

ANNUAL REPORT
OF THE
MINISTER OF MINES
FOR THE
YEAR ENDING 31st DECEMBER,
1874,
BEING AN ACCOUNT OF
MINING OPERATIONS FOR GOLD, COAL, AND SILVER
IN THE PROVINCE OF
BRITISH COLUMBIA.

HON. JOHN ASH,
Provincial Secretary and Minister of Mines.

MR. CHARLES GOOD,
Deputy Provincial Secretary and Minister of Mines.



VICTORIA:
PRINTED BY RICHARD WOLFENDEN, GOVERNMENT PRINTER,
AT THE GOVERNMENT PRINTING OFFICE, JAMES' BAY.
1875.

BRITISH
MINING STATISTICS

Districts, and their Divisions.	ALLUVIAL MINERS.		Mining Population.	Total Population—Whites, Chinese, Men, Women, and Children, at Mines.	MACHINERY EMPLOYED IN ALLUVIAL MINING.				
	Whites.	Chinese.			No. of Steam Engines Employed.	Water Wheels.	Shafts.	Tunnels.	Hydraulics.
CARIBOO.									
Lightning Creek.....	92	90	182	416	2	12	18	4	
Williams Creek.....	210	104	314	1012	1	4	29	5	22
Grouse Creek.....	44		44	46		4	3		4
Lowhee and Stouts Gulch.....	38		38	38	2	3	6		2
Antler, Cunningham, &c.....	34		34	34		2	4		2
Musquito Creek.....	17		17					2	
Van Winkle, Stanley, and Peterson.....	13	6	19	19		1	1		1
Davis, Jawbone, and Coulter.....	23		23	23		1			1
Swift and Cottonwood Rivers.....		19	19	19					2
Nelson Creek.....		20	20	20					4
Chisholm Creek.....	14	1	15	15			1		1
Burns Creek.....	14	26	40	40				2	
Quesnelmouth.....		18	18	104					4
Quesnel—North and South Forks.....		120	120	253		1	9		1
Keithley Creek.....	26	60	86	86		3	1	2	
Harvey Creek.....	11	14	25	28			1	1	
Snow-shoe Creek.....	7	5	12	12			2		
Other Creeks.....	1	57	58						
KOOTENAY.									
Perry Creek.....	33		33	35				2	1
St. Mary and Moojin Rivers, Weaver's Creek, Palmer's Bar.....	14		14	14					1
Wild Horse Creek.....	75		75	120				1	7
OMINECA.									
Slate, Elmore, and Lost Creeks.....	21		21	21					1
Manson River.....	19		19	19				1	
Germansen Creek.....	34		34	40				1	3
LILLOOET.....	8	80	88	195					
CASSIAR.....	1500		1500	1600				2	
TOTAL.....	2248	620	2868	4209	5	31	75	23	57

REPORT OF THE MINISTER OF MINES

FOR THE YEAR 1874.

To His Excellency JOSEPH W. TRUTCH, *Lieutenant-Governor of the Province of British Columbia.*

MAY IT PLEASE YOUR EXCELLENCY:—

Having been appointed Minister of Mines, under the provisions of the "Minister of Mines Act, 1874," and being charged with the duty of collecting information on the subject of the Mining industries of the Province; I have therefore the honor, herewith, to present to Your Excellency this, the first Report.

All of which is respectfully submitted.

I have the honor to be,

Your Excellency's obedient Servant,

JOHN ASH,

Provincial Secretary & Minister of Mines.

March 8th, 1874.

REPORT.

Productive mining in British Columbia is, at the present time, restricted to mining for gold in many widely separated districts of the Province; and to mining for bituminous coal, which is confined to Nanaimo and its immediate vicinity.

The indications of the existence of other metals and minerals of great economic value are frequent throughout the country, and in some localities they have been thought sufficient to justify mining operations, which after the expenditure of large sums of money have been suspended or even abandoned for various reasons, among which difficulty of communication stands first.

GOLD MINING.

The gold fields of British Columbia, at present known, extend from Rock Creek on the 49th to Liard River on the 60th parallel of north latitude, a distance of seven hundred miles. The gold is chiefly found on the slopes of a range of mountains, lying between the Rocky Mountains on the east, and the Cascade Range on the west, and known as the Selkirk Range, embracing an area of 105,000 square miles. Gold has been found, and profitably worked, in different fields throughout the whole of the area in question: such as Similkameen, Rock Creek, and Kootenay (between the 49th and 50th parallels); Hope, Yale, Lytton, Lillooet, Bridge River, and the Big Bend of Columbia River (between 50° and 52°); Cariboo, Quesnelle, Keithley, and Harvey (between 52° and 54°); Omineca and the Peace River mines, with Skeena and Naas Rivers (between 54° and 56°); and, finally, Stickeen River and the last discovered and rich mines at Cassiar and Liard River (between 56° and 60°).

The tabulated statement hereto appended, which has been prepared from the Returns received from the Government Agents at the various mining camps, gives some idea of the number of miners employed, their earnings, the value of the gold found in different localities, the total amount realized, the works in operation, the machinery in use, and other interesting and useful information.

The gold deposits of British Columbia are found on bars, left bare by falling streams; in the beds and banks of rivers; on benches, high above water level; in gulches; and far down beneath the surface of the ground, in the beds of ancient water-courses.

The gold is collected both by rocker and sluice-box, and steam and water power is brought to bear on its production.

The gold of different localities is very different in aspect and value; sometimes it is in round jagged pieces; sometimes in even scales; sometimes in smooth oblongs like melon seeds; sometimes in coarse rough lumps. Its color is as variable as its shape, some being an iron rust color, some pale silvery, some glittering yellow, and some bronze green; while its value varies, with locality, from fifteen to eighteen dollars an ounce.

On the bars near the mouths of rivers it is found in a fine impalpable dust, known as "flour gold," and can only be collected by the aid of quicksilver. As the head-waters of the streams are reached, the original matrix of the gold is approached, and the gold becomes larger and less water-worn, till the veins of quartz, from which it is supposed to have been originally disintegrated, may be traced up the sides of the steep mountain precipices, whence the streams have their source.

The earliest discoveries of gold in British Columbia were on the bars and benches of the Fraser River, extending from below Hope to Lillooet; on Bridge River, which empties into the Fraser above Lillooet; and on the Thompson, which joins the Fraser at Lytton. Considerable quantities of gold were taken out in 1859-60, from these localities, and soon afterwards discoveries of great value were made on Williams Creek, in the district now known as Cariboo, at a distance of 350 miles from the original diggings; while to the east, discoveries were reported on the Similkameen River, at Rock Creek, and in Kootenay.

Cariboo soon became the centre of attraction; deep diggings of immense value were discovered, and miners from all parts of the Province left diggings where they were making a certain livelihood, on the chance of participating in large strikes of which they had only heard.

Cariboo has, up to the present time, maintained its supremacy, and the yield of four claims alone, on Lightning Creek, have amounted, in 1874, to \$479,980.

In 1865-66, great excitement was created by the discovery of gold, in paying quantities, on the Bend of the Columbia, known as the "Big Bend Excitement." Miners from all parts flocked in considerable numbers to the new locality; steamers were built; and roads, at great expense, opened to encourage traffic; but before twelve months had expired, Big Bend was deserted, and new discoveries on the Findlay Branch of the Peace River, in the district now known as Omineca, claimed the attention of the wandering miner. Again, expensive trails, routes, and roads were opened; and it was publicly declared, and confidently believed, that the veritable El Dorado had at last been discovered. Three years' persevering work has proved that gold, in no inconsiderable quantities, exists in Omineca, but the original promise of the district has not yet been realized. At this juncture, a rumour became rife of new and important discoveries on the extreme northern confines of the Province, at or about the 60th parallel of north latitude. These diggings, known as the Cassiar Mines, are situate on Dease and Thibert Creeks, feeders of Dease Lake, and on the affluents of Dease River, into which the lake empties. They can be reached at moderate cost, from Victoria, by the following route: Ocean steamer to the mouth of the Stickeen River; thence by river steamer or canoe to the head of navigation; 80 miles of land travel follow, and the miner arrives at Dease Lake,—the scene of the latest gold discoveries in British Columbia.

The work and discoveries in this district, in 1874, have been eminently successful and satisfactory. Several new creeks, of equal value with the original discoveries, have been struck; and the individual yield of gold has rarely, in the first year of a new field, been exceeded. Hardly any of the miners, who visited Cassiar and remained there for the season, returned "broken;" while the experience of all former strikes has been, that the many have returned unfortunate, while the few have realized fortunes.

The number of miners employed in British Columbia, as estimated from the Returns embodied in the tabulated form herewith, is Whites, 2,248; Chinese, 620; or a total of 2,868.

With regard to the actual annual yield of gold, as this is the first time that any attempt has been made in the history of the Province to collect mining statistics, numerous obstacles have prevented full information being obtained, foremost among which is the disinclination on the part of the miner, both white and Chinese, to furnish information which might be relied upon, the prevalent idea being that such information can only be sought with the view of imposing some new tax.

The gold exported by Banks, as will be seen from the following Return, amounted in 1874 to \$1,383,464; if, however, one-third more be allowed for gold exported by private hands, a very low estimate considering that none of the Rock Creek or Kootenay gold reaches Victoria, the total yield of gold amounts to \$1,844,618.

GOLD EXPORTS IN 1874, EXCLUSIVE OF EXPORTS IN PRIVATE HANDS.

Bank of British Columbia.....	\$741,984 21
Bank of British North America	435,894 60
F. Garesche	205,585 97
Total.....	\$1,383,464 78

Exports by Banks in 1873.....	\$ 799,113 00
Do. do. 1872.....	1,208,228 00

It is satisfactory to note an increase, in favor of 1874, of \$409,115, mainly traceable, no doubt, to the opening of the Cassiar Mines.

Cariboo.

The most extensive and costly workings in operation, in the Province, are at Cariboo; here there are 5 steam engines, 27 water-wheels, 13 tunnels, 63 shafts, 43 hydraulics, 23 ground sluices. The miners employed, number over 1,000; and the estimated yield of gold amounts to \$700,000.

This district embraces an area of some 7,000 square miles; and occupies an elevation varying from 2,000 to 5,000 feet above the surface of the sea, between the 52° and 54° of north latitude; and is bounded on the south and south-west by the Quesnel Lake and River; on the west, north, and east by the Fraser River, which here bends back suddenly, almost parallel to its original course.

It includes the well-known Williams, Lightning, Grouse, Van Winkle, Otter, Cunningham, Musquito, Stanley, Peterson, Davis, Nelson, Chisholm, Burns, Antler, Keithley, Harvey, and Snow-shoe Creeks; Lowhee and Stouts Gulches; Swift, Cottonwood, and Quesnel Rivers.

It is impossible to estimate correctly the amount of gold that has been taken out of Williams Creek during the last ten years.

But the annexed Return of the yield of a few of the claims at Cariboo in 1861-2 3-4, will serve to illustrate the enormous value of the gold deposits of that District.

Antler Creek in 1861, for some time, yielded \$10,000 a day. \$1,000 was taken out of a sluice box for one day's work, Steel's claim on Williams Creek, gave a maximum yield of 409 ounces, or \$6,524 a day. Over \$100,000 was taken out of this claim of 80 feet by 25.

In 1862, the highest amount taken out by any one company in 24 hours, was \$9,050. This was from the Cunningham claim on Williams Creek, which realized at the rate of nearly \$2,000 a day for the season; on several days as much as fifty two pounds weight of gold was taken out.

The Adam's claim yielded to each of its three partners \$40,000 clear of expenses.

In the Barker claim, eight partners realized \$7,000 each.

These claims were above the cañon. In 1863 three claims below the cañon yielded \$300,000.

In 1863, Dillon's claim yielded in one day the extraordinary sum of 102 pounds of gold—\$20,000.

In 1864, many of the above claims continued to pay as well as before. On Conklin's gulch, a discovery of this year, the Erricson claim yielded from 400 to 500 ounces a day.

The Butcher claim on Lightning 350 ounces a day; the Aurora, from 300 to 600 ounces; the Caledonia, 300 ounces a day; and the Wake-up Jake, 150 ounces.

These few returns are merely given to illustrate the wealth of Cariboo, and in no way describe the amount of gold taken out over the whole district, but only from a few claims selected for illustration.

Van Winkle and Lightning are now attracting considerable attention. The claims below mentioned have turned out in 1874 the amount of gold set opposite each claim respectively:—

Vancouver	\$150,000
Victoria	167,441
Van Winkle	141,000
Vulcan	21,539

These rich deposits have been invariably found on what is known as the bed-rock, at a depth of 60 to 80 feet from the surface, and in the channels or beds of ancient water-courses.

It is necessary to give some slight description of two works of some importance which have been undertaken at Cariboo, and on which a good deal of the success of the mining on Williams Creek depends. These are the Bed-rock Drain, and the Bed-rock Flume.

THE BED ROCK DRAIN.

The drain is intended to pass as near the bed-rock as possible, in deep claims, and thus to enable miners to drain the water from their claims, without having recourse to expensive pumping machinery.

The drain is therefore a tunnel, about 60 feet from the surface, strongly timbered, 4 feet wide and 5½ feet high in the clear, into which the water from each claim it passes through runs. The magnitude of such a work can be easily estimated from its length, which is about 1½ miles: commencing at the Foster-Campbell claim, at the lower end of the cañon on Williams Creek, about 1,000 feet above Barkerville, and terminating in Valley Creek, about 1,000 feet below Marysville, where it runs into the meadows. This tunnel drains fully half a mile of ground, the claims through which it passes paying an assessment. It is to be regretted, however, that the original cost of the work—some \$100,000—has not yet been realized by the enterprising projectors.

THE BED ROCK FLUME.

The Flume is a work of still greater magnitude and cost. This is situated higher up the creek, and was built with a view of receiving the tailings and collecting the escaped gold from the claims through which it passed, as well as for working by hydraulics a tract of ground acquired by the company on the upper end of Williams Creek.

The Flume commences 1,000 feet above the drain, at the upper end of the cañon, and is about one mile in length; the present head being about half a mile above Richfield.

The Flume is also intended to run as near the bed-rock as possible, but is built in the open and not in a tunnel. It is 36 inches square, built of 6 inch plank at the sides, and 2 inch plank at the bottom, on strong sills, with side stanchions; on the bottom are laid pieces of wood, 6 inches thick, on end, the grain of the wood thus resisting the wear and tear better than flat wood, which would soon be torn to pieces. The gold, uncollected by the flumes of the various claims through which the Bed-rock Flume passes, finds its way into the flume, and is caught in the crevices of the end wood, as well as in two sets of the customary riffles. The company wash up twice a year, but the results have not as yet been large enough to remunerate the original outlay, which may be estimated at \$250,000; the great expense having been incurred in cutting through bed-rock, it having for its whole length passed through an average of rock 5 feet deep and 8 feet wide, the flume being for a considerable part of its length double. It is carried along at an average depth of 20 feet from the surface of the ground.

The results to the company from working their own ground into the flume have been more satisfactory than the results of catching the escaped gold from other claims; and as they have a considerable amount of ground yet to work, the undertaking may yet prove a success.

THE MEADOWS.

At the end of the cañon, on Williams Creek, the hill sides recede suddenly, leaving an open space which is commonly called "the meadows." In the early days of Cariboo, several efforts were made to prospect this locality, it being generally supposed that a perfect mine of wealth must be hidden in the lower ancient channels under the superincumbent meadows; but all these efforts failed, on account of the absence of sufficient means for clearing the mine of water. In 1870, a company was formed in San Francisco to work the "meadows," and a grant of five miles in length was conceded, in consideration of the guarantee of the company to put up machinery and pumps sufficiently powerful to clear the shafts of water, and permit work to be carried on.

This company, known as the Lane & Kurtz Company, proceeded energetically to work, and commenced with a large shaft, 8 by 4 feet wide, and 120 feet in depth, divided, and strongly timbered, with two 10 inch pumps. It was soon found, however, that the volume of water to be overcome was greater than these pumps could clear. Two 12 inch wooden pumps and, subsequently, two 13 inch were added; the combined effort of steam power and water wheels forcing up 1,600 gallons of water a minute,—a volume probably larger than that of Williams Creek. This power served to clear the mine of water (which has also been effected by a new, submerged, steam pump) and enabled the company to drift from the bottom of their tunnel, at immense cost, for a distance of 180 feet, with an 8 feet square passage across the meadows. It was, however, soon found that the drift was not deep enough; and when they had passed through the rock, and come upon the gravel, they had not reached the channel in which the gold is presumed to be. It now remains for them, either to sink another shaft from the end of their present drift, or to tunnel on till they reach the rim rock, i.e., where the rock rises in its upward course from the channel on the opposite side, and then commence a new shaft from the surface, necessarily a costly undertaking.

It is very much to be hoped that success will finally crown the efforts of these most energetic searchers after wealth, they having already expended from \$150,000 to \$175,000 in the undertaking.

Omineca.

In a N. E. direction from Cariboo, and just N. of the 55th parallel of N. latitude, are situated the mines of Omineca, so called from the river of that name, on which they are situated, being a tributary of the Findlay branch of the Peace River, which empties into the Mackenzie River, and thence reaches the Frozen Ocean.

It will be observed, that these mines are situated on the north-eastern watershed of the great gold range, which traverses the Province in a direction from north-west to south-east, between the Coast Range and the Rocky Mountains, while Cariboo is on the western slope, all the water of that district draining into the Fraser River, which falls into the Pacific.

Although mining is still carried on to a considerable extent, the great promise held out by the Omineca Mines has not been fulfilled.

There are, at present, about sixty claims being worked by eighty men; there are two tunnels, forty-five ground sluices, and three hydraulics. It is estimated that the gold taken out in 1874 amounted to \$80,000.

Mining is chiefly confined to two creeks—Manson and Germansen.

There are two methods of reaching this district, one by taking the main trunk wagon road to Quesnelmouth, thence by trail to Fort Fraser on the Nechaco River, and thence by water and land carriage respectively, on Stewart, Tremble, and Tatla Lakes and the portages between them; or, by taking steamer from Victoria to the mouth of the Skeena River, and thence by canoe and land travel to Fort Stager on the Babine River, thence by the Frying-pan Pass to Tatla Landing on Tatla Lake, to which place the Omineca Mines are adjacent. Both routes are tedious and expensive, and it will be long before supplies are cheap at Omineca.

Cassiar.

The name Cassiar is given to a large tract of country in a north-west direction from Omineca, just south of the 60th parallel of north latitude, and lying on both sides of the Liard River (a branch of the Mackenzie River), and on the north-eastern watershed of the gold range before alluded to.

Gold was first discovered at a point near the confluence of this river with the Mackenzie River, but the mines now worked are on the head waters of the river on Dease Lake and Creek, which were first prospected by miners on their way to the original discoveries and proved sufficiently rich to deter them from travelling further. A branch of the Liard River, called the Deloire River (which here runs nearly due east) heading from the north-west, enters some 325 miles from Dease Lake, and excellent prospects have been discovered therein during 1874. In addition creeks called McDames', running into Dease River, and Quartz, running into the Liard River, both from the north, the one before and the other after the confluence of the Deloire, and McCullough's Bar, on the Liard River near the old Hudson Bay Company's Fort, have been discovered.

Mr. Gold Commissioner Sullivan, writing of these creeks, says:—

“MOUTH OF DEASE CREEK.

“13th June, 1874.

“SIR,—I have the honor to report my arrival here on the 10th of June, inst. I am pleased to say that the district is in a peaceful state. The miners here seem to be a law-abiding class, similar in fact to the Cariboo miners, a great many of whom partly compose the mining population of this section.

"Work on Dease and other creeks is retarded very much in consequence of the high water at present prevailing in the creeks of this district, and miners are busy taking out timbers for wing-dam purposes, so as to be ready when the water subsides to work their claims.

"From what I can learn, the pay on Dease Creek so far found averages, say, \$20 per day to the hand, and this creek has been partially prospected for a distance of nine miles, with good results. That Dease Creek is very rich, is the opinion of everyone here at present, The Neil-McArthur Co. took out, for five days' work, \$2,700. Two men in another claim, working with a rocker, took out 50 oz. for one day's work; and in another claim, out of one pan of dirt, \$49 was subtracted. The largest piece of gold so far found on Dease Creek weighed about 3 oz. 2 dwts. The miners who are able to work their ground have all obtained gold in paying quantities, and some have realized handsome amounts.

"Miners have not generally as favorable an opinion of Thibert Creek as of Dease, and seem to think it is "spotted," i. e. the lead of gold not continuous, and broken.

"There are several parties prospecting in outlying creeks, and miners seem sanguine that success will crown their efforts, as the country here is regarded by them, from its physical appearance and from the abundance of quartz and slate to be seen in the creeks and hills of this country, as a country rich in auriferous deposits.

"The white population, I imagine, must be about sixteen hundred, that is, now above the head of steamboat navigation in the Cassiar District.

"The distance from the present head of steamboat navigation to Dease Creek, I consider to be about 110 miles of trail and 17 miles by water (Dease Lake). There is good feed for horses and cattle in that part of the country through which the trail passes, also a good hard bottom and easy grade for making and completing the present trail which Mr. Moore is constructing from Telegraph Creek (16 miles above the present head of steamboat navigation) to the head of Dease Lake. I am of opinion that the trail must be continued to the steamboat landing, as goods must now be forwarded by canoes from that point to Telegraph Creek, and from thence transported by pack-animals to Dease Lake, so as to avoid the re-shipment to Telegraph Creek, now incumbent owing to the necessity of a trail.

"The Stickeen River, from the Hudson Bay Company's post, called the "Boundary Post," up to the present terminus for steamboats, is a very swift and dangerous current, and the class of steamboat at present on the river is not, in my opinion, adapted for such dangerous navigation. On my trip up by the "Hope," we were twice washed against the rocks and had the guards crushed at a place called "Triangle Rapids," steam pressure 138 lbs., and even with that force we were compelled to lay over for the night and land the principal part of the cargo. It was with great difficulty, even with a light cargo, that the vessel got through next day.

"Quite a large mining town is being rapidly erected here (Mouth of Dease Creek.)

"I enclose a list of prices current on Dease Creek.

" Wages : Laborers, per day.....	\$10 00
Mechanics, ,,	16 00
Flour, per lb.....	80
Beans, ,,	90
Bacon, ,,	1 00
Tea, ,,	2 00
Sugar, ,,	1 00
Tobacco ,,	2 00
Yeast Powder, per box	1 00
Butter, per lb.	2 00
Cheese, ,,	1 00
Gum Boots, per pair	20 00
Candles, per lb.	1 50
Soap, ,,	1 00
Beef, ,,	50 and 60
Fish, ,,	33½
Pickles, in bulk.....	3 00
Nails, per lb.	1 00
Salt, ,,	1 00
Brandy, per bottle	6 00 "

“ LAKE TOWN, CASSIAR, B. C.,
“ 21st July, 1874.

“ SIR,—I have the honor to make the following report regarding the state of my District:—

“ The present estimate of the *mining* population of this section is generally thought to be about (1,000) one thousand men; and to supply the wants of this number in provisions, tools, nails, and other necessaries, as well as luxuries, such as liquors, there are only one hundred and ninety pack-animals to convey such goods from the head of navigation on the Stickeen River to the seat of the mining operations, a distance of about ninety miles.

“ The exorbitant rate of 45 cents per lb. is at present the charge for packing in goods from Stickeen River to this place. The cost from Fort Wrangel to Glenora (the head of steamboat navigation), is \$80 per ton, and from Glenora to mouth of Telegraph Creek, where packing commences, \$30 per ton freighting. There is also a charge of \$20 per ton from head of Dease Lake to Dease Creek. Provisions are, consequently, very high, and therefore affect the future of the country by paralyzing the efforts that would otherwise be made to develop the auriferous sections of this District, while there are plenty of men here who lack employment.

“ However, notwithstanding the high price of provisions, several men have gone out to prospect outlying creeks, and about forty men have gone down the Deloire River on a prospecting tour, taking with them two or three months' provisions. They were detached in seven parties, each party having a boat.

“ A colored man named Henry McBean, got a very fair prospect on a creek which empties into the Deloire about 100 miles north of this; working with an Indian, he informed me that he got nearly \$60 in dust, the result of two days' work. He visited this creek for provisions and returned to the creek on which he said he discovered gold, he did not record any mining claims, giving as his reason for not doing so, the necessity of first finding out the most favorable place to locate claims on.

“ Mining on Dease Creek is carried on vigorously; and I am pleased to report that the mines, so far, on which dams have been erected, are yielding very handsome results: The “Three to One” Co. returns from three to four ounces per day to each man; the “Caledonia” Co. from three to eight oz.; the “Lyon” Co., two and a half to eight oz.; the “Forest Rose” Co., three to four oz.; the “Wigg” Co., four to five oz.; the “Canadian” Co., four to five oz. The “Williscroft,” “McArthur,” “Baronovitch,” “McKinnon,” “Cargotich,” and “Miller” Companies average per day to each man employed about five oz. The “Discovery” Co., for the last week's work, washed up 147 oz.; the “Three to One” Co., 127 oz., and the “McKinnon” Co., 200 oz. There are several other claims taking out fair pay; and I may safely say that two-thirds of the companies on the creek have not yet commenced washing, their wing-dams not having been erected.

“ The claims on Thibert's Creek for a mile in length, near its mouth, are paying very well; similar, somewhat, in richness to the claims on Dease Creek; but the upper portion of Thibert's Creek is very spotted, and the lead of gold uncertain.

“ Quite a number of men came up to this country and never made an effort to work, but camped at the mouth of Dease Creek, consumed some provisions, and then went down country, condemning (I learn) the Cassiar mines. There are yet too many men here for the quantity of provisions that can be supplied.

“ I should have mentioned that some hill claims have been taken up on Dease Creek, which prospect very favorably.”

“ LAKE TOWN, CASSIAR, B. C.,
“ 27th August, 1874.

“ SIR,—Relative to the Cassiar District I have the honor to report that the news from the miners who went down the Deloire River on a prospecting expedition is very cheering. I learn that a new creek has been discovered emptying into that river, now known as McDames' Creek. It is situated about one hundred and fifty miles from this, and the journey thereto by water can be made in about four days, the return trip taking five days.

“ Mr. W. H. Smith, a member of the Discovery Company, on said creek, arrived here a few days ago and brought with him nearly six hundred dollars in gold dust, taken out

of his claim, the proceeds of a few days' work; the average yield to the pan out of said claim, when first discovered, was from one to six dollars per pan, and a few companies that have commenced working are rewarded with fair results, but as timber is very scarce in that section mining operations are carried on in a very primitive mode and confined to bars and spurs as the miners have not had time to erect wing-dams for the effectual working of the deep ground or bed of the stream.

"I do not anticipate a large yield of gold from McDames' Creek this year as the cold season is fast approaching and it will be a difficult creek to work, owing to the scarcity of timber and the size of the creek, reported to be one-third larger than Dease Creek. There are about two hundred and fifty miners on the creek, and I have dispatched a special constable there to take charge of the records, etc. I will visit the creek personally at my earliest opportunity and report fully thereon.

"The mines on Dease Creek continue to pay well. The Discovery Co. washed up for the last two weeks' work 362 oz. and 236 oz.; the Wigg Co., four men working, 156 oz. for last week's work; the Perseverance, Giant, Williscroft, Baronovitch, Diamond, Water-Lilly, and McKinnon Companies are yielding largely. The other claims paying from \$10 to \$30 per day to the hand. There are, of course, as in all other mining districts a great many claims, where the lead of gold has not been found, and consequently many are disappointed. The claims on Thibert Creek are paying well, say from one ounce to three ounces per day to the hand.

"I may safely say that no mining district in this Province commenced its era as a proved auriferous section with such favorable auspices as the Cassiar District presents this year.

"Packing rates from Telegraph Creek to Dease Lake have moderated and the charge now per pound is twenty cents, consequently there is a slight reduction in the prices of goods, etc., here."

"LAKE TOWN, CASSIAR, B. C.,

"14th September, 1874.

"SIR,—I have the honor to report that a party of miners who went down last spring on the Dease and Liard Rivers on a prospecting tour have returned here, and inform me that they discovered some rich paying bars on the Liard or Deloire River, about three hundred and twenty-five miles from this in a North-easterly direction. One of the bars, named McCullough's Bar, pays per day to the rocker from one ounce to three ounces. The gold taken from the bars (a sample of which I have seen) is as fine as flour and collected by means of quicksilver. They also inform me that they obtained very good prospects from a creek emptying into the Liard River, the prospect found there being coarse gold. The creek is named Quartz Creek, and is situated about two hundred and sixty-five miles North-east of this, and about sixty miles South-west of McCullough's Bar.

"I have no doubt but that these gold fields will be visited next year by quite a large number of miners. McCullough's Bar, can be reached from this, travelling in boats laden with provisions in twelve days, the return trip with empty boats taking some twenty-two days. The river navigation is on the whole good, with the exception of some four miles of portage made near the mouth of Muddy River."

"LAKE TOWN, CASSIAR, B. C.,

"14th October, 1874.

"SIR,—I have the honor to report that I visited McDame's Creek on the 19th of September last, for the purpose of settling some mining disputes and other matters, as well also to report personally with regard to that portion of this District.

"The journey from Dease Creek to the mouth of McDame's Creek I made in two days and a half in a small boat, with a crew of only Mr. White, of the Hudson Bay Co.'s service, and an Indian.

"The navigation to McDame's Creek is very good for small boats, with the exception of one or two riffles and jams of drift wood. The current is regular, and from the mouth of Kletch-u-lene River the stream widens out into quite a respectable course, say from thirty to sixty yards in width. The distance from Lake Town to McDame's Creek I estimate to be about one hundred miles.

"Mining on McDame's Creek commences at a point about sixteen miles from its mouth, and the results obtained so far by the companies that have been diligent in erecting wing-dams are very satisfactory. The Discovery Co., for the fortnight previous to my arrival, washed up 236 oz., and other five companies are doing nearly equally well. There are fifty men working there. A great drawback, however, to mining operations on that creek is the large body of water it carries, and the attendant difficulties in wing-damming it off. The working season there I think will be confined to the period between the 1st July and the 15th October, for working creek claims. Miners, generally, think very highly of the creek; and I imagine that probably about one hundred and fifty miners will work there next season.

"I met several men returning from the Liard and Deloire Rivers, and one party from Rapid River.

"The men who visited Deloire River seem to think highly of that country as a mining district, having discovered gold along the banks and on the tributaries of it. They informed me that they proceeded up the river some two hundred miles, and came within sight of François Lake, a large lake, which they describe as being one hundred miles long.

"The party who returned from Rapid River, report that they could not obtain gold on that river worthy of notice. They discovered a well-defined seam of coal some distance up it.

"Quite a number of miners have proceeded to Quartz Creek (alluded to in my letter of the 14th September) and Liard River, intending to winter there, and probably trap during the inclement weather.

"Dease River, for a distance of about twenty-five miles, flows in a North-east direction; it then takes a course very little North of East to McDame's Creek. I am informed that at its junction with the Deloire River (known then as the Liard River), it flows South of East to McCullough's Bar.

"I think there will be a larger mining population in this District during the ensuing season than there was this year, as provisions (it is to be presumed) will be cheaper, there being no serious obstacles to packing. That branch of business will, I am sure, attract the attention of many of the packers of British Columbia, heretofore cautious in venturing against imaginary reported difficulties.

"It is impossible to arrive at a proper estimate of the amount of gold taken out of the Cassiar mines this year, as miners are generally averse to disclose the yields of their respective claims. I think the general computation to be about \$1,000,000 in value."

"LAKE TOWN, CASSIAR,
"18th January, 1875.

"There are about forty-five men wintering here, about sixty on Deloire and Liard Rivers, and some twenty-five on the Stickeen, at Glenora and Telegraph Creek.

"There are only two mining companies working, namely:—The Larkin Co., and the Nip & Tuck Co., both hill claims, on Dease Creek, which average per day about fifteen dollars to each man employed. Others of the inhabitants here are sawing lumber for boat building purposes during the ensuing Spring, when it is expected a rush to the Deloire and Liard country will take place. Up to the present date I have received no news from that section.

"We have had no mail communication since the 15th November, and not a newspaper since the 17th October. The want is sadly felt by the inhabitants here.

"The weather is, and has been, extremely cold, since the 10th November, as the register of the Thermometer (subjoined) will testify. As the Thermometer registers to only 32° below zero, I do not know what the extreme degree of cold experienced here was. Quicksilver, placed outside, was congealed for several days in succession. The fall of snow, so far, is inconsiderable, comparing it with the depth of snow usual at this season in Cariboo—about two feet only."

REGISTER OF THERMOMETER AT CASSIAR.

November 8th.....	10° above Zero.	December 9th.....	29° below Zero.
" 9th.....	9 " "	" 10th.....	25 " "
" 10th.....	2 below "	" 11th.....	3 above "
" 11th.....	1 " "	" 12th.....	12 below "
" 12th.....	3 " "	" 13th.....	10 " "
" 13th.....	8 " "	" 14th.....	3 " "
" 14th.....	9 " "	" 15th.....	10 " "
" 15th.....	15 " "	" 16th.....	12 " "
" 16th.....	17 " "	" 17th.....	7 " "
" 17th.....	15 " "	" 18th.....	12 above "
" 18th.....	3 " "	" 19th.....	15 " "
" 19th.....	7 above "	" 20th.....	15 " "
" 20th.....	15 " "	" 21st.....	10 " "
" 21st.....	1 below "	" 22nd.....	5 " "
" 22nd.....	5 " "	" 23rd.....	8 below "
" 23rd.....	10 " "	" 24th.....	23 " "
" 24th.....	10 " "	" 25th.....	20 " "
" 25th.....	19 " "	" 26th.....	6 " "
" 26th.....	22 " "	" 27th.....	8 above "
" 27th.....	25 " "	" 28th.....	8 " "
" 28th.....	20 " "	" 29th.....	5 " "
" 29th.....	12 " "	" 30th.....	10 " "
" 30th.....	0 at "	" 31st.....	31 below "
December 1st.....	3 above "	January 1st to 8th ..	Mercury congealed.
" 2nd.....	3 " "	" 9th.....	22 below Zero.
" 3rd.....	10 " "	" 10th.....	22 " "
" 4th.....	11 " "	" 11th to 15th..	Mercury congealed.
" 5th.....	2 " "	" 16th.....	31 below Zero.
" 6th.....	0 at "	" 17th.....	32 " "
" 7th.....	12 above "	" 18th.....	32 " "
" 8th.....	6 below "		

It has been roughly estimated that 2,000 men visited these mines in 1874.

The route is to take steamer from Victoria to Wrangel, at the mouth of the Stickeen River, and thence by river steamer to Buck's Bar, the head of navigation on that river. From Buck's Bar, about 80 miles of land travel brings you to Dease Lake, on which the mines are situated. It will be seen at once that these mines are very accessible, even more so than Cariboo, and that when sufficient pack animals are placed on the route to allow of open competition, supplies can be laid down at very moderate rates.

Kootenay.

While the diggings at Cariboo, Omineca, and Cassiar occupy chiefly the attention of miners in this Province, and are undoubtedly those of most importance, it is necessary not to overlook the gold deposits lying along the Southern boundary of British Columbia, at Similkameen, Rock Creek, and Kootenay.

On the whole of the Similkameen River, gold in paying quantities has been discovered; and in 1861, before Cariboo was developed, a great deal of profitable mining took place, but the rumors of the richness of the Cariboo fields drew miners away who were steadily earning \$5 to \$7 a day; and this District is now practically deserted, and very few are aware that gold in paying quantities exists on this river.

Proceeding along the Forty-ninth Parallel, Eastward, the next mining camp is that of Rock Creek, where considerable amounts of gold have been and still are taken out; but I have to regret the absence of any returns of yield of gold or mining operations in progress for the present year.

On the South-eastern confines of the Province lies the District of Kootenay, comprising an area of about seven thousand square miles, and embracing the country watered by the river of that name, and the Big Bend of the Columbia River. This district is chiefly occupied by miners coming from the neighboring Territories of Washington, Idaho, and Montana, and has been always a favorite

field for American enterprise. Steady wages have always been obtained on the creeks there, the most important of which are Perry Creek and Wild Horse Creek.

It will be seen from the tabulated form, that the number of miners employed is one hundred and thirty two; eighty-two claims were recorded, and thirty-three regularly worked. The Agent there estimates the yield of gold for the year at \$50,000.

The Government, in 1874, authorized an expenditure to prospect some outlying sections, the results of which are thus referred to by the Government Agent there, Mr. C. Booth:—

“The prospecting operations carried on in the District this season have been a success. Kelly & Co. discovered small diggings on Palmer's Bar Creek, near the Monille River. The discovery is in itself of not much consequence, but the attention of miners is drawn thereby to that portion of the District, and prospecting is going on there this Winter. Price & Co. discovered a creek having its origin in the Selkirk Mountain Range, and emptying into the Columbia River at a distance of about two hundred miles from Horse Creek, where gold was found in any part for a distance of twenty miles from the mouth. The prospecting demonstrates that the creek is good for from *three to five* dollars per day per man. The discoverers report favorably of the country, having found gold in every stream they prospected. It is to be regretted that none of Price's prospecting party were experts in quartz, as they report the country literally full of large quartz ledges. It is perhaps worthy of note, that none of those men located any mining ground on Quartz Creek: the reason they assign is, that they hoped to find some rich spot, and that there is plenty of the kind of diggings above described. There is a company of seven men under the management of W. H. Morrow, Esq., J. P., organized for the purpose of prospecting deep ground on Wild Horse Creek, at a distance of seven miles from this office. The Government appropriation to this enterprise is \$551, which is swelled by private subscription to \$1,000 or thereabouts.”

Should any strike be made in Kootenay, even of moderate richness, doubtless a large population would soon flock thither, there being no difficulties in the travel, either on the British Columbia or American side, and the cost of living being moderate.

The total Mining Revenue of the Province for the year 1874, as far as it can be at present ascertained, amounts to \$19,206 63, divided into the following heads:—

Mining Receipts General	\$ 7,974 13
Free Miners' Certificates	11,232 50
	\$19,206 63

As contrasted with the Mining Revenue of last year, which gave a total of \$11,652, an increase of \$7,573, or nearly 68 per cent. over last year is exhibited.

This increase may be mainly credited to the opening of the mines at Cassiar. The amount realized from Miners' Certificates bears out the estimate formed in the early part of the Report, as to the number of actual miners in the Province; the sum collected from Miners' Certificates, viz., \$11,232 50, divided by \$5, the amount of a certificate, giving a total of 2,246; the number as made up from the official returns being given at 2,179.

Before leaving the subject of the gold deposits of the Province, it is necessary to remark that in 1864, gold was discovered on the head waters of the Sooke River, which empties into the Straits of San Juan de Fuca, about twelve miles below Victoria. The district attracted considerable attention at the time, and from one hundred and fifty to two hundred thousand dollars worth of gold was taken out, chiefly by removing the surface soil and picking out the crevices of the rock on which the gold had been deposited. These diggings have, however, gradually been deserted, and are only now visited from time to time by stray parties of miners, chiefly Chinese.

Fair prospects of gold have been found from time to time on the banks of streams on the West Coast of Vancouver Island, to the north of the Sooke River, but not in sufficient quantities to pay for working.

Veins of quartz, containing gold, have been discovered in Cariboo and in the Big Bend mines, many of which have promised well, and considerable expense has been incurred in endeavoring to develop them, but hitherto without success. The era of quartz mining has not yet dawned on the Province.

A discovery of gold in quartz was made in 1852 on Queen Charlotte Island, a short account of which may be of interest.

A trading party, of the Hudson Bay Company, while in Englefield Harbor, on the West Coast of the Island discovered a seam of gold-bearing quartz of surpassing richness, in fact it may be said to have been a streak of fine gold, about 8 inches, imbedded in slate-rock. The party proceeded to blast out the vein, and at each blast the fragments of rock were hotly contested for by the Indians of the Island as well as the white party; the Indians, however, finally drove the Hudson Bay party away. Another Hudson Bay party subsequently returned to prospect the Island, and several expeditions were fitted out from Columbia River and San Francisco, which visited Queen Charlotte to search for gold, without any tangible results. This seam appears to have been an isolated one, and nothing of the kind has since been discovered, though many endeavors have been made to find further veins of auriferous quartz.

SILVER.

In almost every mining camp in British Columbia, from the earliest discoveries of gold in 1858 to the present time, pieces of virgin silver have been found among the gold found in washing the pay dirt, what led to the conclusion that valuable silver leads would eventually be found.

Silver ore was first discovered on the banks of the Fraser, near Hope, and a lead was opened, by tunnel, at a considerable outlay, but nothing of any importance resulted.

The next discovery of silver ore was at Cherry Creek, in the Okanagan District, where ore of almost fabulous richness was found. At present, however, every effort to discover a well-defined workable lead has been fruitless, the very heavy character of the timber and superincumbent brushwood and soil forming an almost insuperable obstacle to successful prospecting.

True veins of silver ore were, however, finally discovered about 1871 in the Cascade Mountain Range at Fort Hope, about 80 miles from the mouth of Fraser River, and six miles south of the town.

The first lead, called the Eureka mine, crops out about 5,000 feet above the river level, is well defined, four to seven feet in thickness and has been traced 3,000 feet. A tunnel has been driven in this lead for 190 feet. The ore is described as argentiferous gray copper, and has yielded under assay from \$20 to \$1,050 worth of silver to the ton.

During the time the above lead was being worked, another about three hundred feet distant was discovered. This lead is of a far more valuable character, and it is called the Van Bremer Mine.

The ore is described as chloride of silver, and has yielded under assay from \$25 to \$2,403 of silver per ton of rock. A quantity of the outcrop sold at San Francisco at \$420 per ton. The lead is distinctly traceable for half a mile.

Although a company has been formed for working these lodes, no works of any importance have been undertaken. It is, however, rumored that when the company have matured their plans, working of the lodes will be vigorously prosecuted.

COAL.

Leaving the gold and silver mines, the next subject that merits attention is the coal fields of the Province.

The coast of Vancouver Island, commencing from just north of Chemainus, on the east, round to Koskeemo Sound (with a small exception north of Comox, noted by Mr. Richardson, where the chrystalline rocks again rise to the surface), is bounded by a belt of carboniferous strata, composed of sandstones, shales, and coarse gravel-stone conglomerates, interspersed with valuable coal seams, which would appear from the fossils they contain to belong to the cretaceous era.

Merely noticing that coal has been discovered at Chemainus and on DeCourcy Islands, the important deposits in and near Nanaimo claim paramount attention.

Coal was first discovered by the Indians here in about 1854, and their discovery communicated to the Hudson Bay Company, who proceeded to work it till the year 1861, when they sold out to an English company, by whom it is now held.

As the present active operations in coal are confined to Nanaimo District, it would be worth while to reproduce in this paper the Report of Mr. James Richardson on this District, contained in the Report of Progress of the Geological Survey of Canada, under A. R. C. Selwyn, Esq., for 1871-72, which is as follows:—

“On the Strait of Georgia, at the entrance to Nanoose Harbour, a narrow strip of the brownish-gray sandstone, which belongs to the coal-measures, comes upon the coast at Blunden Point, and strikes along it in a south-easterly direction for six miles, resting on the crystalline series, and dipping north-easterly toward the strait at angles varying from two to fifteen degrees. Further on, these sink beneath the surface of the water, and, concealed by it, seem to turn the point bounding the north side of Departure Bay. In conformity with this they occupy a small island about 200 yards from the shore, just at the entrance of the bay, where they present the character of a conglomerate, the pebbles of which are siliceous, varying from a quarter of an inch to three inches in diameter, while the matrix holds a considerable quantity of carbonate of lime. These beds are interstratified with light drab sandstones, the whole having a thickness of forty feet; dip S. 8° E. < 17°.

“Bearing S. 88° W., three miles from the bight of Departure Bay, there being no exposures in the interval, occurs the Dunsmuir Coal Mine. In a part of the coal-bed, which had been covered with a few feet of clay, a trench six feet wide was being cut at the time of my visit, and had already been extended to fifty yards in a bearing N. 63° E. The thickness in this part was sometimes nine feet and sometimes, perhaps from denudation, reduced to seven feet. At the end of the distance the seam had become covered with about a foot of decomposing argillaceous shale, and was of its full measure, while all the way it rested upon a bed of light drab sandstone, which was quite horizontal.

“Proceeding from the commencement of the trench, in nearly the same bearing as before (S. 88° W.), the surface of the ground gradually rises above the base of the coal about twenty feet, and exhibits a mass of light gray conglomerate-sandstones, with pebbles derived from the crystalline rocks, varying in size up to an inch in diameter. The ground again falls about twenty feet, and in a distance of a little more than a quarter of a mile from the first coal exposure, we meet with a second. This, three or four years ago, was worked to the extent of several hundred tons; and I was informed by Mr. Dunsmuir that the seam is from four to seven feet thick, and like the other, it is so nearly horizontal that, being on the same level, it might readily be supposed to be identical with it; but, according to Mr. Dunsmuir, the one gives a red, and the other a white ash; moreover, the second one being nearer the run of the coal-measures, and upon strict examination appearing to slope towards it at the rate of about one degree, it may, from some slight increase of inclination in the interval between them, sink beneath it.”

The Departure Bay Mines are now in full operation. The following Returns from the Managers illustrate the practical value of the seams:—

DEPARTURE BAY MINES, 1874.

Output of Coal for 12 months ending 31st Dec., 1874.	No. of tons on hand, 1st January, 1874.	No. of tons sold for home consumption.	No. of tons sold for exportation.	No. of tons unsold.
29,818 tons, 12 cwts.	2,429 tons, 8 cwts.	6,144 tons, 15 cwts.	23,719 tons.	2,384 tons, 5 cwts.
No. of hands employed.			Wages per day.	
Whites 73	Chinese 60	Indians 12	Whites \$2 to \$4	Chinese \$1 25 Indians \$1 25

(Signed) R. DUNSMUIR.

To continue Mr. Richardson's Report—

"Nanaimo Harbour is situated about three miles S. 25° E. from Departure Bay. A sound leads from the one to the other, on the south sides of which are Newcastle and Protection Islands; the latter so named from the shelter it affords to Nanaimo. The northern extremity of Newcastle Island bears a little east of south from the small island which has been mentioned at the entrance of Departure Bay, the distance between the two being about three-quarters of a mile. It presents bold cliffs to the water, which rise to heights of from 100 to 150 feet in some places, and are perpendicular, or even overhanging. These are composed of a coarse conglomerate rock, in which rounded masses of various sizes, up to a foot in diameter, consist of diorite, quartzite, and other hard materials, derived from the crystalline series. The breadth of the conglomerate was found to be about a quarter of a mile, and in the cliffs it nowhere shewed distinct stratification; but on the two sides of the island finer beds which succeed have a slope of nine degrees, conformable, in the direction of the dip, with those at the entrance of Departure Bay. The following ascending section, from the crystalline rocks on which it rests, may be constructed of the coal series in the vicinity:—

	Feet.
Brownish-gray sandstone, in beds of from six to eighteen inches, occasionally merging into impure limestone from the presence of calcareous remains of <i>Bryozoa</i> and <i>Aviculina</i> , such as in the band already described.....	30
Concealed under the water	35
Gray sandstones, with beds of fine conglomerate.....	40
Concealed under the water	35
Gray conglomerate, with siliceous pebbles, varying in size from a quarter of an inch to an inch, in a matrix of fine sand, and much carbonate of lime.....	77
Concealed under the water, between Small Island and Newcastle Island.....	917
Brownish-gray coarse conglomerate, with rounded masses varying in size from a quarter of an inch to a foot in diameter, consisting of diorite, quartzite and other hard materials	211
Gray, fine-grained, thinly-laminated sandstone, separated into beds from half an inch to four inches thick by carbonaceous partings, showing remains of plants as well as of <i>Inoceramus</i>	37
Black argillaceous shale.....	4
Coal, clean and hard, with a cleavage oblique to the bedding, thin leaves of carbonate of lime filling the cleavage joints in some places; thickness from three and a half feet to.....	4
Concealed	24
Brownish-gray sandstone.....	5
Brownish-gray sandstone, holding sub-globular masses harder than the rest of the rock, from the presence of carbonate of lime, of from two to four feet in diameter, which stand out in relief on surfaces exposed to the beating of the sea waves.....	4
Brownish-gray or light drab sandstones, in beds of from six to eighteen inches, interstratified with bands of conglomerate with pebbles up to two inches in diameter	21
Brownish-gray sandstones with sub-globular masses, as before.....	3
Concealed	10
Coal, clean and hard, not seen, from the presence of water in the slope which has been opened on it, but said to be from three feet thick to.....	4
Concealed	17

	Feet.
Gray, thinnish-bedded sandstones, with fragmentary remains of the stems and leaves of plants.....	3
Gray, fine-grained sandstone, holding iron pyrites disseminated obscurely in small grains in the rock, which crumbles away on weathering	6
Gray, fine-grained and finely-laminated sandstones, separated into beds from an inch to a foot in thickness by the presence of thin carbonaceous partings..	4
Gray, fine-grained sandstone in one bed	5
Gray, fine-grained sandstone in one bed.....	4
Gray, fine-grained and finely-laminated sandstones, separated into beds from an inch to a foot thick by thin carbonaceous partings, and yielding excellent flag-stones; on some of the surfaces remains of plants are displayed...	12
Gray, fine-grained sandstone, which constitutes a good building stone in some places, and in others, from the decomposition of finely-disseminated iron pyrites, crumbles on weathering.....	16
Gray, fine-grained sandstone, in one bed yielding excellent building material..	10
	1538

“Both the coal-seams mentioned in the Newcastle section have been tested by openings. A slope was sunk in the upper one, upwards of a dozen years ago, to the extent, I was informed, of about one hundred and twenty yards, and coal shipped from it to Victoria. It seems to have been out of working for a considerable time; and the Vancouver Island Company are at present erecting a small steam-engine at the mouth of the slope for the purpose of bringing it into operation again; but when I was there, the slope was full of water. The lower seam is in actual working, a small steam-engine standing at the mouth of the slope to haul up the coal. Several schooners and steamers were supplied with coal from it while I was on the neighbouring coast, and several hundred tons were piled on the wharf at the time of my visit to the mine.

“The main working of the Vancouver Coal Company, however, is at Nanaimo, on a six-foot seam, about two miles south of the seams on Newcastle Island. Of the measures associated with this seam, Mr. John Bryden, the under-ground manager of the mine, has been so kind as to furnish me with the following descending section, the data for which, having been obtained from a vertical bore-hole, the thicknesses have been reduced by me to measurements perpendicular to the plane of the beds:—

	Feet.
Bluish-black argillaceous shale	11
Brownish or drab, coarse-grained sandstone, holding a few disseminated pebbles up to half an inch in diameter.....	11
Coal, clean and hard, holding thin leaves of carbonate of lime in the cleavage joints; the thickness varies from two and a half feet to	6
Brownish or drab, coarse-grained sandstone.....	65
Gray, fine-grained sandstone.....	75
Coal associated with from two to three feet of bluish-black shale, the thickness both of the shale and coal being very irregular.....	7
	175

“In the working of the upper seam on the slope, it has been found that the dip is N. 54° E., with a very regular inclination of sixteen degrees in the first 350 feet, increasing to seventy and eighty degrees in the succeeding 300 feet; the seam then suddenly rises and dips South-westerly at an angle of twelve degrees, on which it has been followed for sixty feet. There may possibly be some variation in the bearing of the dip in the steepest part.

“In a bearing S. 22° E., a little over a mile from the mouth of the slope, there is an exposure of coal on the coast, in which three or four seams of good coal, varying in thickness from a quarter of an inch to an inch, are interstratified in about four feet of black shale, resting on about sixty-three feet of light drab sandstone. The dip in the neighbourhood is N. 32° E. < 15°, gradually changing to S. 83° E. < 7°, in something less than a mile along the coast.

“Continuing in about the same bearing as before, S. 22° E., for about four miles, two seams of coal are said to occur on the Nanaimo River, about a mile up from the mouth, but I was not so fortunate as to ascertain their thickness or the distance between them. Another reported locality of coal is about a mile South from Dodd Narrows, which would be about four miles South-east from the previous one; but I could gain nothing satisfactory from my informant, of either the thickness or the character of the seam. How these reported seams are related to the Nanaimo coal-beds is uncertain.

They may not, however, be far removed from this horizon. On the outside of Dodd Narrows stands the Island of Gabriola. It has a length of ten by an average breadth of about three miles, and, judging from an examination across the strike at the North-west end, and along it on the South-west side, the rocks of the island seem to consist almost wholly of brownish-gray sandstone, sometimes becoming conglomerate, particularly on the South-west side. No coal-seams were observed to be associated with the strata. The dip on the outside of the island appears to be North-eastward, with an average inclination of about four degrees. But in Rocky Bay at the North end, towards the West side, there are evidences of a small undulation.

"The area, including all the coal-seams which have been already mentioned as belonging to the Nanaimo field, has a length from the Dunsmuir claim to the end of Gabriola Island of about sixteen miles, with an average breadth of about six miles. Its surface would then measure upwards of ninety square miles. In the remaining part of this basin, to the South-east, no important coal-seams, as far as I am aware, have as yet been met with. But little of the region is up to the present known, and there is every probability that the same seams will extend to it."

The operations in the Vancouver Coal Company's workings are fully illustrated by the annexed Return:—

VANCOUVER COAL MINE, 1874.

Output of Coal for 12 months ending 31st Dec., 1874.	No. of tons sold for home consumption.	No. of tons sold for exportation.	No. of tons on hand 1st January, 1874.	No. of tons unsold, including coal in stock, 1st Jan. '75.
51,728 4-5th tons.	18,878	32,319		5,065

No. of hands employed.			Wages per day.		
Whites 204	Chinese 61	Indians 19	Whites \$1 75 to \$3 75	Chinese \$1 12½ to \$1 25	Indians \$1 25 to \$1 50

Miners' earnings \$2 75 to \$5 a day.

Name of Mine, distance from water, &c. Nanaimo Colliery, situate at Nanaimo Town and at Newcastle Island. At former place, mine is rather over half a mile from wharf; at the latter, say 200 yards.

Value of Plant, Machinery, Railway, and Rolling Stock (not including Workshops, Stores and Dwellings) \$93,657.

Total depth of mines; average thickness of seams *Douglas Mine*, 450 yards by slope; vertical depth below surface, 400 feet; seam, 4 feet average, perfectly clean. *Chase River Mine* (or seam), 290 feet deep by shaft; seam variable in thickness, 4 to 11 feet, but mixed with shale. *Newcastle Mine*, 240 yards by slope; vertical depth below surface, 90 feet; thickness of seam, 7 to 8 feet, intersected with bands of shale. *Fitzwilliam Mine*, Newcastle Island, 720 yards by slope; vertical depth below surface, 250 feet; thickness of seam (which is interrupted by a fault), 2½ feet to 5½ feet.

Number, horse-power, and kind of Engines at the Mines *On the surface*, 1 horizontal pumping and winding engine, 45 horse-power; 1 beam winding and pumping engine, 22 horse-power; 1 horizontal engine, 90 horse-power, in reserve; 2 horizontal engines (coupled), each 10 horse power; 2 locomotives (1 in reserve), 10 and 12 horse-power; 3 steam winches, 5, 8, and 10 horse-power (1 in reserve). *In the Mines*, a 7 in. and a 4½ double-acting steam pump. *In Reserve*, a large patent steam pump, 20 inch steam cylinder, and 6½ inch water cylinder.

(Signed) M. BATE.

It will be seen from the above Returns, that the output of coal at Nanaimo for 1874, amounted to 81,547 tons 8 cwt., of which 25,022 tons 15 cwt. were used for home consumption, and 56,038 tons exported abroad. The actual amount disposed of for the year, was 81,060 tons 15 cwt., which, at a sale price of \$6 per ton, gives a gross return of \$486,360 per annum.

The number of miners employed is 277 whites, 121 Chinese, and 31 Indians. The wages are from \$2 to \$4 to whites, per day; \$1 to \$2 to Chinese and Indians.

The value of the plant, machinery, rolling-stock, &c., of the Vancouver Island Company amounts to \$93,657. No return of the value of plant, &c., of the Dunsuir Coal Company has been received.

These returns show a steady increase in the development of the coal interests of the Province; and the early commencement of railway works will doubtless still further advance the coal workings.

North of Nanaimo, the coal strata disappear for some distance, but appear again in the Comox District, which may be said to extend from Qualicum River to Kookootherm Point, a distance of about forty miles. It will be satisfactory again to have recourse to Mr. Richardson's able Report, which comprises the information gathered in his survey in 1871 and 1872:—

“Leaving this place on the 17th October, 1871, I was conveyed by steamer as far as Nanaimo, on the south-west side of the strait, about seventy miles from Victoria, where coal has been worked for the last twenty years. A week was spent in the examination of the rocks of this vicinity, and I proceeded about seventy miles farther to Comox Harbor, near which several coal claims have been taken up within a year or two, reaching it on the 27th of October. Coal is known to occur sixteen miles still further along the coast, but it appeared to me that the season was too far advanced to render it prudent to go beyond Comox. I accordingly returned from there to Victoria, where I arrived on the 23rd of November, and after continuing my examinations in its vicinity until the 22nd of December, started on my return to Montreal.

COAL DEPOSITS.

“Coal-seams are known to exist in other parts of Vancouver Island, besides those already alluded to. They have been met with towards the north-western end, one locality being on the north-east side, near Fort Rupert, on Queen Charlotte Sound, another on Quatsino Sound, which opens on the south-west side into the Pacific; and there appears at present nothing to render it impossible that they may spread out in some places into the centre of the sound. But I shall here confine my remarks to those parts which I have visited on the Strait of Georgia. These appear to belong to a narrow trough, which may be said to extend from the vicinity of Cape Mudge on the north-west, and to approach to within fifteen miles of Victoria on the south-east, with a length of about 130 miles. It is occupied by a series of rocks which in some places present a rolling surface, with no elevations rising to a greater height than 800 or 1,000 feet, and in others is comparatively level. It possesses generally a good soil, and may hereafter be thickly settled. It is mostly covered with forest, but in some parts presents a prairie or park-like aspect, with grass-covered ground, studded with single trees or clumps of them, and offers great encouragement to agricultural industry.

“The north-east side of this trough lies beneath the waters of the Strait of Georgia, and on that side is bounded by crystalline rocks coming apparently from beneath it in Lasqueti, Texada and other islands, and on the mainland beyond; while on the south-west it occupies a strip along Vancouver Island, limited by a range of very bold mountains of the crystalline series, which runs nearly parallel with the coast, having points of from 4,000 to 7,000 feet above the sea. In the first or nearest ridge of these are Mount Washington, 5,410 feet, Beaufort Range, 4,900 and 5,420 feet, Mount Arrowsmith, 5,970 feet, and Mount Moriarty, 5,185 feet; while in the second ridge, farther in the country, is Alexandra Peak, 6,394 feet, and Mount Albert Edward, 6,963 feet.

“In the general trough, coal seams are exposed in upwards of a dozen different places, and in five distinct localities claims have been laid before the government by different companies. The most instructive exposure is one that occurs about five miles

(S. 63°W) from the shore on the south-west side of Comox harbor, on the claim of the Union Coal Mining Company.

"Here in an almost perpendicular cliff, which rises on the north side of a small brook, tributary to the Puntledge River, there occurs the following descending section, the coal seams in which I shall number in ascending order:

	Ft.	Ins.
Brownish or drab-colored, slightly calcareous sandstone, the grains of which are composed of quartz, feldspar and mica, with some of a black substance supposed to be peroxide of manganese, the beds being from one to five feet thick.....	45	0
Coal (No. 4), black and shining, apparently clean and free from shale.....	4	6
Brownish-black argillaceous shale and greenish-brown sandstone, interstratified with one another in thinnish layers, the shale predominating, and both holding thin, irregularly-disturbed, lenticular patches of coal, which may constitute about one-tenth of the mass; no indications of roots penetrating the upper part of the bed were observed.....	15	0
Coal (No. 3), apparently all of good quality.....	5	4
Brownish-gray or light drab sandstone, in beds of from one foot to eighteen inches.....	10	0
Coal (No. 2), apparently clean and of good quality.....	6	0
Brownish-gray or light drab sandstone, interstratified with thin layers of black soft, argillaceous shale.....	3	0
Coal (No. 1), without observed impurities.....	10	0
Total.....	98	10

"The dip of the measures in this part is N. 32° E. < 11°. The brook, which is, as already stated, a tributary of the Puntledge, runs north-westward, nearly on the strike, and at some height on the right bank, about 600 paces down the stream, a coal-bed of four feet and a half is exposed, which very probably corresponds with number 4 of the above section, and shows an apparent regularity in its course, and in the attitude of the measures, for at least that distance.

"None of the seams in this locality have yet been opened for productive working.

"The level of the brook where the seams are exposed, is about 500 feet above the sea, and the road will have a pretty even fall the whole of the way to it.

"Coal-seams, said to resemble those which have been described, occur at no very great distance in a north-western direction from the Union Claim.

"I was told also that still further to the north-west, the position being sixteen miles from Comox Harbor and close upon the coast, there is a four-foot coal-seam, but the weather prevented me from visiting it.

"About five and a half miles along the coast from Comox Harbor, in a general bearing about S. 28° E., there occurs a trail or path leading to what is called the Beaufort Coal Mine; the general bearing of the path being S. 80° W., and the distance from the coast a little over five and a half miles. Here, on the left side of a small stream called Bradley's Creek, there occurs a seam of good hard coal, measuring 3 feet 2 inches, and resting on two feet of soft black argillaceous shale, beneath which there are visible between five and six feet of brownish-gray sandstone, holding disseminated pebbles of quartz, feldspar, and diorite. The dip of the strata is here N. 27° E. < 18°, and Bradley's Creek, which, flowing north-eastward, ultimately gains Baynes Sound, at this place crosses the measures nearly at right angles.

"Proceeding down the stream, the coal-seam appears to be overlaid by a considerable thickness of sandstone, and, at the distance of about half a mile, another coal seam occurs, of which, from the quantity of water in the brook, no more than two inches were visible; while half a mile farther on, there are indications of still another seam. These two seams, from the quantity of water caused by recent heavy rains, were very imperfectly seen by me; but Henry Bradley, one of my men, who was one of the first discoverers of the seams on this claim, and was afterwards employed to ascertain their thickness, informed me that the two in question were from one to two feet each. He also informed me that about a mile and a half to the westward of the position where the lowest of the three seams is exposed, there occurs a fourth seam on the Trent River. The quantity of water prevailing, and the occurrence of an intervening swamp, prevented me from visiting this seam, but Bradley gives the thickness, as far as ascertained without reaching the bottom of it, as nine feet.

“The transverse distance in which these four seams occur appears thus to be upwards of two miles, while the four seams of the Union Claim, with a less apparent dip, would not occupy a greater breadth than 250 feet; and the strike of the latter would seem to place them considerably higher in the measures. If it should hereafter be ascertained that any of the seams of the two localities are identical with one another, it can only be through the occurrence of undulations or faults, of which we at present know nothing.

“Five miles along the coast, in a bearing S. 18° E. from the trail to the Perseverance Claim, a path runs inland, in general bearing S. 70° W., and leading, in a distance of a little over two miles, in a straight line, to the Baynes Sound Coal Mines. Here in a deep gorge, through which a small stream of water finds its way in its course to Fanny Bay on Baynes Sound, occurs the following descending section:—

	Ft.	Ins.
Brownish-gray or drab, moderately fine-grained sandstone, slightly calcareous, with scales of white mica, and in layers of from six inches to two feet, holding fragments of the stems and leaves of Plants	30	0
Coal, clear and hard	5	10
Brownish-gray or drab sandstone, in beds of from six inches to four feet thick, holding fragments of plants	48	0
Black, soft, argillaceous shale, with short thin lenticular patches of coal	5	0
Brownish-gray or drab sandstone, in beds of from six inches to two feet.....	5	8
Black, soft, argillaceous shale, with obscure impressions of plants	2	0
Coal, which appears to vary in its thickness, being in some parts not over five feet two inches, and in others seven feet, while the lower two feet shew occasionally thin seams of carbonaceous shale, with obscure impressions of plants, say.....	6	0
Brownish-gray or drab, moderately fine-grained, slightly calcareous sandstone, with scales of white mica.....	5	0
	107	4

“The dip of the strata is here N. 86°, E. < 15°, gradually increasing to 40°, and the two coal-seams are seen descending in both sides of the ravine, the edges of the lower one meet in the bottom of the stream, but while those of the upper one are still about twenty feet above the water, a fault occurs cutting them off. The underlie of the fault is S. 62° W., < 38°, and the dip of the strata on the other or eastward side of it is N. 64° E. < 43°. The strata on that side, after an interval in which seventy feet of the base are concealed, consist of seventy-two feet of brownish-gray sandstone, holding a few fragments of plants, overlaid by ten feet of black argillaceous shale. As these beds are not recognised on the west side of the dislocation, the amount of it, on the side on which the strata are thrown down, cannot be determined with certainty, unless a small mass of coal which is caught in the fault, and lies lower than the extremity of the upper seam, be derived from it. In that case the down-throw would be on the east side. In a position, which appears to be close to the east side of the fault, a shallow shaft has been sunk in search of the upper seam; it penetrates the measures on that side, but sandstone alone appears to have been excavated.

“The section which has been given above does not suggest any means of identifying the coal seams displayed in it with those of the previous localities. It may reasonably be supposed, however, that the whole of those described belong to the lower part of the measures, and the localities may each belong to a separate zone.

“From Qualicum River to North-west Bay, in a bearing about S. 75° E., there is a distance of about twenty miles in which no rock exposures were observed. Beyond this, masses of the crystalline series present themselves, continuing for fourteen miles in the same bearing, and separating what may be called the Comox field from one farther on; shewing that the general trough is divided into two distinct basins.

“The Comox basin would then have a length, between Cape Mudge and North-west Bay, of about sixty-four miles, but limiting it, for safety sake, and the probable occurrence of some thickness of unproductive measures at the base, to the distance between Kookooshun Point and Qualicum River, it may be safely called forty miles. The greatest breadth from the Beaufort Claim to a line in the run with the outside of Cape Lazo, or, as it is commonly called, Point Holmes, would be about thirteen miles, without taking into consideration what may be beyond under the water. But estimating the average breadth to be somewhat over seven miles, the productive area may safely be considered to hold about 300 square miles.

“The rule applied in the coal-field of South Wales in the United Kingdom, to calculate the productiveness of a coal-seam, gives 1,000 tons for every square foot in each acre of a seam one foot thick, leaving a sufficient quantity for pillars to support the roof. In the Union area, the total thickness of workable seams is a little over twenty-five feet. This would give 25,000 tons per acre, or 16,000,000 tons per square mile. In the Baynes Sound Mine, the quantity would be about 12,000 tons per acre, or per mile 7,680,000 tons. Not having seen the full thickness of all the seams on the Beaufort Claim, I shall not venture upon a calculation, but any one can easily make it for himself. To attempt a calculation of the productive yield of the whole field would be premature, before all the details of its structure have been ascertained, seeing that where the seams sink beyond a certain depth they can scarcely be profitably worked, and until all the seams have been discovered, the undulations determined, and the dips every where observed, how much or how little of the seams are in this condition cannot be known. For the facilities of trade, Comox Harbour would afford excellent accommodation to both the Union and the Beaufort Mines. The former being, as already stated, five miles from it, with a fall of about 500 feet, while the latter is about seven miles distant, with a fall of about 700 feet. Baynes Sound, with proper wharfage, might be made available at most places. It is in one place less distant from the Beaufort Mine than Comox, but the fall is not so even. Baynes Sound Mine is about 200 feet above the sea, and Fanny Bay on the Sound is about three miles south-east from it, while Deep Bay is about eight miles. Both of these harbours, though small, are safe, especially the latter, being thoroughly protected from all winds. The approaches to all the harbours named, as well as the harbours themselves, have a depth of from five to twelve fathoms at low water. The more southern division of the two, into which we have separated the general trough holding them both, may be called the Nanaimo Field or basin.”

In his Report for 1873, Mr. Richardson thus further describes the Comox coal-field:—

“It is bounded on the south-west by the Beaufort Range of Mountains, on the north-east by the Strait of Georgia, and extending from Comox Harbor about twelve miles to the west, and about thirty miles to the south-east, includes Denman and Hornby Islands.

“Measurements of the coast-line from about three miles north-westward of Point Holmes were made round to the mouth of Courtenay River, which flows into Comox Harbour, and thence to Deep Bay, opposite the south-east end of Denman Island. Following all the sinuosities of the line, its length exceeded thirty-two miles. The coast was further examined on foot, without measurement, for about twelve miles beyond. But in the whole distance, measured and unmeasured, only two small exposures of rock, situated on the south side of Comox Harbour, were met with.

“Additional measurements were made up the Courtenay River and its tributary the Puntledge, to Puntledge Lake, making together about nine miles, as well as three miles up Brown's River, which flows into the Puntledge about five miles from the lake. The partial measurement of last year on the proposed line of tramway to the Union Mine (Report 1871-72, p. 76) was verified and continued to the coal-seam, the correct bearing and distance from the coast being S. 61° W., a little over five miles and a quarter. The Trent River (Ibid. p. 76) was measured as far up as its general bearing was at right angles to the strike of the measures, giving a distance of six miles in a straight line from the coast, and the measurement was continued nearly half a mile further, up a small tributary, to the crystalline rocks. Bradley's Creek joins the Trent on the right side, about three miles and a half from the coast, and this tributary was measured for about three and a half miles up. The River Sable, a small stream on Baynes Sound Claim (Ibid. p. 78.) was measured for three miles up from Fanny Bay.

“From the exposures observed in these transverse measurements, and on the coast, of Denman and Hornby Islands, has been ascertained all that I am enabled to give of the character and distribution of the coal-bearing rocks of the area in question. These rocks may be separated into seven divisions, which, in ascending order, may be referred to as follows:—

- A. *Productive Coal Measures.*
 B. *Lower Shales.*
 C. *Lower Conglomerate.*
 D. *Middle Shales.*
 E. *Middle Conglomerate.*
 F. *Upper Shales.*
 G. *Upper Conglomerate.*

DIVISION A.—*Productive Coal Measures.*

“The most westerly point examined is on Brown’s River, about nine miles N. 82°W. from the court house or steamboat landing, on the north side of Comox Harbor. There is here a continuous exposure of the strata, occupying the bed of the stream for a mile and three-quarters in a straight line, with a bearing N. 84° E. It affords the following section in ascending order:—

SECTION 1.

	Ft.	Ins.
<i>Coal</i> (1). Impure, and apparently in separated masses, of which two were observed on the strike in the breadth of the stream (between thirty-five and forty feet), one of them on the right, about five feet long and seven feet thick, and the other on the left, seven feet long and two feet thick, both terminating somewhat abruptly. They are from eight to ten feet apart, and carbonaceous shale with a pale brownish streak and argillaceous odour fills the interval between them, and seems to occupy the space in continuation beyond them.....	7	0
Brownish-gray, slightly calcareous sandstone, the grains of which are composed of quartz mingled with feldspar and a few scales of mica, as well as a greater number of small flakes of blackish argillaceous matter. The mass is divided into beds of from three inches to four feet in thickness; many of the latter show false-bedding, but would in general yield good building stone.....	132	0
<i>Coal</i> (2). Clean and bright.....		3
Brownish-gray sandstone as before.....	94	0
<i>Coal</i> (3). Clean and bright.....		2
Brownish-gray sandstone as before.....	33	0
Blackish argillaceous shale with a white streak, interstratified with thin seams of clean coal interlocking with one another.....		5
Brownish-gray sandstone as before.....	110	0
<i>Coal</i> (4). Clean and bright, varying in thickness from six inches to.....		1
Brownish-gray sandstone as before.....	92	0
<i>Coal</i> (5). Clean and bright.....		1
Black argillaceous shale with a white streak, and thin seams of coal.....		3
Brownish-gray sandstone.....		86
Black argillaceous shale, with thin patches of coal interlocking with one another.....		10
Light-gray, massive sandstone, in beds, varying from two to ten feet, and showing little or no false-bedding.....		95
<i>Coal</i> (6). Good and clean.....		1
Black argillaceous shale.....		4
Light gray sandstone, similar to the last.....		28
Black argillaceous shale with a white streak, interstratified with thin patches of coal interlocking with one another, some of them an inch apart, and altogether making up from ten to twenty per cent. of the mass.....		3
<i>Coal</i> (7). Clean and good.....		1
Light-gray sandstone, similar to the last.....		27
<i>Coal</i> (8). Good and clean.....		6
Black argillaceous shale.....		1
<i>Coal</i> (9). Clean and bright.....		8
	739	6

“The thicknesses of the sandstones in the above section are reduced from horizontal measurements, at right angles to the strike; and the inclination is determined by the dips of the coal-seams and shales above and below the sandstones, so as to avoid errors from false-bedding. The dips vary in direction from E. 30° N. to E. 22° S., and the angles of inclination from 0° to 20°, with the exception of two or three in the middle of the distance, which are a little to the east of north, with an inclination of from 2° to 7°, and indicate an undulation or irregularity, for which a due allowance has been made.

“Though to the westward of this section, on Brown’s River, a mile intervenes before the flank of Mount Beecher rises up to indicate the presence of the crystalline

rocks, they are yet supposed to be concealed by drift not very far off, on the west side of a shallow depression which appears to run east of south to an elbow in the Puntledge River. The distance to the elbow is about two miles, and to this point the upper stretch of the river flows in the same depression from the lake for a mile and a half. This depression marks the strike of the measures, and a rock supposed to belong to the crystalline series is seen in a rapid just below the outlet of the lake. The exposure, which does not exceed forty feet in length, consists of a brown-weathering igneous rock, showing, according to Mr. Harrington, when sliced and examined under the microscope, both a concretionary and a porphyritic structure, with disseminated crystals, which appear to be feldspar, while the concretions are composed of two minerals which exhibit a radiating structure. When treated with an acid, the rock assumes a light gray color, from the removal of the oxide of iron.

"There is not much doubt that the base of the productive measures, though not seen, immediately overlies this, while the summit is displayed on the Puntledge, about a mile and a quarter below the elbow, showing that to be the direct breadth of Division A on this stream. The summit on the Puntledge is due south of the same horizon on Brown's River, and about a mile and a half from it. The details of the division in the Puntledge, however, are by no means well exposed, and none of the coal-seams are visible. This may be called Section 2, though a very imperfect one.

"From the outlet of Puntledge Lake, a bearing of S. 48° E. strikes the extremity of the line of the proposed tramway to the Union Mine, on the south side of the lake, and about a mile from it, the whole distance being about two miles and three-quarters. A section occurring at this mine in an almost perpendicular cliff, from the face of which a landslide had carried away all the trees and loose soil on the north side of a small stream flowing into the Puntledge Lake, was given in last year's Report (Report of Progress 1871-72, p. 77). But most parts of the cliff being out of reach, the thickness of many of the beds could only be ascertained approximately, having been merely estimated by the eye. A more favorable condition of the weather on the present occasion permitted me, by the aid of a rope tied to a tree at the top of the cliff, to descend the whole face, and obtain exact measurements. The following is a corrected section in ascending order:—

SECTION 3.

	Ft. Ins.
Brownish-gray, or light drab sandstone, and black argillaceous shale, interstratified with one another, and both holding flattened stems of plants.....	6 0
Coal (1). Of a dull earthy aspect, and containing upwards of twenty per cent. of ashes by Dr. T. Sterry Hunt's Analysis (Report of Progress, 1871-72, p. 99).....	2 6
Coal (2). Clean and bright.....	7 6
	— 10 0
Brownish-black argillaceous shale.....	7 0
Coal (3). Clean and bright.....	2 4
Brownish-black argillaceous shale.....	2 6
Coal (4). Clean and bright.....	1 6
Brownish-black shale.....	1 3
Coal (5). Clean and bright.....	1 5
	— 9 0
Brownish-black argillaceous shale, interstratified with brownish sandstones and brownish-yellow weathering, hard, ferruginous beds from two to four inches thick.....	14 3
Coal (6). Clean and bright. This seam occupies the face of the cliff for a distance of only twenty feet, coming from the right, and then terminates somewhat abruptly, the corresponding space on the strike to the left being filled with black argillaceous shale, holding interstratified thin seams of coal.....	2 0
Brownish-black argillaceous shale.....	2 9
Coal (7). Clean and bright. This seam occupies the cliff for sixty-six feet, coming from the right, and then terminates somewhat abruptly, like the previous one; but on the right hand, there occurs in it a band of brownish-black, argillaceous shale, two feet thick, with thin patches of coal, and occupying about twenty-five feet on the strike, with about three inches of coal above and below.....	2 6
Brownish-black argillaceous shale.....	3 0
Coal (8). Clean and bright, varying in thickness from five to twelve inches, from inequalities sometimes at the top and sometimes at the bottom.....	1 0
Brownish-black argillaceous shale.....	4 0
Coal (9). Clean and bright.....	4 6
	— 16 9

	Ft.	Ins.
Brownish-black argillaceous shale	16	0
Coal (10). Clean and bright.....	2	8
Brownish-black argillaceous shale.....	6	0
Coal (11). Clean and bright.....	4	4
Brownish-gray or drab sandstone, slightly calcareous, the somewhat fine grains of which are composed of quartz, feldspar and a little mica, with small black flakes consisting of argillaceous or carbonaceous shale. The mass is divided into beds of from one to five feet thick, some of which show false-bedding.....	30	0
	122	0

"The deposits of this section rest visibly on the crystalline rocks which pave the brook at the foot. The course of the brook is south-east and north-west. In the former direction, these rocks rise gradually higher among the coal-bearing strata, and at the distance of about a quarter of a mile up the brook, reach to within ten feet of the sandstones at the summit. Between the sandstones and the crystalline rocks, there occurs a coal seam in the brook, of which the thickness could not be ascertained, owing to the depth of the water; beyond this the strata are concealed. Down the brook to the north-west, the crystalline series is exposed for about sixteen chains, and thirteen chains further on, a coal-seam of four and a half feet was last year visible, dipping N. 48° E. < 11°; but at the present time was covered up by a slide. At seventeen chains across the measures to the right, two additional coal-seams were observed, with an interval between them of 192 paces, dipping in the same direction, the lower one two feet thick, with an inclination of five degrees, the upper one three feet thick, with an inclination of eleven degrees. In ascending order a vertical section would be,

SECTION 4.

	Ft.	Ins.
Coal	4	6
Measures concealed.....	54	0
Coal	2	0
Measures concealed.....	52	0
Coal	3	0
	115	6

"Openings for trial had been made on the two upper seams; but the concealed intervals render it at present difficult to say how the three are related to those in the previous section (3).

"In a bearing S. 38° E. from section 3, a line of two miles and a third would strike the valley of Trent River at right angles, about five and a third miles from the coast. The crystalline rocks make their appearance at less than a mile and a half further up the valley, on a small tributary which has been already mentioned; the spot being about thirty chains above the junction of the tributary and the main stream. They are of mottled dark green and dull red colors, and present a concretionary and porphyritic structure, like the exposure at the outlet of Puntledge Lake. Resting upon them, the following ascending section occupies the tributary and the main stream for a distance of a mile and a quarter:

SECTION 5.

	Ft.	Ins.
Coal 1. Clean and bright, resting on red and green crystalline rocks.....	0	2
Black carbonaceous shale, with thin patches of coal.....	4	0
Brownish-gray or drab, fine-grained sandstones, in beds of from six inches to five feet, which would yield good building stones, as well as perhaps tolerable grindstones.....	92	0
Coal 2. Of a dull earthy aspect.....	1	0
Brownish-gray sandstones as before.....	3	0
Coal 3. Of a dull earthy aspect, mingled with black carbonaceous shale.....	3	0
	7	0
Brownish-gray or drab sandstones, imperfectly seen	75	0
Black argillaceous shale	1	6
Brownish-gray sandstones, interstratified with black argillaceous shale, the sandstones predominating, but imperfectly seen.....	60	0
Coal 4. Clean and bright.....	0	8
Black argillaceous shale, with thin seams of coal.....	6	0
Coal 5. Clean and bright.....	1	9
	8	5

	Ft.	Ins.
Brownish-gray sandstones, interstratified with black argillaceous shale, the sandstones predominating	15	0
Coal 6. Clean and bright.....	0	8
Brownish-gray sandstones, interstratified with black argillaceous shale, the sandstones predominating	30	0
Black, rust-stained, argillaceous shale, with short interlocking patches of coal, about an inch in thickness	1	0
Coal 7. Clean and bright.....	1	4
Black, argillaceous shale, with short, one-inch interlocking patches of pure coal	2	6
Coal 8. Clean and bright.....	1	0
Black argillaceous shale, with thin seams of coal.....	2	6
Coal 9. Clean and bright	3	8
	—	12 0
These twelve feet of strata occur at the junction of the tributary with the Trent, and are exposed in the channel of the latter several times in a distance of about eight chains on the strike, which is N. 68° W. The dip is N. 22° E. < 50°, and the thickness of the deposits is sometimes less, and sometimes more, than represented.		
Brownish-gray or drab sandstones, in strata of from one to four and five feet thick, many of which show false-bedding.....	130	0
Black argillaceous shale	4	0
Coal (10.) Clean and bright	1	8
Brownish-grey or drab sandstones, in beds of from three to ten feet thick	24	0
Coal (11.) Clean and bright.....	1	0
Black carbonaceous shale	12	0
Brownish-grey sandstone.....	37	0
Coal (12.) of a dull earthy aspect	0	6
Black argillaceous shale.....	10	0
Brownish-grey or drab sandstones.....	28	0
Black argillaceous shale.....	4	0
Brownish-grey or drab sandstones.....	41	0
Coal (13.) Clean and bright, varying in thickness from one foot to.....	1	8
Light-grey, fine-grained sandstones, slightly calcareous, in even beds of from three to ten feet thick. They would yield excellent, easily dressed building stones, and probably afford good material for grindstones and whetstones	59	0
Black argillaceous shale	4	0
Light grey sandstones, similar to the last.....	47	0
	—	710 7

"The next locality where the coal-bearing strata were met with on the strike to the south-eastward, is Bradley's Creek, already mentioned as a tributary of the Trent, the distance between the two streams being upwards of a mile. No crystalline rocks were met with in the portion of the tributary examined, and the lowest exposure of the coal-bearing series occurred about three miles and eleven chains from the junction with the main stream.

"The whole of the exposures belonging to this division on Bradley's Creek, occur in a transverse distance of one mile and three-quarters, being about the same as that holding those of the Trent, but the bearing N. 24° E. is somewhat oblique to that of the average dip. In some parts there are considerable intervals between the exposures. Where seen, the dips are steeper and more irregular, and it thus becomes very difficult to state the true thickness in a vertical column. For this reason I shall describe the deposits in this section (to be numbered 6) as they succeed one another in ascending order on the horizontal line.

SECTION 6.

"Resting on a few feet of brownish-grey sandstone the lowest coal-seam, which is clear and bright, is from fifteen to eighteen inches thick, and a few feet of brownish-grey sandstone overlies it. A quarter of a mile down the valley, there is a coal-seam eight inches thick, with a dip N. 32° E. < 32°. Nearly nine chains further, occurs the coal-seam mentioned last year, (Report 1871-72, p. 76,) as three feet two inches thick, with a dip N. 27° E. < 18°. This is probably the same as coal-seam 5 of section 3. Twenty-eight chains beyond, resting on black argillaceous shale, is a seam shewing eight inches of impure coal. After an interval of fifty chains, again resting on black argillaceous shale, there is another eight inch seam, displaying good coal, with a dip N. 40° E. < 18°. This supports 128 feet of light-grey sandstones, in beds of from one to six feet

thick, similar in character to the two masses at the summit of section 3, which, with the band of black shale between them, shew a thickness of 110 feet. They may thus be considered to represent the same horizon; but above the sandstones of Bradley's Creek, no exposures occur for half a mile. The deposits of the two sections, 3 and 5, are on the Beaufort coal-mining claim.

"The last place examined, in the further extension of the rocks of this division, is at the Baynes Sound Coal Mine, on the River Sable, as it is written by some, being probably a corruption of Rivière aux Sables. The position of this mine is about five and a half miles from the base, section 5, on Bradley's Creek, in a bearing S. 53° E., and two miles and three-quarters due west from the mouth of the stream on Fanny Bay. Here, as stated last year (Report of Progress 1871-72, p. 78), in a deep ravine through which the river finds its way, the following section occurs, resting on a black dioritic rock, the beds being given in ascending order, and their average dip being N. 76° E. < 10°—25°:

SECTION 7.

	Ft.	Ins.
Yellowish-weathering, dolomitic-looking conglomerate, with pebbles derived from the crystalline rocks and varying in diameter from half an inch to two inches, filling depressions in the black dioritic rock beneath	3	0
Brownish-grey or drab sandstones, moderately fine-grained, and slightly calcareous, with scales of white mica.....	19	0
Black carbonaceous shale, showing numerous obscure impressions of plants, with nests of good coal, as well as beds of the same from two to eight inches thick; some parts of the whole thickness are half made up of coal	6	0
Black argillaceous shale, with nodules of iron ore, some of them flat and varying in length from six inches to four and five feet, and in thickness from six to eighteen inches, while others are round, with a diameter of eighteen inches: they all contain impressions of plants, difficult, to be obtained in a perfect state. The thickness of the band is from two feet to	3	0
Brownish-grey sandstones as before	18	0
Coal (1.) Clean and bright; varying in thickness, being in some parts five feet two inches, and in others seven feet; the lowest two feet show thin seams of black calcareous argillaceous shale, with obscure impressions of plants, say	6	0
Brownish-grey sandstones as before	60	0
Coal (2.) Clean and hard	5	10
Brownish-grey or drab sandstones, forming the whole height of the cliff, and estimated to be about.....	100	0
	220	10

"A partial section of these beds was given last year, from which it will be perceived that the present differs a little in some of the beds; but, as then stated, the two coal-seams are seen descending both sides of the ravine, and the edges of the lower one meet in the bottom of the stream; but while those of the upper one are still about twenty feet above the water, a fault occurs cutting them off, the underlie of the fault being S. 62° W. < 38°. The dip of the arenaceous strata which occur immediately on the eastward side of the fault is obscure. The coal-seams occupy two chains, and then the dip becomes N. 64° E. < 38°—43°. The following is the section of the whole of the measures on the eastward side in ascending order:

SECTION 8.

	Ft.	Ins.
Brownish-grey sandstones	99	0
Brownish-black, soft, argillaceous shale	22	0
Light-grey sandstones.....	25	0
	146	0

"This is a greater volume of sandstone than was ascertained in this position last year; but, as then stated, the fault appears to be a down-throw to the north-east, the amount of which has yet to be determined.

"From the facts displayed in these various sections, it will readily be seen that workable seams of coal occupy a belt of pretty uniform breadth along the south-western rim of the Comox field, associated with brownish-grey false-bedded sandstones, interstratified with black carbonaceous and argillaceous shales at the base, and overlaid by light-grey, even-bedded, fine-grained sandstones at the summit. In all the sections a constant character is easily enough recognisable in Division A as a mass; but the notable

differences in the thickness of the coal-seams, and their distances from one another when in proximate sections, make it very difficult to establish the identity of individual seams over a very considerable area. This must be the work of practical explorers of the seams, by trial pits along the outcrops. But these irregularities and the occasional sudden interruptions in the continuance of the coal-seams constitute a remarkable distinction between them and the more regular beds of the true Carboniferous era, and may often occasion perplexities in working them. In no part of the exposures of Division A were any fossil shells met with.

CRYSTALLINE ROCKS.

"The detailed exploration of the lower measures of the Comox coal-field has as yet been confined to the eighteen miles that lie between Brown's River and River Sable, and in this the crystalline series on which they rest has been seen only in three places. In these, my inspection did not extend beyond the masses near the newer formation, or in positive contact with it. I cannot, therefore, pretend to give from these any connected view of the relation of the two series in age; but the exploration made for railroad purposes, at the request of Mr. Sandford Fleming, from the mouth of Qualicum River to Alberni on the upper extremity of Barclay Sound, having afforded me the opportunity of making a preparatory reconnaissance on a short line transverse to the strike of the crystalline series, has added to my information, and I propose here to give a brief description of the masses that were imperfectly observed in succession.

"The general bearing of the traverse, reduced to a straight line, is S. 28° W. It starts from the shore of Georgia Strait, at a point a little under three and a half miles north-west from Qualicum River, and terminates at the upper end of the Alberni Canal, as this part of Barclay Sound is called, the whole distance being somewhat under fourteen miles.

"On this the surface presents a plain, with a very gentle inclination for about the first four miles. It then rises with increasing rapidity for nearly two miles, and culminates on the ridge of Mount Mark, at a distance of six and a quarter miles from the commencement.

"The summit of this mountain is, by the Admiralty chart, 3,080 feet above the sea, and from this there is a precipitous fall of 2,723 feet, in less than a quarter of a mile, to the level of Horne Lake, which is 357 feet above the sea. A segment of the western end of Horne Lake occupies a little over two-thirds of a mile upon it. It then rises again with a few not very great undulations, for nearly three and a half miles, and attains a height of about 1,600 feet above high water mark. From this it falls rapidly for about two-thirds of a mile, and again reaches a gently inclined plain, over which it passes for two miles and two-thirds, and attains the Alberni Canal.

"The road travelled is a trail on the right bank of Qualicum River, and leaves the coast of Georgia Strait about a quarter of a mile from the mouth of the stream. For five miles it keeps about parallel with the river and with the traversed line, and reaches the lower end of Horne Lake. It then turns to the north of west, and runs close along the north side of the lake for about four and a half miles, crossing Qualicum River at its exit from the lake, which is about half a mile from its eastern extremity, and coming upon the traverse line, it still follows the margin of the lake, but in a southern direction for about two miles more, attaining its upper extremity. It then bears to the west of south for about two miles and a half, and winding round the foot of a hill called View Mountain, which attains an elevation of 1,600 feet over tide waters, on the right, it runs south-west for about three and a half miles in a straight line to the mouth of the Somass River, where this empties into the Alberni Canal at Stamp Harbour.

"The rock masses to be mentioned were all observed on or within a quarter of a mile of this trail, and none of them before reaching Horne Lake. The chief part of this nearly level intermediate plain is probably underlain by the deposits of the Comox coal-field, and to these a space of four miles has been assigned on the traverse line. The masses first seen at the lower end of Horne Lake are composed of crystalline limestone. They were followed all along the north side, and partly round to the west side, in the whole of which distance they present an abrupt escarpment on the right hand. A quarter of a mile from the east of the lake, the dip is N. 48° E. < 41°, and three miles further on, it is N. 2° E. < 55°. Reaching the west side of Horne Lake, and looking northward to Mount Mark, a drift-covered surface rises up between 300 and 400 feet

above the lake in a distance of about a quarter of a mile; and from this starts up a wall of limestone with an almost perpendicular face, presenting a thickness of probably 1,200 feet, which is again capped by a great mass of brown-weathering diorite, probably 1,000 feet thick, and constituting the summit of the mountain.

"The diorite is of a dark olive-green color, and has a ragged fracture, on the surface exposed by which, when fresh, small spots of dull greenish-white feldspar are observed. The rock has a felted kind of structure, and obscure parallel joints are observable, the walls of which are varnished with a brilliant black mineral, which Dr. Harrington supposes to be Delessite. The rock has something of the aspect of the masses observed in contact with the coal-bearing series at the Union Mine, and on the River Sable, and the intermediate distance between Mount Mark and this series may be occupied with this and allied diorites. The mass capping Mount Mark, however, after descending to the sea level in its dip on the traverse line, would leave a blank space of about a mile between it and the coal series of which nothing definite can yet be said.

"The limestones which underlie this diorite are of whitish, bluish, dove-grey, yellowish, greenish, and pinkish colors, the different tints running parallel conformably with the stratification. The greenish tints may perhaps be due to the presence of chloritic or epidotic matter.

"The calcareous masses are interstratified throughout the whole 1,200 with well-defined bands of diorite of various thickness, from the eighth of an inch to two feet, as far as observed, but there may be beds of much greater thickness that have escaped observation. In these bands, the dioritic character is well marked by the presence of crystals of black hornblende, some of which attain a length of half or three-quarters of an inch, with a breadth of from one-eighth to a quarter of an inch, all with well-defined plains of cleavage. These diorites, at the junction of which with the limestone epidote is sometimes distinctly developed, are of various tints of grey, from dark to light, and some of them are of a speckled aspect similar to masses associated with the limestones in the vicinity of Victoria, mentioned in last year's report (Report of Progress 1871-2, p. 91). Some of the diorite beds are of lenticular form, while others are continuous; and they appear to be more abundant in the lower than the upper half of the calcareous mass.

"The limestones appear to be highly crystalline throughout, sometimes coarsely and sometimes finely so, and in some parts, on being acted upon with acid, show multitudes of grains of silica. They are in many places crowded with fossils, which in the more coarsely crystalline bands appear to be chiefly encrinural columns. Many of the remains are replaced by silica, and are weathered out distinctly on the surfaces. Some of them have been obtained by dissolving the limestone in acid, while numbers have been observed in thin microscopic sections prepared by the skill of Mr. Weston, since my return to Montreal. The following are Mr. Billings' remarks in respect to them:—

"The fossils from Mount Mark north of Horne Lake are,

1. Corals apparently of the genera *Zaphrentis* and *Diphiphyllum*.
2. Large crinoidal columns.
3. *Fenestella* or *Polymorpha*.
4. A large *Productus* and also a large *Spirifer*.

"They are so obscurely preserved that they cannot be determined specifically. They appear to be either Permian or Carboniferous, most probably the latter."

"These limestones probably extend on the traverse line for three-quarters of a mile to its intersection with Horne Lake, which occurs about eight and a quarter miles from the coast. This, however, would give to their thickness about 500 feet more than actually seen.

"For the next mile and three-quarters, including the portion which passes over the lake, there were no exposures on the traverse line. Further on, three-quarters of a mile are occupied by red ferruginous rocks, green diorites which are sometimes slaty and frequently amygdaloidal, and pale green epidotic rocks. These masses are interstratified with bands of bluish and greenish crystalline limestone in which no fossils were observed, and they are followed by green dioritic rocks, occupying about six chains, and dipping N. 13° E. < 44°. Beyond this, there is another interval of concealment of nearly a quarter of a mile. Then whitish, yellowish, and bluish limestones present themselves, with a breadth of five chains, and beyond them seven chains hold red and green slates. These are followed by coarsely crystalline limestones of a yellowish-white color, occupying about twelve chains, and many of them crowded with crinoidal stems, some of

which are three-quarters of an inch in diameter. The dip of the beds is N. 2° E. < 32°, and their position on the traverse line is very nearly nine miles from the Georgia Strait coast.

“Another interval of concealment here occupies about ten chains in width, and is succeeded by twenty chains of red clay slates, interstratified with harder red bands, to which green stripes parallel with the bedding give a ribband-like aspect, while both the harder and softer red slates are again interstratified with beds of red and pinkish limestone containing obscure fossils. In the next thirty chains red and grey clay slates prevail, interstratified with bluish and dove-grey limestones, varying from six inches to four feet in thickness. For half a mile beyond this the strata are vertical, their strike at first being N. 31° W., and finally N. 61° W. They consist of bluish-grey and yellowish-white limestones, in beds varying from five inches to two feet. The larger part of this great calcareous mass shows obscure organic remains, on weathered surfaces, crinoidal columns being unmistakable at the end of the distance. These masses constitute the rocks of View Mountain, and beyond them there occurs a valley which is half a mile wide, and about 1,034 feet above sea level. In it the rocks are not well seen, but they appear to consist chiefly of grey clay slates, interstratified with grey sandstones. On the succeeding rising ground, and on the rapid fall of the flank beyond, three-quarters of a mile are occupied by green, slaty diorites, dipping N. 87° E. < 59°, underlain by red and bluish-grey clay slates, which rest upon a green diorite. Here the height is only 578 feet above the sea.

“We now come again upon the coal-bearing series; and about eighteen chains are occupied with a conglomerate belonging to it. It holds well rounded pebbles of white and brownish quartzite, of from one to three inches in diameter, in a matrix of sand, the whole forming a strong and solid rock. No dips were anywhere observed in it, and it is therefore impossible to state its thickness. Further on there are no exposures; but the drift is probably underlain by a continuation of the coal-bearing series, and the ground falls gently for two miles to the margin of the sea. The crystalline rocks which thus occupy the space between the coal-bearing areas on each side, are no doubt those which constitute the Beaufort Range of mountains. With the exception of the vertical portion in View Mountain, they all dip in one direction, namely eastward. Whether they are affected by undulations producing repetitions, has not yet been determined. But in order to shew in one view the supposed thickness to be dealt with in the investigation, they are here given in succession in what would appear to be a descending order, although it is possible that a fold may have occurred, causing a repetition of the beds:—

	Feet.
Measures concealed between the coal rocks and Mount Mark.....	2,240
Dark green diorites of Mount Mark.....	1,000
Whitish, bluish, dove-grey, yellowish, greenish and pinkish, crystalline, fossiliferous limestones, interstratified with dark and light-grey diorite.....	1,700
Measures concealed	3,332
Red ferruginous rocks, green diorites, which are often amygdaloidal, and epidotic rocks, with interstratified bands of bluish and greenish crystalline limestones	1,139
Measures concealed	352
Whitish, yellowish, and bluish limestones.....	176
Red ferruginous rocks and slaty diorites, underlain by yellowish, coarsely crystalline limestones, some of them crowded with crinoidal stems and with thin strings of what appears to be dolomite.....	308
Measures concealed	154
Red clay slates, interstratified with hard red bands, striped with green, all interstratified with red and pinkish limestones with obscure fossils.....	880
Red and grey clay slates, interstratified with bluish and grey limestones.....	1,320
Bluish-grey and yellowish white limestones, shewing obscure fossils in most parts, but distinct crinoidal columns at the base. These beds constitute View Mountain	1,760
Grey clay slates, interstratified with grey sandstones	968
Green dioritic slates, followed by bluish-grey clay slates resting on green diorite.....	2,112

“How far this great mass of rocks may descend in the series of geological formations, it would for the present be premature even to conjecture.”

The quality of the anthracite coal found on Queen Charlotte Island is excellent, as will be observed from a glance at the following analysis:—

Carbon	71.20
Moisture	5.10
Volatile combustible matter.....	17.27
Ash	6.43
	100.00

The percentage of carbon in this analysis brings it very close up to the Pennsylvania anthracite.

No examination has yet been made, by the officers of the Dominion Geological Department, of the coal to the north-west of Comox; but the following extracts from Mr. Robert Brown's Report of the Coal Fields of the North Pacific will be highly interesting:—

"*Sukwash*.—North of this locality the trap rocks only appear until we come to a stream called Sukwash by the Indians, two miles south of Fort Rupert, when it again makes its appearance under the same conditions as before. Here the Hudson Bay Company mined it for some time, but have long ago discontinued the works, which have again begun to be tried by another company, who propose to carry it to Fort Rupert Harbour as their port of shipment; but independently of other considerations, the usual financial troubles inherent in colonial companies will prevent this scheme being realized for some time at least. From Sukwash, is a valley which goes right through to Koskeemo Sound on the other side of the island. This basin is, I believe, one of coal deposit, and the coal at Sukwash is of the same nature, and continuous with the extensive coal seams of Koskeemo Sound on the other side.

"*Koskeemo Coal Seams*.—The sounds of Quatseeno and Koskeemo are situated on the north-west coast of Vancouver Island, about 240 miles seaward from Victoria. The sound is one vast harbour, entered from the Pacific, and ramifying into a south-east arm, an east arm, and a west arm. The land in the vicinity of this inlet was acquired by an English company some years ago, who expended a considerable amount of money in causing a proper survey to be made of their mineral riches. These surveys were chiefly confided to Mr. J. J. Landale, who has been already mentioned as an able mining engineer. In 1866, just before my return to Europe, I had the good fortune also to visit these sounds, travelling over the island with some Indians who had visited Fort Rupert of the Hudson Bay Company, where I was then staying. The Indians I found to be the mildest and most amiable of the class I have yet encountered, and during my examination of the shores (chiefly for botanical purposes), they showed me every attention and kindness. At the period of my visit there were no whites then living there, and accordingly my sole companions were the Indians, in whose company I remained for upwards of a week, travelling from the head of the East or Rupert Arm to the Pacific in their canoes, subsisting almost entirely by my rifle, having taken very little provision from the fort. Previous to my visit, Mr. Landale was good enough to favour me with a perusal of his MS. notes, which formed a useful guide to my geological examination of the coal seams. I found them exceedingly accurate, his examination having, from the length of time he resided in the locality, been much more minute than mine. What follows is derived almost entirely from his memoranda. However, without the use of sections and coloured geological maps, some portion will not be so intelligible as I should have desired.

"The coal-fields are situated on the north-western side of Rupert Arm, and are contained within an area of 5000 acres. The coal strata lie on a bed of calciferous sandstone many hundreds of feet in thickness—the last deposit being probably equivalent to the mountain limestone of older series. This coal-field has several peculiar stratigraphical features. While there are several beds of conglomerate through it, still two of them require particular attention, and form distinctive features in the basin. The one is of an aggregate thickness of 70 feet, overlying and in contact with the calciferous sandstone, and the other entirely above the coal; the former containing finer stones and pebbles, and having a dull reddish colour, owing to the presence of peroxide of iron; while the latter is coarser in its material, and not so firmly cohesive, and is, according to Mr. Landale, at least 100 feet in thickness. These two deposits may be classed as the (a) upper,

and (b) lower conglomerate of the series. By attending to the peculiarities described, it is easy to see when you are above or below the coal strata. Through the whole formation, consisting of coarse and fine conglomerates, sandstones, shales, fire-clays, and coal, are found fossiliferous beds. The contained fossils leave no doubt that the age of the beds are cretaceous, probably belonging to the same horizon as the Nanaimo strata. Dicotyledonous plants form the principal vegetable impressions, and calamite-like stems are common. Among other animal remains are *Belemnites*, *Ammonites*, *Plagiostoma*, *Inocerami*, *Hippurites*, various *Chama*-like shells, *Trigonia*, and some still more recent types as *Pectunculus sublevis*, *Astarte*, *Natica*, and *Paludina* (several species), all these overlying the coal-beds. Most of the shales are more or less bituminous, and the different seams of coal are characterised by a shining cubical fracture, by a regular lamination, and an almost complete exemption from sulphur in the "cutters" or vertical divisions. A large penine fault cuts off the whole basin by throwing it southwards, on which side of it are to be seen, at the surface, the calciferous sandstone whereon the basin lies, and also the underlying metamorphic rocks. The trap does not cross the great fault.

"The seams of this basin are five in number, and have been found in outcroppings on various parts of the field, and in sundry small shafts sunk by Mr. Landale. The dip is southwards, with an average indentation of 1° , $3\frac{1}{2}^{\circ}$, or 4° . The first seam is seen cropping out about two miles up the stream, called by the Indians *Natsenuchtum*. It varies in thickness from 2 feet 8 inches to 2 feet 11 inches, and consists of different varieties of coal. It is an excellent household coal; Mr. Landale informs me, in his opinion—the best on the coast. It contains an unusually high per centage of carbon—fully as high as the Queen Charlotte Island anthracite, to be hereafter described—so that it seems scarcely a secondary lignite. I presume the analyses to be correct. It is as follows:—

	1st Analysis.	2nd Analysis.
	In 100 parts not dried.	
Carbon	70.00	71.00
Hydrogen	5.30	5.35
Nitrogen.....	1.28	1.10
Oxygen	10.01	11.55
Sulphur	0.41	0.60
Ash.....	13.00	10.40
	100.00	100.00
Specific gravity	1.360	1.320

It evolves a strong, continuous heat, leaving a small bulk of pure white ash, easily fusible. The coke from it does not swell much. Mineralogically it has a cubical fracture, horizontal laminae, and vertical cleavage planes, with thin films of carbonate of lime. The basin is calculated to contain about 4000 acres of this coal, and to be capable of yielding 2100 tons per acre. Immediately above the next seam lies a fine building stone. The thickness of this coal seam is from 1 foot 10 inches to 2 feet thick. The coal is of a denser quality than the former, is well-fitted for coke making, swells considerably while burning in an open fire, and leaves a good deal of cinder. It is well adapted for smelting and smiths' purposes. There are about 3500 acres of this coal, computed by Mr. Landale to yield 2500 tons to the acre. Its mineralogical characteristics are cubical fracture, laminae filled with lignitic matter, lustre small. On analysis, it gives 100 parts—

	1st Analysis.	2nd Analysis.
	Not dried.	
Carbon	67.50	67.00
Hydrogen	5.15	5.10
Nitrogen	1.75	1.50
Oxygen	12.00	13.17
Sulphur.....	0.90	0.84
Ash	12.70	12.39
	100.00	100.00

"Of the next seam it is difficult to speak, as it is only seen in a vitrified condition, at one point, lying close on the fault to the west of a point known as "Adamson's Hut." It appears to be a hard coal, and, in its natural condition, probably of the cannel kind. The next seam is 2 feet 6 inches in thickness, highly impregnated with gas, and closely

resembling the Torbanehill or Boghead Gas Coal. It would probably yield paraffin by distillation. The bowl of a common tobacco pipe filled with this shale, powdered, gave a jet of gas for two minutes and a half, though the luting round the bowl was very imperfect. This seam resembles the Torbanehill in another particular, viz., in burning it looses immensely in weight, though but little in bulk. Mr. Landale computes that there are at least 4000 acres of this coal, capable of yielding 2250 tons to the acre. On analysis, it gave in 100 parts—

Carbon	60.436
Hydrogen	8.820
Nitrogen	1.235
Sulphur	0.300
Oxygen	4.551
Ash	25.168
	100.510

In appearance it is dullish black, with very little lustre.

“The fifth, or main seam, was found in a shaft close to Adamson’s Hut, in the West Arm. It is 4 feet 6 inches in thickness. There is some resemblance between this coal and that mined at Nanaimo. There is, however, this important difference, that the Nanaimo coal has its laminae and cleavage joints filled with a crust of earthy matter, consisting of carbonate of lime and iron, and often iron pyrites, to an extent which frequently renders the coal useless, while the only impurities in this seam are little laminae of shale of a dark colour, which burns nearly as well as the coal itself, the cleavage joints showing scarcely any sulphur, being very thin, and containing only a little lime. For steaming purposes an analysis of this seam shows it to be excellently adapted—

	1st Analysis.	2nd Analysis.
Carbon	66.15	68.15
Hydrogen	4.70	4.50
Nitrogen	1.25	1.10
Sulphur.....	0.80	0.70
Oxygen	13.50	11.50
Ash	13.60	14.05
	100.00	100.00
Specific gravity.....	1.320	

“The whole of the Koskeemo coal-basin is broken up by four faults into three great divisions. The quantity of coal contained in the basin (of nearly 8 square miles) would, according to the calculations already given, be about 41,350,000 tons; deducting, however, one-fifth for the action of the faults—a large estimate—there yet remains 33,080,000 tons, or 600,000 tons for a period of fifty-five years! Even this calculation does not embrace all, for the study of the Vancouver coal-fields shows that the lower conglomerate is rarely found nearer than 120 feet to the top of the series, and is generally much further off; so that, in going down beyond 120 feet, other seams of coal may be discovered of great extent and excellence. Many copper seams being found in this vicinity, as well as in many other parts of Vancouver and Queen Charlotte Islands, smelting works might be conveniently established here. An exuberant supply of the finest timber is everywhere found over the North Pacific coast. My opinion is decided that the Koskeemo coal-field is the best yet discovered in Vancouver Island, though unopened out, not only on account of the superior quality of the coal, but the ready accessibility of the mines from the Pacific, without the tedious inland navigation requisite for reaching the mines on the eastern seaboard of the island.

“Other localities.—The accompanying lithological characteristics of the coal strata do not disappear, except at intervals, down the whole west coast of Vancouver Island, until the cretaceous beds are again overlapped by the tertiary on the north shore of the De Fuca Straits. However, no coal has been found there; and in some places the rocks are highly metamorphosed, and for long tracts nothing but gneissose rocks, crystalline limestones, or traps are seen. The Indians told me of coal in Ouckucklesit Harbour, off the Alberni coast; but I could never get any specimens of it. At Alberni, the coal shales appear, but no boring has been made for coal, so that whether coal underlies them or

not is difficult to say. The little layers of coal which crop out here and there on the northern (Vancouver) shores of De Fuca Straits are, I am convinced, in every case of tertiary age, and continuous with the seams on the opposite shore at Clallam Bay."

The Nanaimo coal is bright, tolerably hard, and not unlike some of the best qualities of English or Welsh coal in appearance. It burns freely, with good heat, but produces a great amount of ash.

The coal mined by the Vancouver company and Wellington company are alike suitable for domestic purposes, and though both are used for furnaces, yet the latter is preferred as producing less slag. Gas, at Victoria, is manufactured at present entirely from the Vancouver company's coal.

The following is an analysis of a fair sample of the coal from Nanaimo:—

Carbon	66.93
Hydrogen	5.32
Nitrogen	1.02
Sulphur	2.20
Oxygen	8.70
Ashes	15.83
	100.00

Although coal at the pit's mouth ranges in price from \$5 to \$5 50 per ton, still it is of such excellent quality, that every ton raised finds a ready sale.

IRON.

Iron ore has been found from time to time in different parts of the Province, and recently deposits have been discovered on Texada Island, in the Gulf of Georgia, of inexhaustible quantity, and of the greatest value.

These deposits were examined, in 1874, by Mr. James Richardson, of the Geological Survey of Canada; and the following extract from his Report to Mr. Selwyn may prove interesting:—

"On the south side of Texada Island, about three miles north-westerly from Gillies Bay, and about seventy paces from the shore, a small exposure of magnetic iron ore was met with, associated with a coarse-grained epidotic rock, and grey diorite. Immediately north of this exposure the ground rises steeply to about 450 feet above the sea. Here on the eastern and south-eastern slopes of the hill, for 150 feet down, and extending from 200 to 250 feet in length, is an exposure of rich magnetic iron ore. On the out-crops facing to the north-west the ore-bed which dips from S. 58° E. to E. < 25°—30° is seen to be from twenty to twenty-five feet thick, and to rest on grey crystalline limestone, with which, for about two feet down, are interstratified bands of ore, of from half an inch to one inch in thickness. The hill still rises to the north and north-east, but along the flank, and at about the same elevation, in a north-westerly direction for nearly a mile, the ore is occasionally seen, and in one place there is a continuous exposure of it for about 250 feet, the bed apparently varying in thickness from one foot to ten feet. In the concealed intervals its course appears to be indicated by a coarsely crystalline epidotic rock carrying ore in places, but with the grey limestones apparently overlying it to the north-east, and the grey and green dioritic rock beneath it to the south-west. Where the ore-bed is exposed in this part of the hill, a similar arrangement of the beds is observed, and what here appears to be the base of the limestone exhibits interstratifications of ore similar to those described at its summit in the first exposure. An overturn dip is probably the cause of the apparent differences in the arrangement of the beds. In a north-easterly direction from the first noticed exposure for a quarter of a mile no ore is seen, after which it is again found, at first in irregular patches mixed with epidotic rocks, and then, its course becoming more northerly, for more than half a mile the bed presents an irregular surface exposure of from 600-900 feet of nearly pure ore. In this part the dip could not be ascertained with certainty, and I am therefore unable to estimate the thickness of the ore. Loose pieces of limestone, with interstratified ore-

bands, were found on the west side, while to the east the ore is bounded by grey and green dioritic rocks.

"Circumstances did not admit of my remaining on the island long enough to trace the continuation of this valuable deposit of iron ore. Mr. Henry Trim, of Howe's Sound, however, who has explored the island, informed me that the ore is to be seen occasionally in considerable exposures to near the north-east coast of the island, a further distance of more than three miles.

"These iron ores could scarcely be more favourably situated than they are, either as regards mining, smelting or shipment. There is deep water close to the shore, and wharves might be easily and cheaply constructed, at which vessels could always load in safety, except during the heavy south-east winds which occur occasionally from the middle of September to the end of March. But during these, Gillies Bay, only three miles distant, would afford a safe and convenient harbour of refuge. There is also another harbour at the north end of the island, about seven miles distant, which would afford shelter in all weather. The site of the ore is eighteen miles from Comox Harbour, twenty-one miles from Deep Bay, and about twenty-three miles from Fanny Bay. These are all good and safe harbours, and are only a short distance from the productive coal-seams of the Comox area. In the event of charcoal being required for smelting the ore, abundance of wood suitable for making it can be procured on the island."

COPPER.

In the remarks made upon the Hope silver leads, it will have been observed that one of the ores there, in which silver exists, is described as argentiferous grey copper; there is, however, no assay of this ore available from which the percentage of copper could be estimated.

There is no doubt that copper is widely distributed throughout the Province, the crystalline rocks being invariably more or less stained with copper, while the submarine cable from Vancouver Island to San Juan, on being lifted, is always discovered to be corroded and encrusted with deposits of copper.

Copper ore, *in situ*, has been found in various parts of the Province, notably at the entrance of Howe Sound. Here, a well-defined lead of excellent copper pyrites, giving some 30 per cent., was discovered in 1865, and worked for some time, with excellent prospects of success. Want of capital has caused the operation to be suspended, if not abandoned.

Copper was found near Sooke in 1864, and efforts were made to develop this industry in that locality, but no defined lead could be discovered.

Copper has been found also on Knight's Inlet. White men, trading at the head of this Inlet, have obtained, by gift or purchase, considerable quantities of excellent copper ore from the Indians, who, there is reason to believe, are aware of the existence of valuable leads. Parties of white men have from time to time endeavoured to discover the exact locality, but hitherto without success. The Indians cannot be induced to point out to the white man the lead from which they have taken the specimens.
