fully as wide along the smaller streams and at the watersheds which separate the different streams, as along great rivers like the Columbia and the Finlay. The average height of the bottom of the valley above the sea is about 2300 feet, and the variation in height is about 1000 feet. The heights of the watersheds in the valley are approximately as follows: Kootanie-Columbia, 2740 feet; Columbia-Fraser, 2900 feet; Peace-Liard, 3100 feet. The increase in height of the watersheds toward the north, does not hold good in regard to the depressions. The Columbia leaves the valley at a height of 2050 feet, the Fraser at a height of 2100 feet (?), and the Peace at a height of 2020. The two former streams break through the ranges bounding the valley on the west, while the latter cuts through its eastern walls. None of the streams occupying the great valley, the salient features of which have just been described, are doing much rock-cutting at the present time. Secondary valleys are being sunk in most places through the old floor, but the cutting is usually through glacial deposits. The principal exception to this is in the case of the Columbia, which has done considerable rock excavation in the reach extending from above Donald down to the Big Bend, the point at which it leaves the valley. It now flows, for part of the distance, in a rock-walled narrow channel eroded through the floor of the old depression. In no place is any widening of the old valley going on.

Height above the sea.

Age of valley

The age of the valley has not been worked out, but it is evident that it long antedates the inception of the present drainage system of the country, and may have been in existence before the elevation of the Rocky Mountains proper. Rocks of Tertiary age (probably Miocene) are supposed by Dr. Dawson to underlie part of the southern portion of the valley, while sandstones and conglomerates of Laramie age are found in places along both the Parsnip and Finlay. Glacial deposits are present throughout its whole extent.*

*See on this great valley, sketch of Phys. Geol. and Geol. of Canada, Selwyn and Dawson, 1884, p. 34. Annual Report, Geol. Surv. Can., vol. I. (N.S.), p. 28 B.

The Finlay River, as already stated, turns to the west above its junction with the Tochieca and breaks a gap about a mile wide through the range bounding the valley on that side. The part of the range adjoining the river on the north, is called Prairie Mountain by the Indians, on account of the bare slope it presents on the southern exposure. An ascent of Prairie Mountain was made. It is a steep-sided flat-topped elevation about 2400 feet high. The aspen and spruce forest which covers the narrow plain at its base extends up its lower slopes for a few hundred feet, above which the trees become more scattered and inclose large grassy areas. The summit of the mountain is covered with low shrubs, varied at intervals with clumps of stunted spruce *(Picea alba)*, balsam *(Abies subalpina)* and black pine. Farther to the north the ridge increases in elevation and is surmounted by bare rocky peaks.

Prairie Mountain.

View from Prairie Mountain.

From the point ascended, a view of the great valley which holds the Finlay and the Tochieca was obtainable for fifty miles or more in each direction. Northward, as far as visible, it maintains a straight wide course, and is characterized by the same features which prevail below. The range bordering it on the east is regular and well defined, and has an elevation of about 2500 feet above the level of the valley. This is succeeded by somewhat lower round-topped ranges, behind which is a series of massive looking limestone mountains forming the summit of the range. The latter support the large glacier from which the Quadacha issues. Westward, mountains appeared everywhere, apparently increasing in elevation towards the west, and culminating at a distance of forty or fifty miles in a range, the higher peaks of which approach 6000 feet in height. A number of small glaciers appear dotted along this range at the bases of the higher peaks. No plains were visible in any direction.

Rapids.

The Finlay River, after passing Prairie Mountain, bends again to the north-west, and runs for some miles nearly parallel to the continuation of the great valley occupied by it below. The current gradually increases and twelve miles above the mouth of the Tochieca its navigation, except at very low water, is practically stopped by a long cañon. We ascended the cañon for two miles, and then as an examination showed that the river for many miles ahead was simply a succession of cañons, riffles and rapids, it was decided to câche the canoes and continue the exploration on foot.

Long Cañon.

The Long Cañon has a length of about five miles. The river in this distance is frequently narrowed in to less than a hundred feet in width, the constriction often resulting in the production of wild rapids. The walls are irregular and are built partly of Tertiary conglomerates, and

R. G. McConnell, Photo., Aug., 1893.

MOUTH OF LONG CAÑON, FINLAY RIVER.

partly of Palæozoic calc-schists and limestones, arranged in steep and often vertical cliffs from fifty to one hundred feet in height, and capped above by steeply sloping scarped glacial beds. The total depth of the gorge at the upper end exceeds 600 feet. Above the Long Cañon, the Finlay for five miles is a swift shallow stream about 150 yards wide. It is then interrupted by a second but shorter cañon, through which its waters pour in an exceedingly turbulent manner. The river for some miles above the second cañon was not examined.

Leaving the river at the lower end of the Long Cañon, we climbed out of the valley, here about 300 feet deep, and skirted for some miles the base of the range bounding the valley on the west; then, turning more to the north, we descended into the valley of a small stream, which falls into the Finlay below the second cañon. This stream occupies the eastern slope of a wide valley which runs directly westward and meets the Finlay again beyond the great semicircular bend which the latter describes above the second cañon. The space between this valley and the Finlay is occupied by a long mountain, about 3000 feet high above the valley, which was named Mt. Finlay. Leave the river.

Travelling up the valley proved to be very difficult owing to fallen timber, and we were obliged, for most of the way, to follow the bed of the stream, crossing and recrossing it continually. Nine miles from our câche, the stream that we were following turned south into the mountains. Here we left it, and, continuing westward, shortly afterwards reached a couple of narrow lakes, the first about two miles and the second about one mile in length. No water was flowing from these lakes, but in seasons of flood they evidently drain eastward, as the valley ascends beyond them. Difficult travelling

Half a mile from the second lake we reached the summit of the pass, and three miles further on came again to the Finlay, here flowing in a north-easterly direction. The river at this point is about 150 yards wide and is swift and shallow. We followed up the right (east) bank, and two miles further on reached the junction of the Finlay and Thudaca, a rapid mountain stream heading in the Peak Range. Above the Thudaca the Finlay has a rapid flow, and is interrupted by several small falls and rapids for a distance of six miles. Above this reach, what appears to be an old lake basin begins, the rocky banks and bed which characterize it below, suddenly disappear, and are replaced by clay, silt and gravel. The current diminishes to about a mile and a half an hour, and the stream expands to twice its usual size. The flat bordering the river is intersected by sloughs, and holds a couple of small sheets of water, known to the Indians as the Fishing Lakes. Reach the Finlay. Diminution in current.

The valley here has a width of about a mile and a half, and is bordered by mountains, 4000 to 5000 feet above the river, belonging to the Peak Range. Numerous small isolated glaciers, descending to a height of about 2500 feet above the river, occur in the depressions between the summits, but no extended ice-field was noticed. The expanded lake-like portion of the Finlay has a length of about eighteen miles. Near its head, the river divides into several branches, none of which were explored by us. The western branch (called Thucatade by Finlay) was ascended by Mr. Finlay, and is stated by him, in the journal referred to before, to be thirty-five miles in length and to head in a narrow lake, sixteen to twenty miles long, called Lake Thutade by the Indians.

Glaciers.

Geological Observations.

Omenica River Section.

Rock exposures.

Rock exposures on the Omenica commence at the Black Cañon, five miles above its mouth. Below the Black Cañon the valley is cut through the glacial and alluvial deposits which floor the narrow plain bordering the Finlay. A good section of the latter, consisting here of clays, sands and gravels, was observed about a mile above the mouth of the river. A landslip of considerable magnitude occurred at this point not long ago, by which material from the north bank of the valley was carried right across the main channel of the river and deposited on the further side. No permanent change in the course of the stream was effected by this slide, as the blocked channel was quickly cleared by the rapid river.

Landslip.

Rocks at Black Cañon.

At the Black Cañon, the valley for half a mile is bordered by sharp rocky walls consisting of medium-grained muscovite gneisses, micaceous and chloritic schists, and quartzites. At the upper end of the cañon the gneisses and schists are overlaid by a bed of hard grayish limestone, filled with mica, quartz, and other impurities. The general strike of the rocks at the cañon is S. 58° E. and the dip is south-westerly at an angle of 28°. The gneiss and mica-schists of the Black Cañon represent the oldest rock series found in the Omenica district and are undoubtedly of Archæan age. They run in a north-westerly direction parallel to the course of the Finlay for many miles. Their extension southward has not been worked out.

Laramie rocks.

The Archæan gneisses and schists of the Black Cañon, are succeeded in the valley of the Omenica by a series of shales, sandstones and conglomerates of Laramie age. These rocks occur in several places in

the Omenica and Finlay River districts, but so far as observed are everywhere confined to the valleys. They usually strike parallel, or nearly so, to the general direction of the valleys in which they lie, and conform approximately in dip to the older rocks on which they rest. Above the Black Cañon the strike is S. 28° E. and the dip is south-westerly at an angle of 30°.

The materials of these conglomerates and associated beds have been derived from the Archæan gneisses and schists and the Palæozoic schists and limestones which floor the surrounding country. The conglomerate consists of pebbles of quartz, felsite, chert, schist and limestone, imbedded in a soft sand or clay matrix, occasionally hardened by a feruginous cement. The shales are usually dark in colour, are coarsely laminated and often pass by the gradual addition of arenaceous material into a shaly sandstone. Mica enters largely into the composition of the rocks of this series, and in some instances beds a foot or more in thickness were observed, which consisted almost entirely of this material.

Fossil leaves and other vegetable remains are abundant in some of the shales and shaly sandstones, but are usually in a somewhat fragmentary condition. Among the specimens brought back, Sir J. Wm. Dawson has recognized fragments of the stem of an *Arundo*, *Sequoia Langsdorffii* and *S. Couttsiæ*, a *Populus* like *P. Arctica*, a *Platanus*, a *Quercus*, a *Viburnum*, probably *V. asper*, Newberry, and a carpolite resembling *Leguminosites arachnoides*, Lesquereux. The only animal fossils found were a couple of *Ostracods* which have not yet been specifically determined. Fossils.

The Tertiary beds are exposed above the cañon in a nearly continuous section for about a mile, and at intervals for several miles farther. Two miles and a half below the mouth of the Tchutetzeca a ledge of limestone projects out from the left bank, and is also exposed on an island in the centre of the stream. The limestone here is very hard, and evidences its proximity to a line of strong disturbance in its whitened and cracked appearance, and in the schistose condition of some associated shaly beds. A mile further up, an exposure of hardened shales, holding some beds of impure limestone, was noticed in the right bank, which probably belongs to the Laramie series. At the bend of the Omenica above the mouth of the Tchutetzeca, grayish-limestones are exposed in several places, and they also occur in the mountains north of the river. No fossils were found in these limestones, and their age is therefore uncertain, but they probably belong Limestone exposures. Age of limestone.

to the Castle Mountain group, a series which includes beds ranging from the Middle Cambrian to the Cambro-Silurian.*

Gneiss.

Above the limestone outcrops just referred to, exposures are wanting for a distance of over two miles and then hard garnetiferous gneiss appears in the banks of the valley. The Bow River series of conglomerates, quartzites and argillites which usually separates the Castle Mountain limestone from the Archæan was not observed and may be cut off by a fault.

Archæan rocks.

Archæan rocks commence about a mile and a half below the mouth of the Oslinca and are exposed along the river for a distance of twelve miles. The principal variety consists of a medium grained biotite-gneiss. Muscovite- and hornblende-gneisses are also present, but are less abundant. A felspathic augen-gneiss occurs in one section and garnetiferous gneisses were observed at several horizons. Lustrous mica-schists and soft hydro-mica schists alternate with the gneisses in bands and beds, and constitute a considerable proportion of the formation. The Archæan outcrop crossed by the Omenica has the form of a great anticline, with its eastern limb dipping in a north-easterly direction at angles ranging from 30° to 70° and the western limb dipping in a south-westerly direction at correspondingly steep angles. The strike is S. 48° E.

Bow River series.

The Archæan gneisses and schists are overlain by the Bow River series consisting here, as elsewhere, of grayish conglomerates and quartzites, and hard dark slates. The conglomerates are rather fine-grained, the pebbles seldom exceeding a third of an inch in diameter, and are crushed and altered in places into a schistose condition. The pebbles consist principally of quartz and felspar. The Bow River rocks are exposed along the river for two miles. They are succeeded and overlain in turn by grayish unfossiliferous limestone similar in character to that exposed below the mouth of the Tchutetzeca, and, like it, probably belonging to the Castle Mountain group. It dips to the south-west at angles ranging from 40° to 50°.

Castle Mountain limestones.

Order of succession.

The three series of rocks briefly described above, viz., the Archæan gneisses and schists (Shuswap series), the Bow River conglomerates, quartzites and slates, and the Castle Mountain limestones, occur in a similar succession to that on the Omenica, so far as observed, all along the Rocky Mountain range. In the section previously examined on the Bow River the lower beds do not come to the surface, and in other places the relationship is obscured by faults and overturns, but when-

*For a definition of this and the Bow River series, see Annual Report, Geol. Surv. Can., vol. II. (N.S.), pp. 240, 29 D.

ever the section is normal and complete the above described order obtains.

The Bow River conglomerates have a thickness on the Omenica of from 4000 to 5000 feet. The thickness of the Castle Mountain limestone was not ascertained.

The limestones are succeeded by a series of rocks which are entirely different in character from those just described and are mainly of volcanic origin. At the bend of the river below Germansen Landing, three rounded hills, each about a thousand feet high, occur, which are built principally of a green diabasic rock described by Mr. Ferrier as a compact diabase tuff. This rock is massive in character along its eastern border, but proceeding westward, lines of stratification are gradually developed, and in a short distance it passes into a well-foliated green schist, interbedded in places with darker schists, apparently argillaceous in character. The lithological succession at this point, indicates a gradual passage from massive volcanic rocks through an imperfectly bedded pyroclastic variety to well foliated schists probably derived from volcanic ash. Green volcanic rocks.

At Germansen Landing, green schists, striking S. 48° E., and dipping at high angles, are exposed. In proceeding up Germansen Creek the rocks, while apparently all belonging to the same series, display great variety. The predominant type for some miles is a green ash rock pressed and altered into a schist. Interbedded with it are layers of grauwacke, felsite, and hällaflinta, and bands of dolomite, serpentine, and magnesite. At one point below Clinton's an exposure of serpentine, sprinkled with decomposed crystals of felspar, was observed. Near Clinton's, on Germansen Creek, the green schists are replaced largely by dark evenly bedded argillites. On the trail between Germansen Creek and Manson Creek, both green schists and dark argillites are largely developed. The latter are often speckled with yellow spots, due to decomposed pyrite crystals. The strike of the schists and argillites has an average direction of S. 55° E. The dips are variable, but are usually steep. Rocks on Germansen Creek.

Granite is reported to occur on Manson Creek, a mile above the town of Manson. Its presence in the neighbourhood is evidenced by the number of granite boulders of all sizes, which are scattered everywhere over the face of the country. Granite.

Between Germansen Landing and New Hogem, the rocks exposed along the Omenica consist of green and dark schists similar to those outcropping on Germansen Creek, alternating with indistinctly foliated diabase-tuffs. The latter in some places are destitute of stratification

and are not distinguishable in the field from the massive diabases. They vary greatly in texture, passing gradually from a compact cryptocrystalline condition to a rock of medium grain.

Granite.

At New Hogem the schists and diabase-tuffs are replaced by a dark-coloured medium-grained granite, usually of a hornblendic type. An agglomeratic-looking rock, made up of granite and diabase débris, probably a junction material, was found in the wash of a small stream which enters the Omenica immediately below New Hogem.

Granite outcrops along the Omenica from New to Old Hogem, a distance of about eight miles, and extends north and south of the river in a direction parallel, or nearly so, to the prevalent strike of the neighbouring schistose rocks. The southern limit of the area was not ascertained, and it is possible that it may be continuous with the granite outcrops on Manson Creek.

From New Hogem the trail to Tacla Lake via Vital and Tom's Creek was followed. An occurrence of granite half a mile south of the river marks the western boundary of the granite area, as a short distance away, greenish schists and dark gray argillites similar to those on Germansen Creek crop out in the valley of Silver Creek. Outcrops of the same argillites and schists occur in numerous exposures along the route traversed until within a few miles of Tacla Lake. They are instratified in places with grauwacke and beds of felsite. Hällaflinta and amphibolite are also not infrequent. The beds dip at high angles, usually towards the south-west, and are occasionally vertical. Seven miles from Tacla Lake, the argillites and associated rocks are replaced by conglomerates, sandstones and shales of a somewhat similar character to those on the Omenica above the Black Cañon. Conglomerates were also found on the shores of Tacla Lake, and they probably form the basement of the wide valley in which the lake is situated.

Green schists.

Conglomerates.

The Tacla valley conglomerates are more indurated than those on the Omenica and have been subjected to greater disturbances, the tilting of the beds often amounting to 70° and over. The age of the conglomerates is doubtful, as no fossils were obtained from them, but they probably belong to the Cretaceous.

Finlay River Section.

Finlay River section.

The Finlay section is much inferior to that afforded by the Omenica, as the direction of the river for long distances is parallel or nearly so to the strike of the rocks. No exposures occur along the lower part of the river. From its mouth up to the Omenica, the Finlay winds

through a low alluvial plain without touching the bordering highlands or mountains. Above the mouth of the Omenica the banks increase in height, and where cut into by the stream, show glacial sands, gravels and clays, holding numerous scratched and polished boulders.

A mile and a half below Fort Grahame, an exposure of hard grayish contorted limestone appears on the west bank of the river, underlying mica-schists and gneisses. The limestone strikes N. 40° W., and dips to the west at an angle of 70° or over.

Terraces.

An examination was made of the mountains bordering the valley in the vicinity of Fort Grahame. The valley here has a width of about five miles and is terraced on both sides of the river. The main terrace has a height above the stream of 175 feet. The other terraces, although plainly visible from a distance, could not be distinguished during the ascent. Water-worn pebbles were found up to a height of over 2000 feet above the river.

Rocks in mountain east of Ft. Grahame.

The rocks observed consisted of lustrous mica-schists, mica-gneisses, and hornblende-schists, bedded diorites, quartzites, and occasional bands of whitish crystalline limestone, all belonging to the Shuswap series.

At the base of the mountains the rocks dip to the south-west, at a high angle, but further up the dip diminishes and at the summit the beds are nearly horizontal. The strike is approximately N. 40 W., or parallel to the direction of the valley.

The mountain west of the valley was ascended by Mr. Russel and are reported by him to consist of mica-schists, gneisses and limestones, similar to those east of the valley, dipping at high angles.

Absence of glacial striæ.

No glacial striæ or grooves were noticed on either slope, but the rocks in places appeared to have been smoothed and rounded by ice moving in a south-easterly direction. From Fort Grahame to the mouth of the Ingenica, a distance of about twenty miles, no exposures were noticed along the valley. The bordering mountain ranges, judging by the material brought down by numerous tributary streams, are built mainly of gneiss and mica-schists. The latter outcrops in a couple of places a short distance above the mouth of the Ingenica.

Six miles above the mouth of the Ingenica, plant-bearing conglomerates and sandstones of Laramie age appear in the valley. These beds are similar in character to those in the Omenica, previously described. They appear to be confined entirely to the great valleys of the district and to be absent from the highlands, and if ever deposited on the latter have been entirely swept away. They rest partly on an

Archæan, and partly on a Palæozoic floor, and have participated to some extent in the later folding which has affected the region.

The pebbles of the conglomerates seldom exceed half an inch in diameter and consist of rounded and sub-angular fragments derived from the disintegration of the schists, slates and quartzites of the neighbourhood. Below Deserters' Cañon, a ridge of hard conglomerate and sandstone, through which the stream has cut a narrow gorge, crosses the valley. At the lower end of the cañon the walls are vertical in places, but farther up, the banks have weathered into a steep slope.

Deserters' Cañon has the appearance of a recent channel, and probably owes its origin to an alteration in the course of the stream during the glacial period, as the easily eroded material of which its banks are formed could not have withstood the assaults of a large swift stream heavily charged with sediment, such as the Finlay, for any lengthened period.

Shuswap series.

The Tertiary conglomerates and associated rocks are replaced, a short distance east of the Deserters' Cañon, by the gneisses and mica-schists of the Shuswap series, but extend in a westerly direction for four or five miles, or as far as the base of the mountain range bounding the valley in this direction.

White limestone mountains.

Above Deserters' Cañon, the valley is bordered on the west by a conspicuous range of white mountains from 2000 to 3000 feet in height. On closer examination these proved to be composed of a fine-grained, whitish, compact limestone. This rock weathers in places to a light yellow or rusty colour, and occasionally is very siliceous. No fossils were found in it, but from its position relatively to the Shuswap series it was referred to the Cambrian. The limestone is very much disturbed and probably lies along a line of faulting running with the valley.

Bordering ranges.

The schists and gneisses of the Shuswap series form the bordering mountain ranges on both sides of the Finlay below the mouth of the Ingenica, but above that point, while still continuing on the east, they recede toward the west, and are replaced by the limestones referred to above.

Laramie conglomerates.

From Deserters' Cañon to Paul's Branch, a distance of thirty miles in a straight line, the Finlay winds through the centre of its valley without touching the bordering mountain ranges. The valley in this stretch is floored throughout with Laramie conglomerates, sandstones and shales, exposures of which occur at intervals all along. These rocks here are usually little indurated and occasionally hold small lignite seams. Fossil plants occur in many of the beds.

Ten miles below Paul's Branch, banks of glacial deposits 225 feet high occur at the bends of the stream. The banks are sloping below, but are capped with steep bluffs above consisting mostly of coarsely stratified gravels interbedded with bands of hard boulder-clay filled with scratched boulders. The boulder-clay bands often pass into gravels when traced along their outcrop. Glacial deposits.

At Paul's Branch, the river approaches the mountains on the east, and an opportunity was afforded for a short trip inland. Paul's Branch enters the Finlay through a deep narrow cañon, cut through the hard rocks of the outer range. Farther back, its valley becomes enlarged, and the stream soon splits up into several tributaries which wind through the wide marsh-filled valleys separating the hills and ridges of the district. Paul's Branch.

The eastern range here, as elsewhere along the valley, consists of the limestones, gneisses and schists of the Shuswap series. A band of hard compact limestone outcrops at the water's edge, while further back, bands of mica-gneisses, lustrous mica-schists, hornblende-schists, and occasionally quartzose-schists, alternate across the range. These rocks all dip to the south-west at angles from 50° to 60°, and strike N. 73° W.

The Shuswap series has a width at Paul's Branch of two miles. It is succeeded towards the east by argillites calc-schists and limestones of Cambrian age, dipping in a south-west direction under the older rocks. The contact between the two formations is apparently a faulted one, the Shuswap series being thrust eastward over the younger formation. Width of band of Shuswap rocks.

The ridges forming the central part of the Rocky Mountain range were not examined closely, but, judging from their appearance and from the wash of the streams flowing from them, they are evidently composed of massive limestones, similar to those found in a corresponding position in other parts of the range. Rocks in central range.

From Paul's Branch to the Quadacha, a distance of ten miles, the Finlay follows the eastern bank of the valley, and occasional exposures of the schists of the Shuswap series occur. A short distance below the mouth of the Quadacha, Laramie conglomerates outcrop on the left bank.

At the Quadacha, the Finlay bends to the west and soon after leaves the great valley which it has occupied from its mouth to this point. The valley continues northward, and is occupied, after the Finlay abandons it, by the Tochieca a tributary.

Volcanic schists.

In crossing the valley Laramie rocks were seen in a couple of places, but below the mouth of the Tochieca these are replaced by green schists, probably sheared and altered volcanic rocks similar to those overlying the limestones in the Omenica district. These schists have the usual strike, but the dip is to the north-east at an angle of 40°. The green schists have a width of five miles. They form the first ridge through which the Finlay breaks after it leaves its old valley. Prairie Mountain, the part of the ridge abutting on the Finlay from the north, was examined, and found to consist of green schists, often strongly chloritic, holding numerous stringers of quartz alternating with bands of yellowish weathering dolomites. Three bands of the latter were observed and four of the former. The strike of these beds is N. 30° E. and the dip is to the north-west.

Glacial striation or grooving were carefully looked for in ascending Prairie Mountain, but no trace of either was found.

Laramie rocks.

After cutting through Prairie Mountain range, the Finlay enters and follows for some distance a second longitudinal valley running parallel to the first. Laramie sandstone and conglomerates occur in this valley and probably extend southwards along it to its junction with the main valley, a few miles below Paul's Branch. The conglomerate in this valley consists in places largely of sub-angular limestone pebbles, often several inches in diameter, and is occasionally coloured red by iron.

Limestones.

At the second valley, the green schists are replaced towards the west by limestones, alternating with dark, glossy calc-schists, sericite-schists and argillites, evidently a continuation of the same band which forms the mountains bordering the Finlay valley on the west at the Deserters' Cañon, and for some distance above.

The band of limestones and associated rocks has a width of five miles. The thickness was not ascertained, as the dips are very irregular, the beds being overturned in many places. At the western edge of the band the prevalent dip is to the north-west.

Cambrian conglomerates.

The limestones are underlain by fine-grained conglomerates, interbedded with some quartzites and schists. The conglomerate is of Cambrian age, and like similar occurrences elsewhere, consists mostly of quartz and felspar pebbles inclosed in a hard siliceous matrix. It strikes in a north-west direction and dips to the north-east. The conglomerates are succeeded, in descending order, by mica-schists, mica-gneisses, hornblende-schists, etc., of the Shuswap series. The latter are exposed along the Finlay River from the mouth of the Thudaca River, westward to the expanded portion of the river at the Fishing

Lakes. Above this point the river enters an old alluvium-filled basin, and exposures cease. East of the valley, which here runs almost directly north-and-south, the mountains are built of the schists of the Shuswap series, while west of the valley an area of eruptive rocks occurs. The latter consist of diorites around the periphery, but soon pass to the west into biotite- and hornblende-granites. The dip of the schists is to the north-east, or away from the eruptive area.

Finlay section.

The rock section exposed along the Finlay, after the latter leaves the valley bounding the Rocky Mountains on the west, consists of the western half of a great anticline, which includes the schists of the Shuswap series (Archæan), conglomerates and limestones of Cambrian age (Bow River and Castle Mountain groups), and an upper schistose series consisting of altered volcanic rocks, the age of which was not determined.

The dip of these rocks is usually to the north-east, but in places, and more especially in the limestone series, overturns have been produced by pressure from the west, and the dip is reversed.

Faulted anticline

The eastern limb of the anticline has entirely disappeared, a result probably affected by faulting along the line of the Finlay Valley. The junction between the volcanic schists at the summit of the Palæozoic section, and the Shuswap series east of the Finlay Valley, over which they are apparently faulted, is concealed by the Laramie conglomerates.

*Section in Peace River Pass.**

Peace River Pass section.

A short trip was made through the Peace River Pass of the Rocky Mountains, for the purpose of obtaining a general view of the structure of the range in this latitude. The time occupied, one day in descending, and two days in ascending the river, was too limited for anything but a hurried reconnaissance.

Character of river.

Peace River breaks through the Rocky Mountains, here about eighteen miles wide, in a direction a few degrees south of east. In its passage of the range it has a width of from three to five hundred yards. Its course, with the exception of two small rapids, one before entering and the other after leaving the range, is uninterrupted. The current seldom exceeds five miles an hour and for most of the distance is much less. The valley averages about a mile in width, and the bordering mountains range in height from 2000 to 4500 feet above the river, or 4000 to 6500 feet above sea-level.

* See also Report of Progress, Geol. Surv., Can., 1875-76, pp. 41, 80.

Predominance of limestone.

The rocks exposed along the pass consist principally of grayish Palæozoic limestones striking in a north-westerly direction, and dipping persistently to the south-west. Repetitions of parts of the limestone series, caused by overthrust faults, occur at several points. No infolds of Cretaceous or Laramic strata, such as occur in Alberta, exist, and to this fact is due the greater irregularity of the subordinate ranges.

Cretaceous sandstone.

Immediately east of the main range, exposures of yellowish-weathering calcareous sandstone, probably of Cretaceous age, occur in the banks of the river. These are replaced, going westward, by grayish limestones dipping steeply to the west. The junction between the limestone and sandstone is concealed in the valley, but there is little doubt, from the relative position of the two formations, that the contact is a faulted one and that the Palæozoic limestones of the mountains, here as elsewhere along the eastern boundary of the range, are thrust up over the Mesozoic rocks of the foot-hills.

Fossiliferous limestone.

The limestones are fossiliferous, the fauna, so far as ascertained, being similar to the Banff or Devono-Carboniferous division of the Bow River section.

Triassic beds.

West of the fault, the limestones stand at a steep angle, the beds being fairly regular, but further west they become greatly confused and show evidence of much. disturbance. In the second range, the limestones are overlain by a band of dark *Monotis*-bearing calcareous shales and impure limestones of Triassic age. West of the Triassic band, a second fault brings the Banff limestones again to the surface, and the same limestones, probably repeated by faults, occur in the next two ranges. In the first of these, the Banff limestones and overlying Triassic beds have a regular westerly dip, but in the second, a line of strong disturbance is reached, and the strata as seen on the mountain sides are crushed into numerous subordinate folds.

Fault.

A fault of considerable magnitude crosses the valley west of the two ridges referred to above, and brings up limestones which were referred to the Castle Mountain group. West of this fault, the dips north of the river for some distance were too confused to follow, but south of the river, the beds, with the exception of one double fold, dip regularly westward until near Mount Selwyn. The limestones in this part of the range are mostly unfossiliferous and of the Castle Mountain type, but higher beds holding *Halysites* were found in one place.

Mount Selwyn shows a sharp anticline on its eastern slope. The centre of the mountain is formed of almost vertical limestone beds, but going westward these are soon replaced by the quartzites, schists and crushed conglomerates of the Bow River series. The latter are forced

up over the limestones by a well-defined overthrust fault, running in a north-westerly direction.

Mount Selwyn is flanked on the west by a small range composed partly of the rocks of the Bow River series and partly of the schists of the still older Shuswap series, all dipping to the south-west. The latter overlie the former, but the cause of their superior position was not ascertained. Structure of Mt. Selwyn.

The Peace River section through the Rocky Mountains, thus resembles the Bow River section through the same range, in the predominance of limestones and in the persistent westerly dips due to repetition of the beds by overthrust faulting, but differs from it in its absence of beds newer than the Triassic, and in the gradually increasing age of the rocks from east to west. Comparison with Bow River section.

Geological Summary.

Archæan (Shuswap Series).

The oldest rocks in the district consist of a series of well foliated mica-gneisses, probably derived to a large extent from sheared eruptives, lustrous mica-schists, horneblende- and actinolite-schists, quartzose schists and crystalline limestones, filled with mica, hornblende and other secondary minerals. The rocks of this series are usually evenly bedded and conform in dip with the overlying formations. Shuswap series.

Rocks of the Shuswap series are found on both sides of the Finlay from its mouth up to its junction with the Ingenica. North of this point, the formation divides around a bay filled with newer rocks. The eastern limb follows the eastern slope of the Finlay Valley north-westward to the Quadacha and for some distance beyond. It has a width at Paul's Branch, where it forms the most westerly range of the Rocky Mountains, of four miles. This width decreases towards the north and increases to the south. Distribution.

The western limb bends away from the Finlay above the Ingenica, but crosses it again at the great bend which the Finlay describes after leaving the Rocky Mountains, and continues on to the north. The width of this band was not ascertained, as its western boundary was not reached.

A second area of Shuswap rocks, separated from the first by a band of limestones, occurs on the Omenica River above the Oslinca. The gneisses in this occurrence are coarser in grain than is usually the case, and in places have a granitic appearance. The band has a width of ten miles.

Lower Palæozoic.

Clastic rocks overlying Shuswap series.

The Shuswap series is overlain on the Omenica by a band of slates, quartzites and conglomerates similar in lithological character and in geological position to the Bow River series of the Bow River section; and like it, probably referable to the Lower and Middle Cambrian. The conglomerates have an arkose appearance, and consist principally of small rounded quartz and felspar pebbles interbedded in a hard siliceous matrix. Fragments of schist and slate are also occasionally included. A purplish coloration of many of the quartz grains characterizes the conglomerates of this formation wherever found, from Bow River north to the Finlay. The conglomerates and associated rocks on the Omenica have a thickness of about 4000 feet.

A band of conglomerates and schists, referable to the Bow River series, also occur on the Finlay below the mouth of the Thudaca. These rocks overlie the Shuswap series and are similar in most respects to the Omenica occurrence. The conglomerates are greatly crushed in places, and often assume a schistose appearance from the development of secondary mica parallel to the cleavage planes.

A third band, similar in character to the others, forms part of the western slope of Mount Selwyn.

Castle Mountain group.

The conglomeratic bands are everywhere overlain by a great limestone formation, corresponding to the Castle Mountain group of the Bow River section, and like it, probably ranging in age from Middle Cambrian up to Cambro-Silurian. The limestones are grayish in colour, except where whitened along lines of disturbance, and are usually evenly bedded, but in places, especially when impure, pass into a calc-schist. No fossils were obtained from them.

Distribution.

Limestones of this group are found all along the western portion of the Peace River section through the Rocky Mountains east of Mount Selwyn, and extend northward along the range as far as examined. West of the Rocky Mountains they occur in bands of from four to eight miles in width, running in a north-westerly direction. One of these bands crosses the Finlay at its bend and extends south to the Ingenica where it is cut off, and two others cross the Omenica above the Tchutetzeca.

The limestone rests normally on the Bow River conglomerates, but in many places in the district the latter are absent, either from non-deposition or in consequence of faulting, and the limestone comes in direct contact with the Shuswap rocks.

Upper Palæozoic.

Grayish well-bedded limestones, holding corals, brachiopods and other fossils characteristic of the Banff or Devono-Carboniferous division of the Bow River section, occur in the eastern ranges of the Rocky Mountains, while near the centre of the range, lower beds probably Silurian in age, holding *Halysitis catenulatus*, were found in one place. Banff limestones.

The volcanic schists and associated rocks exposed along the Omenica from below Germansen Landing to near Tacla Lake, are probably upper Palæozoic, but no definite evidence of age was obtained, beyond the fact that they overlie the limestones referred to the Castle Mountain group and underlie the probably Cretaceous conglomerates of Tacla Lake. The band of green schists which crosses the Finlay above the mouth of the Quadacha occupies a similar position. Volcanic schists.

The schists are greenish in colour and are well foliated, as a rule, but in places the bedding becomes indistinct, and the rock assumes a very massive character. The transition is nowhere abrupt, and probably indicates a gradual passage from a volcanic centre, usually diabasic in character, outwards to tuffaceous and well stratified ash rocks.

The volcanic schists are interbedded with argillites, and occasionally with beds of limestone and dolomite.

Mesozoic.

Triassic beds, consisting of dark calcareous shales passing into an impure limestone, occur in the second range of the Rocky Mountains, and a band of similar rocks forming part of the third range may possibly belong to the same foundation. Specimens of *Monotis subcircularis* are abundant in the first-mentioned locality. Triassic beds.

Cretaceous beds occur in the foot-hills, but were not recognized in the mountains. The conglomerate and sandstones found in the valley of Tacla Lake resemble Cretaceous rocks found elsewhere in the province, but no direct proof of their age was obtained. Crètaceous beds.

Tertiary (Upper Laramie).

Beds consisting of conglomerates, interbedded in places with shales and sandstones, occupy the bottom of the valley of the Finlay from the Ingenica River north to the Tochieca, and continue northwards along the valley of the latter stream. Similar beds appear again on Laramie.

the Finlay a few miles farther west in a parallel longitudinal valley, which it enters and follows for some distance. They are also found on the Omenica from the Black Cañon up to its junction with the Tchutetzeca.

The pebbles of the conglomerate are usually small, but in places are several inches in diameter. They consist mainly of slate, quartz, and limestone. Oxide of iron is occasionally present in the matrix in sufficient quantities to give a reddish coloration to exposures. The shales are dark in colour, are evenly bedded, and are interstratified in places with small lignite seams. The sandstones are usually somewhat argillaceous, and occasionally consist largely of mica derived from the disintegration of the underlying schists.

Distribution of Laramie.

The Tertiary conglomerates and associated rocks, as stated on a previous page, are distributed in narrow strips along the deep valleys of the district and were nowhere found on the highlands. They were probably deposited in lakes during a Tertiary depression, and evidence the pre-Tertiary age of the present main river-channels. The conglomerates are occasionally horizontal or nearly so, but in most cases they are tilted at angles ranging from 10° to 40°, showing that they have been affected to some extent by the later mountain-making movements.

Some leaves and other plant remains, obtained from the shales interbedded with the conglomerates, were examined by Sir J. Wm. Dawson, who has kindly furnished the following note on them :—

"The collection is small, and the specimens imperfect, more especially in respect to the finer venation and margins of leaves. The following forms were recognized :—

Fossils.

"*Arundo.*—A ribbed stem possibly of this genus. Omenica River.

"*Sequoia.*—Plentiful in Finlay River shales; appears to be *S. Langsdorffii.* On the black flags from Omenica River there is another form, which may be distinct, and shows curious terminal buds. There are also branchlets referable to *S. Couttsiæ.*

"*Populus.*—A leaf of the type of *P. Arctica*, Heer, *P. Nebrascensis*, Newberry, and *P. speciosa*, Ward, if these are really distinct. Omenica River.

"*Platanus.*—Possibly *P. Haydenii*, Lesquereux, or allied species. Omenica River.

"*Quercus.*—A fragment possibly of this genus. Omenica River.

"*Grewia* or *Grewiopsis.*—This is a genus allied to *Tilia.* A single imperfect leaf may represent it. Finlay River.

"*Viburnum.*—Apparently *V. aspera*, Newberry, or near to it.

"*Carpolite.*—A single imperfect specimen resembling *Legumenosites arachnoides* of Lesquereux.

"*Animal Fossils.*—Minute bivalve shells of two kinds, one possibly an *Estheria*, another perhaps a *Cyprid.*

"All the above fossils, so far as determinable, appear to indicate the Upper Laramie period. Of the collections in my possession, the plants seem most nearly to resemble those of the Lignitic series on the Mackenzie River, which are referable to the Upper Laramie. There is nothing among the plants to indicate any other horizon."

Pleistocene

Glacial groovings.

Evidences of glaciation abound throughout the district. In the Peace River Pass, well-marked glacial groovings occur on the south side of the river two miles east of Mount Selwyn. The movement of the ice here was eastward. Glacial groovings of a pronounced character, running in an easterly direction, were observed on the hillsides north of the Omenica River twelve miles above Germansen Landing, and they are also reported to occur on the summit of a mountain south of Manson Creek at an elevation of 5000 feet above the sea. No groovings were found along the Finlay, but the exposures on the mountain slopes north-east of Fort Grahame present in many instances the smooth rounded characters of rocks polished by moving ice. The movement here was in a south-easterly direction.

The glacial deposits consist of boulder-clay, accompanied by gravels, sands and silts.

Glacial deposits.

In Peace River Pass, gravels, sands, and silts of glacial age are of constant occurrence, and boulder-clay holding striated stones occurs in a couple of places. On the Omenica River, a high bank of stratified sands, silts and gravels occurs below the Black Cañon, and boulder-clay accompanied with sand and gravel was found above the mouth of the Oslinca. Below Germansen Landing, light-colouring silts weathering into steep bluffs are exposed for several miles along the valley. From Germansen Landing to Hogem the immediate shores of the river are low and are mostly built of alluvium.

Boulder-clay is developed to a greater extent on some of the tributaries of the Omenica than on the river itself. High banks of this material occur on Germansen Creek and on Manson Creek, and in both cases are underlain by fluvio-glacial gravels, which are often auriferous. Boulder-clay banks of considerable thickness were also found on Vital Creek and on Tom's Creek.

Morainic hills.

Morainic hills, among which small lakes are interspersed, occur near the summit of the pass leading from Tom's Creek to Tacla Lake.

Boulder-clay banks.

On the Finlay River, boulder-clay is scarce below Deserter's Cañon. The river in this stretch is bordered for long distances by banks of alluvial clays and sands, and where the higher terraces are cut into, the sections show, as a rule, only the upper stratified sands and silts. From Deserters' Cañon to the bend of the Finlay, boulder-clay banks, some of which are 225 feet in height, are frequent. The boulder-clay here is often imperfectly stratified and often passes horizontally into gravel beds. Striated stones are common, but the majority of the pebbles are water-worn to a varying extent. No boulder-clay was noticed on the Finlay above its bend, the banks usually consisting of rolled gravels overlying the older rocks in the swifter portions of the stream, and of alluvial clays and sands where the current becomes sluggish.

Terrasce.

Terraces were observed at a number of places. Along Peace River Pass they occur up to a height of about 400 feet and on the Omenica below the mouth of the Oslinca, up to a height of 250 feet. On the Finlay, north-east of Fort Grahame, rolled gravels and traces of terraces easily distinguishable at a distance, occur up to a height of 2000 feet above the river. High terraces were also noticed lining the sides of the mountains at the Fishing Lakes. A well-marked terrace, built of silty clay and gravel, occurs here at a height of 1250 feet above the river or 4500 feet above the sea, and others less distinct were found up to a height of 1950 feet above the river.

Glacial succession.

The glacial succession, when fully developed, consists in ascending order of gravels, associated in places with stratified sands and silts; boulder-clays holding occasional pebble beds; stratified sands, clays and gravels ; and terraces. The position of the light coloured silts on the Omenica, below Germansen Landing, was not ascertained, as their contact with the other members of the glacial section is concealed.

The alluvium-filled rock-basins which the Finlay enters six miles above the Thudaca, and the Omenica, near Slate Creek, probably owe their origin to recent differential crustal movements.

Economic Notes.

Discoveries of gold.

The first discovery of gold in the Peace River country was made on the Parsnip, about 20 miles above its mouth, by Bill Cust, in 1861. In the following year Pete Toy's bar on the Finlay, a few miles below the Omenica was found, and for some time proved wonderfully productive, the yield amounting to about $50 per day to the man. Silver

R. G. McConnell, Photo., Aug., 1893.

GLACIAL BEDS, FINLAY RIVER.

Creek, a tributary of the Omenica, was found in 1868, and Vital Creek, a branch of the former, in 1869. In 1870, diggings were found on Germansen Creek and the following year on Slate, Manson and Lost Creeks. No further discoveries were made until Tom's Creek was struck in 1889.

Population.

The population of the country reached its maximum about 1872, and has since steadily declined. In 1893 four miners were working on Germansen Creek, eight on Manson Creek, three on Vital Creek and about twenty on Tom's Creek. The other creeks have been worked out and deserted.

Production.

The total production of the camp up to the present time, judging from the fragmentary statistics of the district published in the Annual Reports of Minister of Mines for British Columbia, and from other sources, probably approaches closely to, if it does not exceed, a million dollars.

Auriferous stream gravels.

The gold in the Omenica region has been obtained principally from the gravels overlying the older rocks, in the beds of the present streams. The gravels, as a rule, have little depth, and the productive portions of the different streams seldom exceed three miles in length. No deep diggings or extensive hydraulic workings have so far been attempted in the district.

Auriferou glacial gravels.

The auriferous gravels underlying the boulder-clay on Germansen, Manson and other creeks in the district have a wide distribution and promise favourable results if worked on a sufficiently large scale. A short tunnel was driven into a bank of this description on Germansen Creek by Mr. Clinton in 1892, and sufficient gold taken out to pay small wages. Water can be obtained almost anywhere from lakes and mountain streams, within a reasonable distance, and the only drawback to successful hydraulic mining is the great expense attendant on the carriage of material and supplies from the coast. The absence of easily navigable waterways, and the mountainous and swampy character of the surrounding country, present obstacles to transportion which can only be overcome at great expense. At the present time, the greater part of the supplies are brought in by pack animals from Hazleton at the Forks of the Skeena, the rate to Manson Creek amounting to 17 cents per pound.

Transportation.

Prospecting

Some prospecting has been done in the Omenica region every season since its auriferous character became known, but the district has by no means been thoroughly explored. The discovery of pay gravels on Tom's Creek, close to Vital Creek, twenty years after the later was found, shows how loose the examination has been, nor need this be

wondered at when the short seasons, difficult travelling and high prices of supplies are taken into account. That further discoveries of auriferous creeks will be made admits of little doubt.

Gold on the Finlay.

Fine gold occurs on the Finlay throughout most of its course, but with the exception of Pete Toy's bar, previously referred to, no paying placers have been discovered. Very little prospecting has, however, been done on this stream, and with the exception of the Ospica, none of the tributaries, so far as I could learn, have ever been prospected. Gold, mostly in a fine condition, was found in ascending the river, at the mouths of the Ingenica, the Quadacha, and the Tochieca, and also on two of the smaller western tributaries, one of which enters the Finlay eight miles below Paul's Branch, and the other six miles above the Tochieca. With the exception of the Quadacha no "colours" were found on the eastern or Rocky Mountain streams above Deserters' Cañon.

Galena veins

No ore mining has so far been attempted in the Omenica region owing to the want of transportation facilities, although the existence of large veins of highly argentiferous galena has been known for many years.* Arquerite or silver-amalgam is also of common occurrence in the placer diggings on Silver Creek, and on Vital and Tom's Creek, two of its tributaries. The two latter streams are of little length, and a systematic examination of their basins could be made at small expense.

Occurrence of gold.

The gold in the Omenica district occurs in a coarse condition, nuggets often being found with quartz still attached to them, and is evidently derived from the band of green schists and argillites previously described which outcrops along the Omenica and its tributaries from below Germansen Landing west nearly to Tacla Lake. All the auriferous creeks worked up to the present are situated within this zone, which has a width of forty-eight miles. The schists, of which it is formed, are everywhere much disturbed, are broken up by intrusions of granitic and other eruptive rocks, and present in this and other ways promising indications that they are metalliferous in character.

Rocks probably metalliferous.

*Report of Progress, Geol. Surv. Can., 1879-80, p. 111 B.