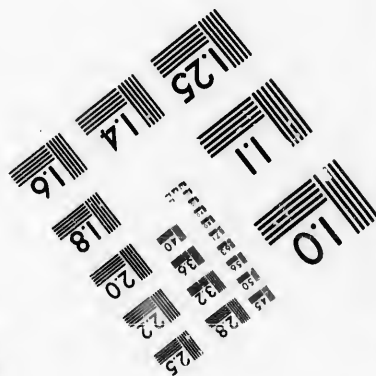
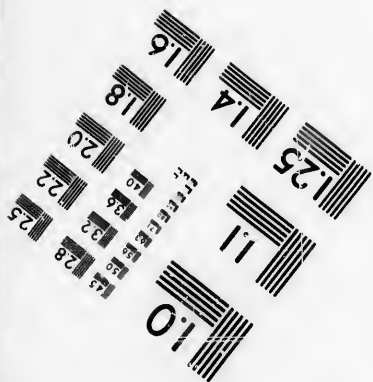
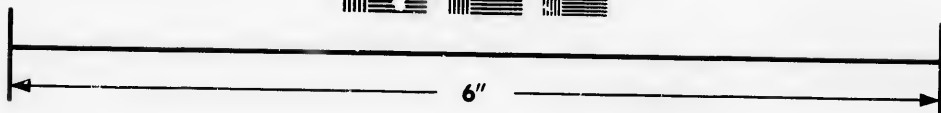
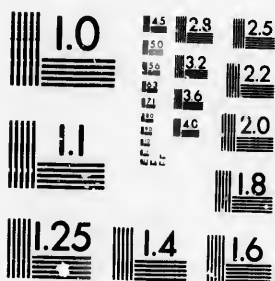


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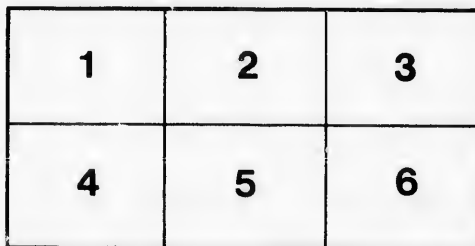
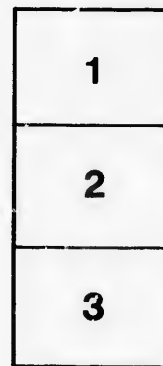
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Gold

MINING IN BRITISH COLUMBIA.

By THOS. DRUMMOND,

MINING AND CIVIL ENGINEER, A.M.CAN.SOC.C.E.

Before the discovery of gold in British Columbia, or what afterwards became known as that province, it was a comparatively unknown country, under the control and government of the Hudson Bay Company, whose interests were bound up in the fur trade, and in that alone. In 1849, the Company's headquarters were removed from Fort Vancouver, on the Columbia River, to Fort Victoria, on Vancouver Island, which had been established in 1843. In 1851, James Douglas was made Governor of the Colony, vesting in his person the authority both of the Hudson Bay Company and the Colonial Government. In 1856, Vancouver Island was divided into four electoral districts, and seven members were elected. At this time the united white population of the island was about 300. After the discovery of gold on the mainland in 1857, and the consequent rush to the new country, Douglas was forced, by the increased responsibility of government caused by the conflicting interests of the fur traders and gold miners, to resign his position as head of the Hudson Bay Company, which he did in 1859. In the same year the Imperial Government re-purchased the exclusive right of the Hudson Bay Company to trade, and the Company, as a monopoly, ceased to exist on the Pacific Coast. In 1858, the Province of British Columbia was created, and Douglas became its first governor.

The discovery of gold then marks a new era in the history of the country, and though the stirring events of that time are now things of the past, still they are not without interest, for with them begin the real history of the province, which, from being a country comparatively unknown, was raised to the dignity of being one of the great gold-producing centres of the world.

People by the thousands and tens of thousands rushed to its shore, and in their search for the precious metal also discovered the capabilities of the country; so that, after the gold excitement, many settled down, and formed, so to speak, the nucleus of the future growth and prosperity of the province.

In the first part of this paper, then, I propose to give a history of the more important discoveries of gold, and the dates at which they occurred, and also a short description of the methods adopted in separating the gold from the alluvial washings in which it is found.

Before going on with the paper, I would like to state that, in the absence of actual statistics, the subject matter of this paper has been obtained from the most reliable sources available. In many cases from personal observations, and, where I had not that opportunity, from miners and others who actually worked at the places to be mentioned later on—men to whom I am greatly indebted for information, and whom I knew personally to be little given to exaggeration. Statements were verified by comparisons when possible, and different authorities who had written upon the subject were also consulted, such as Dr. Selwyn, Dr. Geo. Dawson, and other members of the Geological Survey of Canada, Baneroff's History of British Columbia, Sessional Papers and Reports of the Provincial Government, J. W. McKay, and many others; so that, though the information and figures given are not in the nature of actual statistics, still they are near approximations of these taken from the most reliable sources. I mention this because reliable information upon this subject is difficult to obtain, and were all statements accepted this would read more like fairy land than what I wish it to be: a sober history of events which have occurred in the history of British Columbia, and which there is every reason to suppose will be repeated in the near future

in a more permanent form when the discoveries in quartz, even those already made, have been sufficiently developed to shew their value.

For convenience, I have divided the subject into—

- (1) Placer Mining.
- (2) Vein Mining.

The first authentic discovery of gold in British Columbia, or what afterwards became part of that province, was at Gold, or Mitchell's Harbour, on Queen Charlotte's Island, in 1851. The discovery was in the form of a nugget weighing about five ounces, found on the seashore by an Indian, who sold it to the Hudson Bay Company. A vessel was shortly afterwards sent out by the latter to examine the locality, resulting in the discovery of a small vein of quartz containing gold, from which it is estimated that ore to the value of \$20,000 was obtained by the Hudson Bay Company and other adventurers. The deposit then proving limited, it was abandoned. About the same time, or a little earlier, Mr. McKay also found colours of gold at various places on Vancouver Island, between Victoria and Nanaimo, when exploring for land.

Hudson Bay Company's Journals also state that in 1852, Indians brought samples of gold from the Skeena River. G. B. McClellan's party also discovered gold on the Similkameen River in 1853, when engaged on exploratory surveys for the Northern Pacific Railway.

Gold was also discovered at Pend d'Oreille by Colville men in 1854 or 1855, and worked with success, and the finding of gold in British Columbia was a direct result of this discovery, for Indians from the Thompson River, visiting their friends near Walla Walla, stated that gold like that was found in their country. Accordingly, some French Canadians and Indians crossed over and discovered paying placers in the vicinity of Neocozan, on the Thompson River, in the fall of 1857. The news spread and caused the Fraser River excitement of 1858. California was at this time filled with a mining population, attracted there by the gold excitement of 1848 and 1849, and when the authentic discovery of gold on the Fraser River became known, a perfect rush was made for the new El Dorado. From thirty to thirty-five thousand people are said to have come into the province early in 1858.

Many of these became discouraged and turned back, but those, however, who did reach the Fraser River, pushed their way onward and found gold in paying quantities on the bars and tributaries, from the mouth of Harrison River up both the Thompson and Fraser Rivers as far as the season of 1858 would allow them to go. Some of the more important of these bars were as follows:—Maria, Hudson, Cornish, American, Union, Cameron, Emory, Texas, Hills, Sailor, Wellington, Spuzzan, Chapman, Nicaragua, Boston, Yankee, Mariner's, Lytton, Morman, Foster, Lillooet, French, Robison, Upper Morman, British, Ferguson, and Long Bars.

Of these, Hills Bar, just below the town of Yale, may be taken as an example of the richest. It is reported to have produced \$1,400,000 worth of gold during the excitement, from an area of less than half a square mile, and from a report of the Minister of Mines in 1875, it is credited with having produced up to that time \$2,000,000. On this bar four men washed \$4,000 in six days. Ned McGowan, of historical fame, took out \$33,000 in three months. It is also said that the present site of the town of Yale with the flat opposite would yield a large amount of gold if worked by hydraulic power, and I understand that a company is now being formed with that object in view. The gold in the bars especially below Yale was fine, and in shallow ground, and at first they were only mined a little below the surface of the river, and in the most primitive manner with pick, shovel, rocker and pan, and yielded, when worked even in this way, large returns of gold. Between Yale and Hope one rocker yielded \$830 in eight days, another \$800 in twelve days, and a third \$248 in five days, and at Yale 150 sockers gave in one day 723 ounces. Sailor Bar is said to have averaged one ounce a day per man and two to five ounces was quite common. As the surface of the bars was washed out, wing damming was resorted to, where possible, to reach deeper ground. Many flumes and ditches were also built to carry water to the benches along the river; they varied in length from one to fourteen miles, and cost many thousands

of dollars. Water wheels were also built, one below Cornish Bar being 30 feet in diameter.

These pioneers and prospectors had many difficulties to overcome in making their way up to the new diggings. At first there were no steamers to the mouth of the Fraser, and afterwards when there were, a great many were unable to pay their way, so they went from Victoria to the mainland in canoes and small craft built by themselves, and many were lost in the dangerous tide rips and currents of the coast. Early in 1858, it was found that the Fraser River was navigable as far as Yale, which became the distributing point for the upper country. Beyond this, the country was rough, mountainous and comparatively unknown, and travelling by land and water was hard and laborious work. Supplies were scarce and difficult to transport, and the Indians for a time were hostile. Is it strange then that many became discouraged and turned back? The wonderful thing to my mind is, that so many succeeded in forcing their way onward through so many difficulties and dangers.

In the fall of 1859, rich diggings were discovered on Quesnel River, and this stopped the onward march for a time.

In 1860, Koithley Creek was discovered, and this marks a renewed era of prosperity in mining, for with it was discovered the famous Cariboo District, one of the richest placer mining centres ever found.

In the winter of 1860 and 1861, miners discovered Antler Creek. They tried to get a grant of this stream from Governor Douglas in Victoria, but it was refused. The news became known and caused a second influx of miners, this time to the Cariboo District. During the same year (1861) William's, Grouse, Lightning, Jack of Clubs, Lowhee and other creeks, which have since become famous were discovered. Of these, William's, Grouse, and Lightning were the richest. These creeks with their tributaries yielded, up to the end of 1861, some \$2,000,000.

William's Creek was discovered by William Dietz, better known as Dutch Bill. He located in the cañon, and his claim, though the Discovery, turned out to be one of the poorest on the creek. Other owners located ground along the creek about the same time. The ground was supposed to be shallow, the yield of gold was poor, and the creek was known for a time as Humbug Creek. The first run of gold was found in shallow ground over a stratum of blue clay. To test below this, Abbott & Co. sunk a hole 4 x 7 feet and took out 57 ounces of gold, and the other companies soon followed their example. Deep ground was located in an old channel behind the cañon and also below it by Black Jake, Barker, Cameron, and others, and Barkersville, Cameron Town, and Richfield were started. Starting at the head of the stream and going downwards, some of the claims were as follows:—

Steele & Co.,	Lilloet Co.,
Point Claim,	Forest Rose,
Abbott & Co.,	Cameron & Co.,
12 Foot Davis,	Tinker Co.,
Adams & Wilson,	Raby & Co.,
Casto & Co.,	Caledonia Co.,
Dutch Bill,	Grizzlie Co.,
Diller & Co.,	Never Sweat Co.,
Canadian Co.,	Ballarat Co.,
Welsh Co.,	Prince of Wales,
Wake Up Jake Co.,	Sheepshead,
Cariboo Co.,	Coonskin,
Aurora,	—and others,

As may be seen from the following examples, William's Creek was immensely rich. Diller is said to have taken out 202 lbs. of gold in one day, with only two men drifting: this represents about \$38,784. Steele & Co.'s claim yielded on two consecutive days 387 and 409 ounces of gold, and in two months, \$105,000. The Cunningham claim averaged 125 ounces of gold for the season of 1862, and on several occasions gave 600 ounces, or 50 lbs. a day. The Adams claim yielded each of its three owners, \$40,000. The Caledonia gave for a time \$5,000 to \$6,000 a day, and the Cameron and Tinker were not far behind.

The Raby, in one day, yielded 310 ounces of gold as witnessed by

Milton & Chendle. The Point Claim yielded \$90,000 in dividends. The Wattie claim, \$85,000. The 12 foot Davis, a gore between two other claims, \$25,000. Diller took out \$100,000. Cariloo Cameron, \$160,000. In 1863, three claims below the cañon produced \$300,000, and 20 claims were steadily producing from 70 to 400 ounces per day. In the Aurora one pan of picked dirt is said to have yielded 387 ounces, and \$600 to \$900 to the pan was obtained on several occasions. The Briscoe claim, according to *Victoria Colonist*, produced for seven consecutive weeks, between June 17th and July 29th, 1864, as follows:— 900, 640, 1,400, 1,926, 1,256, 1,300, and 2,600 ounces. Two miles of creek is said to have averaged \$1,000 to the running foot, and that this is within possibilities may be seen from the following statement:—

Adams' Claim.....	100 feet	\$ 120,000
Steele "	80 "	120,000
Diller "	50 "	240,000
Cunningham "	500 "	270,000
Burns "	80 "	140,000
Canadian "	120 "	180,000
Never Sweat "	120 "	100,000
Moffat "	50 "	90,000
Tinker "	140 "	120,000
Watty "	100 "	130,000
	1,340	\$1,510,000

—or say \$1,127 per running foot of creek.

Next in importance and richness was Lightning Creek, also discovered in 1861. For a time the annual yield is said to have been larger than on Williams Creek, but it was not so lasting.

In 1861 the Campbell & Whitehall adjacent claims yielded \$200,000, and Campbell is said to have taken out 1700 ounces of gold in 3 days, as follows:—1st, 900 ounces; 2nd, 500 ounces; 3rd, 300 ounces. In 1876 the deep channel was bottomed, leading to the subsequent discoveries. At one time the Butcher, Aurora and Caledonia claims yielded respectively as follows:—Butcher, 350 ounces per day; Aurora, 300-600 ounces per day; Caledonia, 300 ounces per day. The old channel was worked for a distance of 16,000 feet, and is said to have yielded \$300,000 to the running foot. The following statement, taken from the report of the Minister of Mines for 1875, showing the yield of some of the more important claims, will give some idea of the amount produced by this Creek:—

Campbell & Whitehall.....	\$200,000.00
Dutch & Seegel.....	130,000.00
Dunbar.....	30,000.00
Lightning.....	153,962.00
Discovery & Butcher.....	120,000.00
South Wales.....	141,531.00
Spruce.....	99,908.00
Point.....	136,625.00
Van Winkle.....	363,983.00
Victoria.....	451,642.00
Vancouver.....	274,190.00
Vulean.....	56,955.00
Costello.....	20,476.00

A statement obtained by myself from miners, and supposed to give the total yield, is also given. The figures are much larger, and are perhaps exaggerated, though given for a later period than the above:—

Van Winkle.....	\$600,000.00
Victoria.....	600,000.00
Vancouver.....	300,000.00
Point Claim.....	180,000.00
South Wales.....	200,000.00
Lightning.....	220,000.00
Butcher Bench.....	250,000.00
Dunbar Flat.....	150,000.00

\$2,500,000.00

Grouse Creek was also very rich. Mr. Heron, the discoverer of the famous Heron head, told me that his company took out from 100 to 400 ounces per day, and made \$300,000.00. The old channel was followed for about a mile, giving immense yields, and was then lost.

Antler Creek also yielded a large amount of gold, both from the benches and gulches, and also from the bed of the stream. The gold was taken from shallow ground, as the stream was never bottomed. One company made \$83,000.00 in 3 weeks. The creek yielded \$10,000.00 a day for some time in 1861, and some spots are said to have yielded as much as \$1,000.00 to the square foot. Besides these, there were Jack of Clubs and Lowhee Creeks, and all the tributaries, gulches and ravines of the above streams, which, though not so rich, yielded in the aggregate a large amount of money and many independent fortunes. Some of these were as follows:—Van Winkle, Chisholm, Last Chance, Davis, Anderson, Harvey, Cunningham, Cedar & McArthur's Creeks, and numerous gulches, ravines and valleys.

These deep placers, however, were expensive to open before any return was obtained, and the actual working expenses were also heavy. The Van Winklemine cost \$40,000.00 to open before the channel was reached; it yielded a large amount of gold afterwards, however, 3 consecutive weekly clean-ups being as follows \$15,700.00, \$14,000.00 and \$12,000.00; Cunningham Chair cost \$100,000.00 to open work, and yielded \$500,000.00. The California Claim, about the same cost and yield, also the Tontine. The Black Jack cost about \$50,000.00 to open and work, and yielded \$200,000.00. In Raby & Co's claim the pay roll for 2 weeks is said to have amounted to \$12,000.00. Mr. Heron, the discoverer of the famous Heron Lead on Grouse Creek, told me that their weekly pay roll amounted to from \$1,200.00 to \$2,300.00. The great expense of working can easily be accounted for. The pay dirt was deep all the way from 30-90 feet, large pumps were required to keep the water down, often long bed rock ditches for discharging water were required, and expensive timbering was also necessary.

The timber, which was massive, cost 8c. per running foot, and lagging \$7 a hundred pieces. The District was also far removed from any civilized centre, and provisions, supplies and transport were expensive, as may be seen from the following statement, which may be taken as an example of the highest prices paid at Cariboo at any time.

Flour.....	\$1.50	per pound
Bacon.....	1.50	“
Tea and Coffee.....	3.00	“
Sugar.....	1.50	“
Beef (fresh).....	0.60	“
Beans.....	0.75	“
Nails.....	0.75	“
Boards.....	0.25	per foot
Gun boots.....	\$30.00 to \$50.00	a pair
1 spool thread.....	\$0.50	
1 clay pipe.....	\$0.50	
1 needle.....	\$0.50 to \$1.00	
Wages per man per day.....	\$10.00 to \$16.00	

Packing from Quesnel Mouth to Williams Creek by mule power cost from \$0.85 to \$1.00 per lb.

Exorbitant freight rates consequent upon the inadequate preparations for the great rush were the causes. "It is not the first cost of the goods," said a trader to a miner, when selling him a darning needle for a dollar; "it is not the first cost of the goods, mine friend, it is the freight."

The distance to Cariboo via Harrison River was 520 miles. Lillooet was the headquarters for the pack trains, which were inadequate to accommodate the great numbers, who, therefore, had to resort to all kinds of devices, packing on the back, with dogs and with oxen. Mr. Cammel, who is well and favourably known at Kamloops, told me that he bought an ox at Lillooet, which was the first pack animal to go into Williams Creek, where it was killed, dressing some 900 lbs., and sold for 60c. per lb. Camels were also imported for packing purposes, several of which are still alive, and to be seen not far from Kamloops. The wagon road to Cariboo was finished in 1865. Stages were run, carrying passengers, mail and express, and easier access and cheaper supplies were the result,

The telegraph line was also bought by the Provincial Government about the same time. This telegraph line is famous, for it formed part of the line built by the Western Union Telegraph Co., which was to have crossed at Behring's Straits, and which was rendered useless as a transcontinental line by the successful laying of the Atlantic Cable.

I have given a somewhat detailed description of the Cariboo District, because it was the most important of the British Columbia discoveries, and it gives, at the same time, a good example of typical life at a successful mining camp. As might be expected, lawless characters congregated, and gambling and kindred vices were prevalent. A Spanish packer, being asked if the Cariboo diggings were rich, answered that he had doubted it till he saw \$27,000 00 gambled away in one sitting by three miners. But wise, just and capable men were in charge, and not a single case of murder is said to have occurred in Cariboo, which is an agreeable contrast to the scenes enacted at the mining camps in the neighbouring Republic. Chief Justice Begbie was a terror to evil-doers, to whom sure and impartial judgment was administered. Crime became comparatively unknown, and fire arms were practically discarded. This is all the more surprising, when we consider that the yield of gold was measured, not by the ounce, but by the pound; it became so plentiful that it was troublesome to ground, and miners returned ragged and rough, with so much gold, that men and mules had to be engaged to transport it. According to Macfie's estimate of those who went to Cariboo in 1861, one third made independent fortunes, one-third made several thousand dollars, and one-third returned unsuccessful.

During the Cariboo excitement, mining camps of less importance were almost depopulated, and were only worked during later years when the Cariboo excitement had subsided. Among these were Tranquillo Creek, Louis Creek, Jamison Creek, Barriere River, Adams River and Lake, Deadman River, Nicola River, Scotch Creek, and, in fact, nearly all the streams running into the Thompson River in the vicinity of Kamloops. They were discovered principally in 1858 and 1859, and, in many cases, have been worked almost without intermission ever since, principally by Chinese.

ROCK CREEK AND SIMILKIMEEN DISTRICT.

Discovered in 1859 and 1860, and mined to some extent at that time and then abandoned for Cariboo.

Between 1882 and 1888, mining was renewed, and many new discoveries made. The principal streams worked up to date are as follows:—

Similkimeen River,	Cedar Creek,
South Fork, Similkimeen River,	Slate Creek,
Whip Saw Creek,	Bear Creek,
Nine Mile Creek,	Rock Creek,
Tulimenee River,	Boundary Creek,
Granite Creek,	Mission Creek,
Collins' Gulch,	Cherry Creek.

This district yielded between 1885 and 1888, \$553,500, out of which Granite Creek produced \$383,000. The latter creek was discovered in 1885, and caused quite an excitement for a time.

Cherry Creek also yielded well, and has been worked almost without intermission ever since; in later years, principally by Chinese. I saw a piece of ground in this stream which had been worked over three times in seven years, and was then, according to Chinamen working there, yielding from \$3 to \$5 a day per man.

EAST AND WEST KOOTENAY DISTRICT.

First discovered in 1863. In 1865, 1,000 miners at work, getting from one to three ounces a day per man. The yield between 1874 and 1888, after the more successful days, was \$582,878. This also includes returns from the Big Bend country.

The principal streams were

Wild Horse Creek,	Toby Creek,
Bull River,	Cañon Creek,
Findlay Creek,	Quartz Creek,
Dutch Creek,	Perry Creek.

The streams were discovered at various times between 1863 and 1888. Wild Horse Creek produced, between 1878 and 1888, \$255,780.

HIG HEND DISTRICT.

The principal streams mined were as follows :—

French Creek,	Carnes' Creek,
McCulloch's Creek,	Smith's Creek,
Downie Creek,	Fernie Creek.

It was discovered in 1865, and the principal mining was carried on in 1866, and in that year French and McCulloch's Creek each produced about \$100,000, and four, six, and twelve ounces per day per man was not uncommon. One nugget worth \$253.00 was found.

OMENICA REGION.

Discovered in 1869. The principal streams were :

Vital Creek,	Lost Creek,
Silver Creek,	Black Jack Gulch,
Omenica River,	Pinlay River,
Germanson Creek,	Bars on Peace River.
Mansen Creek,	

This district produced between 1874 and 1888, \$350,000. This does not include the first and more prolific years, the yield of which is unknown.

CASSIAR DISTRICT.

The Stikeen River was first discovered in 1861 and worked for a time, but not with great success.

Cassiar proper was discovered by Thibert and McCulloch, who came overland from the Red River country. The district yielded, between 1873 and 1888, about \$5,200,000. The principal streams were :

Dease Creek,	Walker's Creek,
Thibert Creek,	Snow Creek,
McDames' Creek,	Quartz Creek,
First North Fork of McDames' Creek,	

Miners went to Cassiar by ocean steamer from Victoria to Fort Wrangell, at the mouth of Stikeen; then up the latter river for a distance of 150 miles to Glenora Landing by river steamers. Then across an 80 mile portage to Dease Lake, where a small steamer had been built. The Stikeen River runs within three miles of Dease Lake; but it is not navigable on account of the great cañon of the Stikeen, about 90 miles long.

A trail was cut from Quesnel Mouth to Dease Lake, a distance of about 425 miles. During the first year, freight across the 83 mile portage was 50 cents per pound, and poor pack-horses cost \$250 each.

YUKON DISTRICT.

Though this is beyond the boundary of British Columbia, I have included it here because its discovery is due to a great extent to the miners from Cassiar.

The principal streams are :

Sayya Creek,	Ross River,
Finlayson River,	Stewart River,
Lewis River,	Forty Mile Creek,
Big Salmon River,	Sixty Mile Creek,
Upper Polly River,	

Rich diggings have been discovered, but, owing to the remoteness of the district, difficulty of obtaining supplies, and shortness of the season, it has not been worked to a great extent as yet.

SKEENA RIVER AND STREAMS OF THE COAST RANGE.

These include :

Skeena River,	Lorne Creek,
Seymour Creek,	Bones Gulch,
Prospect Creek,	Douglas Creek.

Lorne Creek was the best, and produced as follows :—In 1844, \$17,000; 1885, \$18,000; and in 1886, \$12,000.

VANCOUVER ISLAND.

Leech River, Nanaimo River,
Sooke River, San Juan River,
Jordan River, Cowachin River,

were the principal streams; of these, Leech River is said to have produced \$150,000; and Jordan River about \$35,000.

A tabular statement from the Report of the Minister of Mines, shewing the total estimated yield of gold between 1858 and 1888, is as follows—

GOLD PRODUCTION.

TABLE shewing the actually known and estimated yield of gold; the number of miners employed; and the average earnings per man, per year, from 1858 to 1888, in the Province of British Columbia.

YEAR.	Amount actually known to have been exported by Banks, &c	Amount added to represent gold carried away in private channels.	Total.	Number of Miners employed	Average yearly earnings per man.
	\$	\$	\$		\$
1858 (partial return.)	513,000	*765,000	3,000	235
1859.....	1,211,304	1-3rd 463,768	1,615,072	4,000	403
1860.....	1,671,410	" 557,133	2,228,543	4,100	566
1861.....	1,999,589	" 666,529	2,666,118	4,200	631
1862.....	1,992,677	" 664,226	2,656,903	4,100	648
1863.....	2,935,172	" 978,391	3,913,563	4,400	889
1864.....	2,801,888	" 933,962	3,735,850	4,400	849
1865.....	2,618,401	" 872,861	3,491,265	4,291	813
1866.....	1,996,580	" 665,526	2,662,106	2,982	893
1867.....	1,860,651	" 626,217	2,486,868	3,041	811
1868.....	1,779,729	" 593,243	2,372,972	2,390	992
1869.....	137,234	" 443,734	1,774,378	2,369	749
1870.....	1,552,717	" 334,239	1,336,956	2,31	569
1871.....	1,349,580	" 449,860	1,799,440	2,450	734
1872.....	1,208,229	" 462,743	1,616,972	2,460	671
1873.....	979,312	" 326,437	1,305,749	2,360	567
1874.....	1,383,464	" 461,154	1,844,618	2,868	633
1875.....	1,856,178	" 618,726	2,474,904	2,924	1,222
1876.....	1,339,986	" 446,662	1,786,648	2,282	784
1877.....	1,206,136	" 462,045	1,668,182	1,960	820
1878.....	4,062,670	1-5th 212,531	4,275,201	1,883	677
1879.....	1,675,049	" 216,069	1,296,058	2,124	607
1880.....	844,856	" 168,971	1,013,827	1,955	518
1881.....	872,281	" 174,456	1,046,737	1,898	551
1882.....	795,071	" 159,014	954,085	1,738	548
1883.....	661,877	" 132,375	794,252	1,965	404
1884.....	613,304	" 122,861	736,165	1,858	396
1885.....	594,782	" 118,956	713,738	2,962	246
1886.....	753,043	" 150,608	903,651	3,147	287
1887.....	578,924	" 115,785	693,709	2,312†	296
1888.....	513,943	" 102,788	616,731	2,007	307
Total known and estimated yield of gold, 1858 to 1888..			54,108,804		
Average number of miners employed yearly.....				2,775	
Average earnings per man per year.....					62†

* Waddington's estimate.

† Exclusive of a number of men working on or prospecting for quartz.

From it, the total yield of gold is \$54,108,804. Assuming that the average value of the gold was \$16.75 per ounce, this gives 3,230,377 ounces, or 269,200 lbs., and, taking the specific gravity of the gold as being 19, a cubic foot weighs 1,000 lbs. This gives 269.2 cubic feet, or it may be represented by a solid pyramid, with a square base, whose sides are six feet and height 224 feet.

Of this amount, Cariboo is credited with producing about one-half. According to this statement, the average earnings per man, per year, for thirty-one years, was \$622. Another average is from 1,200 miners, who crossed the bridge at the mouth of the Quesnel early in 1861. Twenty soon returned, discouraged; the remainder returned in the fall, bringing down as their season's earnings, \$1,500,000—or say, an average of \$1,272 each.

From the foregoing you may, perhaps, imagine that placer mining has ceased in this province; this, however, is not the case—it has certainly fallen off from the yields in the palmy days, but, as may be seen from the statement, it still produces annually nearly \$800,000 worth of gold.

The shallow placers are, of course, practically exhausted; but, with better roads, cheaper supplies, improved machinery, and the method of

working by hydraulic power, the miner still obtains a good return for his labours, and will for many a year.

There is little doubt, also, that during the course of the next few years much of the deep ground in the Pig Bend, Kootenay, Similkameen, Cassiar, Cariboo, and other districts, which, from its remoteness, was abandoned during the early days, will be tested and yield rich returns.

It is quite in the region of possibilities that new and rich placers may be discovered. The district between the head waters of the North Thompson and Cariboo is looked upon as being one of great promise.

Dr. Geo. Dawson, and other authorities of the Geological Survey, also consider that it is quite possible, if not likely, that rich placers may be discovered belonging to older formations and periods than those which have been worked. Such, for instance, as the extensive gravels of the Middle Tertiary, which were afterwards covered by basalts and other igneous rocks, and there is reason to suppose that the modern placers have been considerably enriched by the robbing of these old gravels. Still older conglomerates, as far back as those of the Carboniferous, have been successfully worked in several countries. These considerations are not merely of a theoretical nature, but are warranted by experience gained in California and other localities in the United States, in Australia, in New Zealand, and in Nova Scotia.

I have treated this part of the paper more in detail than I first intended, but I think it deserves attention because, as far as I am aware, it is not generally known that the Province of British Columbia has and still is producing gold in such quantities; and, in view of the discoveries of quartz within the past few years, I think it is only fair that attention should be directed to this point.

Before going on with the paper, it is, perhaps, not out of place to say a few words regarding the origin of the gold in the sand and gravel.

One theory is that, through the action of *organic acids* and *alkalies*, the gold is brought into a state of solution, and in this condition is carried by streams to other localities, where it is re-precipitated in the form of nuggets by organic matter, such as fragments of coal, etc. In a geological sense, then, gold may be, and probably is, largely distributed in this way. The usual theory, however, is that, through the agency of air, frost, etc., pre-existing vein matter and rocks containing the gold became decomposed and destroyed, and the indestructible gold is then deposited in a concentrated form in the various localities, where it has been found by the following agencies:

- (1) The present system of water courses.
- (2) Older systems of water courses, following the same general directions as the present systems, and in many places coinciding with the latter.
- (3) Still older water systems.
- (4) By the action of glaciers.

By these agencies, then, the gold is deposited with varying richness in many localities. In the beds of modern streams, in the older channels, on benches, in gulches, valleys, and ravines; sometimes near the surface, but often deeply buried under barren soil or igneous rock. Being found under so many varying circumstances, much must be left to the ingenuity of the miner. The general principles, however, for working are about as follows:—

METHODS OF WORKING PLACER MINES.

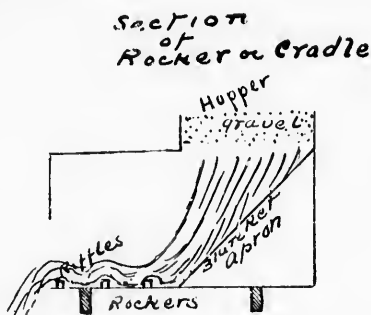
The following tools, appliances, and requisites are used in one form or another in placer mining, though, in individual cases, all may not be required. A plentiful supply of water, picks, shovels, axes, drills, hammers, crowbars, wheel-barrows, hoisting bucket, rope, nails, magnet, blow-pan, cross-cut saw, whip saw, small car, miners' pan, cradle, quicksilver, pumps, derricks, water-wheels, sluices, wing dams, etc.

Most of the above appliances are in such general use that a description is unnecessary; with the following, however, it is not out of place:—

The *Miner's Pan* is made of pressed sheet iron, is circular in form, about 14 inches in diameter on the bottom, 18 inches on the top, and five inches deep. It is used for separating the gold from the gravel by

a sort of circular motion, given to it in water, the pan at the same time being held in a sloping position. By this means the lighter sand and gravel drops over the lower side, while the black sand and gold remains behind. The remainder is then dried on a shovel or fry-pan in the fire, and the black magnetic sand is then removed with the blow-pan and magnet. The pan is also used for cleaning concentrates from sluices and cradles, and also for washing gold amalgam where mercury is used. It is especially useful as a prospecting tool.

The *Cradle or Rocker* is also of more importance as a prospecting tool. It is a rough wooden box, say 40 inches long, 20 inches wide, and 20 inches deep. On the bottom it is fitted with rockers like a baby's cradle, and it is slightly inclined, say two to four inches. At the upper end, and on the top, is a hopper, or coarse sieve, into which the gravel is thrown. The finer portion of the latter passes through and falls into the apron usually made of blanket. On the bottom, below the apron, riffles are placed, and the lower end is left open. The dirt is shovelled into the hopper, water is poured in with one hand, while the rocking motion is given with the other hand. The fine dirt and gold passes through, some of the gold is caught in the nap of the blanket, the balance on the riffles, while the water and waste dirt runs out at the lower end. The following is a sketch shewing a section of the rocker.



A *Puddling Box* is sometimes used, especially if there be much clay. It is a box of any size, and has an auger hole about four inches from the bottom. The auger hole is plugged, the clay put in and puddled with plenty of water. The water and suspended clay is then run off through the hole, leaving the black sand and gold as before.

The *Wing Dam* is to turn the water from the claim. It starts at the head, runs in a slanting direction across the stream till about one-half is taken in, and then runs straight down for the remaining distance. The whole is weighted with heavy stones to keep it in place, and filled with soil and gravel to make it water-tight. It is built of timber. The space within the dam is then worked down to bed rock, and the dam is finally changed over to the other side, which is worked in the same way.

The *Water Wheel* is used for hoisting purposes and for pumping water. In shallow places it is an undershot wheel, projecting over the side of the dam into the water, and running the pump which is attached to it on the inner side.

The *sluice boxes* are made from boards which are generally sawn by the miners themselves with the whip saw. The planks are usually 12 feet long and 1 to 2 inches thick. These are formed into boxes 16 to 20 inches wide and 12 inches deep for ordinary placers, and larger for more extensive workings. They are made a little narrower at one end so as to fit into each other, and soon become water-tight. These boxes are then set in strings supported on trestles, and are given an inclination of from 2 to 10 inches per box of 12 feet, depending upon the character of the gravel and gold, and the available grade which can be given them.

The boxes are provided with riffles of various forms to catch the gold, which is generally coarse; quicksilver is therefore not much used. Where fine, both quicksilver in the crude state and amalgamated plates are used.

Placer mining may be divided into the mining of

- (1) Shallow placers.
- (2) Deep placers.

Shallow placers are such as are opened from the surface, the whole of the dirt being washed down to bed rock, the latter being not more than, say, 12 feet deep. They include the shallow beds of permanent streams and dry gulches, ravines and valleys carrying water only during part of the season, or perhaps carrying none at all. They may thus be subdivided into

- (a) Wet diggings.
- (b) Dry diggings.

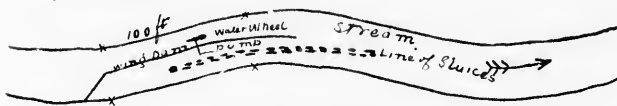
Deep placers, on the other hand, are such mines as are opened from beneath, or both from beneath and above as in the case of hydraulic mining. The pay dirt is deeply buried under barren soil so that it would not pay to remove the latter, and mines are therefore opened by shafts, tunnels and bed rock flumes, which require to be heavily and securely timbered. Mining of this description may also be classified under two heads, viz. :—

- (a) Deep placer mining by hand.
- (b) Hydraulic mining.

Let us first take a case of shallow placer mining under class (a) or wet diggings.

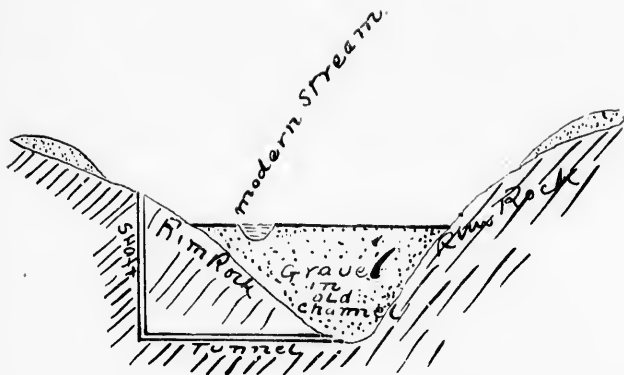
Fig. 1 represents a cross section of the stream, say 50 feet wide, showing the surface of the water, the gravel beneath, the bed rock, the steep banks of the stream with benches on either side.

A plan would be something like the following, in which, as is usually the case, the claim is 100 feet long.



The boundaries having been staked out, the wing dam is first put in, and is either closed across at the lower end of the claim, or, as is usually the case, carried on far enough to keep the claim clear of water. The water wheel and pump are then put into position, the wheel projecting over the side of the dam into the water, the axle of which actuates the pump, which in this class of mining is usually of a primitive character, consisting of a wooden box through which a series of canvas buckets are carried on an endless band. The sluice boxes are then strung out in position, the slope and length depending upon the character of the gold, the available grade, and the means of the miners. As a general rule, the larger the string of boxes the more thoroughly is the gold saved. The riffles are then put into the sluice boxes. All then being in position, water is admitted into the sluices, the pump is set in motion, and the process of shovelling in the sand and gravel goes on. The latter is carried through the sluices by the force of the water and goes off as tailings, while the gold and heavy black sand settle into the riffles, from which it is removed at stated intervals, usually at the weekly clean up. The process of working a shallow dry placer is much the same, save that, as water is absent, enough to supply the sluice must be brought by ditches, and the wing dam is unnecessary.

Mining laws in British Columbia limit the size of placer claims, which can only take in 100 feet in length of stream in the case of creek and bar diggings, and 100 feet square in bench and dry diggings. Where a new stream is discovered these claims, as above, are staked off, and if the ground is shallow it is worked as has been described. If, on the other hand, the ground is deep, as is usually the case in the old channels and also in many of the modern streams, such methods would be too expensive to employ, and in such cases deep placer mining by hand is resorted to. This consists essentially either in running a drift or bed rock flume to strike the bed rock, or in sinking a shaft at the side of the stream in solid ground and drifting out to strike the bed rock, as is shown in the following sketch,



in which the shaft goes down through the rim rock forming the banks of the stream, and at the lower end of the claim. When the miners think they are deep enough, a trial drift is run out to strike the bed rock of the present stream or old channel, as the case may be; and when this is struck, the gravel is hoisted through the shaft to the surface, and washed in sluices as before. These underground workings require to be heavily and securely timbered, for the life of the miner to a great extent depends upon this. Powerful pumps are also required to keep the drifts clear of water. The hoisting and pumping gear is usually actuated by water power obtained from water wheels; and if the height to which the water has to be lifted is too great, flumes from one claim to another, the expense of which is shared by the various companies, require to be built. A better plan, when practicable, is to run a tunnel with sufficient slope for drainage to strike the bed rock at the required place; the sluices are then set in the tunnel if water can be admitted; if not, at the mouth of the tunnel, and washing goes on as before. Bench claims being in dry ground, and often high above the level of the streams, are easier to work. The main difficulty there is to bring water to the ground; to do this, long ditches are often required. Water wheels are utilized when practicable, one such wheel on Quesnell River being 60 feet in diameter. In the vicinity of Clinton, in a piece of ground where water was difficult to obtain, it was brought across the Fraser river in rubber hose. We can thus see that much ingenuity is exercised by the miner in accomplishing his end.

Such methods as the above are utilized when the diggings are shallow or reasonably so, and when they are rich enough to bear the expense of such costly work. When this is not the case, or when the richer ground has been exhausted, the ground can only be profitably worked by hydraulic power. In view of the fact that much of the mining ground now left in British Columbia is of this character, I propose to give a more detailed description of this method of mining, from which, in the course of the next few years, much in the way of developments can reasonably be expected.

In such cases small claims as specified above could not be profitably worked; and to encourage the industry, leases of mining property are given as follows:—

In *dry diggings*, 10 acres.

In *bar diggings* unworked, $\frac{1}{2}$ mile in length along high water mark.

In *bar diggings*, worked and abandoned, $1\frac{1}{2}$ miles in length along high water mark.

In *Creek claims* on abandoned streams, $1\frac{1}{2}$ miles.

In *Bench Lands* adjoining unworked or abandoned streams, 160 acres.

Hydraulic Mining is that process of extracting gold from auriferous gravel by means of water under great pressure, discharged through pipes and nozzles against the bank. Or, in other words, the same agency which originally buried and concentrated the gold in the gravel is by this method forced to strip and separate it again.

It is absolutely necessary that there should be:—

- (1) A plentiful supply of water under pressure.
- (2) Good facilities for grade and dump.

The richest deposit of gold is found usually in a stratum eight to ten feet thick immediately over the bed rock of the old channel; and if this is slate, as is generally, though not necessarily, the case, it also penetrates into the crevices, seams and holes; so that such bed rock is more likely to be rich than smoother and harder rocks. Such a deposit being suspected or known, it is first necessary, or at all events desirable, to explore the ground by means of shafts and drifts to learn something about the depth, extent, character and richness of the deposit. A plentiful supply of water must also be provided for, and brought to the ground by ditches, flumes, or pipes.

The *site of the tunnel* is then chosen, giving due regard to the disposal of tailings, and the grade which should be given to provide for the drainage of the mine and the economical washing of the gravel. The *size of the tunnel* must also be decided. This depends upon the extent of the deposit and how it is to be worked; that is to say whether a single or double line of sluices is to be employed.

The *sluices* and *riffles* must also be prepared—no small undertaking, when it is remembered that, in some cases, they are over a mile in length. They may range in size from 16" in width and 12" in depth, to five feet or more in width and three feet in depth. They are made from planking, one to two inches thick, securely and tightly put together, and must be strongly mounted on sills and firmly supported by trestle work where necessary, to withstand the great pressure of water. The *riffles* are of various forms, and differ materially from those employed in ordinary placer mining, some of the more common and better forms being as follows:—

Block Riffles are of two kinds, namely *Square Block Riffles* and *Round Block Riffles*. In the first case, the blocks are sawn good dimensions, being 10 x 10 x 10 inches, but the size, of course, may vary; these are placed in position, with spaces between, in much the same way as block pavements on our roads are laid. The round block riffles are blocks sawn square off from the trunks of trees and set on end in the sluices.

Rock Riffles are stones laid in place in the same way, and are durable, effective, and cheap; but are more difficult to remove when cleaning up. They can be very profitably employed in the lower part of the sluice, where the catch of gold is not so great.

Roll Riffles made from scantling, built in sets usually of about eight feet long; the upper part is protected by strips of iron, and the whole is laid lengthwise in the sluice. Or the riffles, as a whole, may be a combination of the above methods.

The length of the sluice depends mainly upon the disposal of the tailings, for all the coarse gold and a large percentage of the fine gold is found in the first 400 feet of the sluice. The slope given to the boxes depends upon the character of the gold and the gravel in which it is found, heavy material requiring more slope and water than lighter material. If the grade is too great, the sand is apt to pack in the riffles, and a slope of about seven inches to the box of 12 feet generally works well.

Grizzlies and *undercurrents* are also used. A *grizzly* is put in when a drop can be given to a line of sluices, and is especially necessary when cement and pipe-clay are present. They consist essentially of parallel iron bars, such as pieces of railroad iron, set with spaces between, which allows the finer material to pass through, the cement and clay being pulverized by the fall into the sluice or undercurrent below, while the heavy boulders go over the side.

Undercurrents are large settling boxes, say 20 x 40 feet (the size varies), set to one side of the line of sluice boxes, and with less slope than the latter. They are provided with riffles as in the sluices. The water enters at the upper end and re-enters the sluice at the lower end. Most of the remaining gold is caught in these undercurrents.

These preliminaries having been settled, the work of opening the claim begins as follows:—The tunnel, or open cut and tunnel combined, is started with the proper grade to strike the deposit, say 20 feet below bed rock to provide for contingencies, such as holes, etc., and also to make sure of being below bed rock; otherwise, it is money and labour lost. The tunnel is severely timbered as the work progresses, and is carried well into the bed rock under the deposit, curves being avoided

as much as possible. A shaft, usually vertical, is then sunk either to strike the tunnel directly, or at a short distance to one side, and, in the latter case, the two are connected by a short drift. The shaft must be securely timbered and lugged throughout to within about eight feet of the surface. The ditches, or sluices, carry the water to a distributing point, usually some high point convenient to the claim, where the pressure box is situated; from the latter it is carried by iron pipes or canvas hose to the claim, nozzles being provided to direct the water against the bank. Good forms of the latter are fitted with ball and socket joints, so that they may easily be turned in any direction. The pipes are made of light sheet iron, and fit into each other like stove-pipes; or they may have lead joints, if thought advisable. All being in readiness, water is turned on and washing through the shaft begins. The first washings must be made with care, and all the soil or gravel within as great a radius as possible carefully sloped and drawn toward the mouth of the shaft before the timbering is removed. By this means, caves and washes are avoided. As the work progresses, the timbers are removed till bed rock at the bottom of the shaft is reached, and, finally, an open cut in front of the tunnel is made. The mine may then be said to be opened. The bank is undermined, caved, and washed into the bed rock flume, here taking the place of the sluice boxes, and the latter is carried forward as the bank recedes. *Quicksilver* is largely employed, the charging being done at the head of the sluice. It is added at intervals, as required, being regulated by the amount in view in the riffles. The quantity used depends upon the length of the sluice.

Hydraulic mining is a development from California, and it has been largely employed both there and elsewhere in the States, where long and expensive lines of ditches and iron pipes have been built, the latter being provided with automatic air valves, distributing gates, and improved nozzles. Immense dams, forming storage reservoirs for use during the dry season, were also built. By this method, large quantities of gravel, up to nine and ten thousand cubic yards, can be run through the sluices in a single day. The average cost is about six cents per cubic yard; so that gravel yielding only 10 to 20 cents per cubic yard can be profitably worked.

Hydraulic mining is successfully carried on in British Columbia, but in a more primitive and very much less extensive manner than above. The expensive preliminary work is unnecessary, for the process, so far, has been carried on in a small scale in Cariboo and elsewhere, where, from previous workings, the ground is known to be at least rich enough to yield fair returns; water is also plentiful. Against these advantages we have the shortness of the season to contend with.

The disposal of such quantities of gravel is a serious question: streams become choked up, and bottom lands are buried under the run, and in many parts of the States it has become illegal to mine in this way. But we need never fear that this will be the case, at all events in the northern parts of the province; and the successful operation of mines by this method will, there is no doubt, open and develop parts of the province otherwise useless, and foster and encourage an industry furnishing a livelihood and independence for many miners.

VEIN MINING.

For convenience I have classified the various discoveries of minerals in British Columbia under the above heading. The term is not strictly accurate, notably so in the case of coal and iron, and is adopted for description only, for it is beyond the scope of this paper to speak of the treatment of ores and methods of mining as the industry is in its infancy still. I purpose, therefore, merely to give a brief account of some of the more important discoveries of minerals in the Province.

As has been stated before, the placer miner is so to speak the pioneer of the quartz miner, it is only reasonable to suppose that in the case of rich placer deposits surmises should be made as to the origin of the gold, and if the latter is found to have a coarse unworn appearance with fragments of quartz adhering we may safely take it for granted that this source is not far distant; and when in addition to this, fragments and nuggets of other minerals, such as silver, copper, lead, platinum, etc., are found in the sluice boxes we know, with a fair amount of

certainty, that rich discoveries are likely to be made. This has been the case in British Columbia, and such discoveries of ledges and veins, of quartz and minerals as above were made in many localities shortly after the discovery of the placer deposits, and though such finds from the remoteness of the localities have up to the present time not been tested, still they are valuable and interesting as indications of future developments which are bound to come.

As may be noticed in every case, almost without exception, where placer deposits have been worked, promising ledges and veins have been discovered, and this over a mountain district extending from the International Boundary on the south, to the Youkon River and beyond in the north, a distance of over 1400 miles, and there is little reason to doubt but that as the country becomes opened up the mineral deposits of this vast region will become extremely valuable.

I purpose for convenience to divide this region into districts as follows:—*Southern, Cherry Creek, Kamloops, Yale, Kootenay, Lillooet, Cariboo, Omineca, Cassiar*, and to give brief notices of each. In some of these districts, from their accessibility or from other favoring circumstances, more development work has been done than in others; such localities I purpose to treat more in detail, not because they are likely to prove richer but simply because in such cases results may be submitted to you.

In the *Southern Division* I include all that country to the south and in the vicinity of Okanagon Lake. In this district a great number of promising locations have been made at the following camps and places:—

Camp McKenney, about 12 miles from the placer mines on Rock Creek and not far from the boundary. A working test from a quantity of ore sent to San Francisco from these mines gave returns in gold of \$62.00 to the ton.

Camp Fairview, on Okanagon River.

Copper Camp.

Boundary Creek.

North Fork of Kettle River.

Tulemeen River.

Wolfe Creek.

Keremeos.

Amelia.

Maple Leaf.

Bear Creek.

Toad Colley.

Newton District, near Granite Creek.

In all of these localities promising ledges have been discovered, and a considerable amount of development work done with satisfactory results so far as they go, but the district is out of the regular line of travel and the mines are not being developed as they would be were the country made more accessible by the building of railroads or wagon roads.

Cherry Creek Division.—In this locality we find two ledges upon which a considerable amount of work has been done. One is silver bearing, and crosses Cherry Creek near the placer mines. Assays from this mine shew it to be extremely rich, one made by myself yielding 1205 ounces of silver to the ton, and a working test from two tons of ore sent to San Francisco giving 625 ounces to the ton. The other ledge, known as the McIntyre ledge, is situated about 12 miles further on, on Mount-see Mountain, and shows gold visible to the naked eye. A quartz mill has been erected at this mine, and both localities reached by a good wagon road.

Kamloops Division includes the Nicola Mines and those claims situated at Jameson Creek and vicinity, and elsewhere on the North Thompson River.

The Nicola Mines are situated about 30 miles south of Kamloops, in the vicinity of Stump Lake, and on Idaho Mountain. A good wagon road connects them with the above place. The principal mine owners are as follows:—

Nicola Mining and Milling Company (English Capital).

Star Mining Co., Patterson & Henderson.

Mary Reynolds Co.

Wright & Fletcher.

Silver King Mining Co., and others.

A company was formed about 1882 to prospect these claims. About 1886 they sold out to the Nicola Mining & Milling Co., an English syndicate, who have expended a large amount of money in a systematic and business-like manner, principally on three of their claims, known as the King William, Joshua and Tubal Cain, which claims the company are testing thoroughly preparatory to erecting extensive reduction works. These mines deserve special mention, for the amount of work done by this company far exceeds that done by any other company in the province. They employ a large force of men, are using improved machinery, have run, including drifts and shafts, up to 1890, some 3400 feet, and the future of the camp as a whole depends to a great extent upon their developments, with which they have so far been well satisfied.

The *Star Mining Company* have also done a considerable amount of work on their claims, and have also erected a small concentrating plant, and shipped some 16 tons of ore to San Francisco, yielding \$75 per ton.

Other mine owners, as above, have also prospected their claims, and are well satisfied with the results. The principal minerals are lead sulphides and carbonates, rich in silver, and also carrying a percentage of gold.

Many claims have also been located in the vicinity of Jameson Creek which from surface indications promise well, as do other claims located further up the North Thompson and Clear Water Rivers. But as yet little development work has been done to prove the future value of these claims.

Yale Division.—By this is meant that section of country in the vicinity of Yale, Hope, North Bend, and Siwash Creek. In this division a number of claims have been developed to a considerable extent. Some of them are known to be rich, such for instance as those south of Hope, which have been known for a number of years, and upon which difficulties regarding ownership have prevented development.

The ore on two of these claims, known as the Eureka and Van Bremer, is described as being principally argentiferous grey copper and silver chloride, and assays varying from \$25.00 to \$2,400 to the ton in silver are obtained. Promising indications are also obtained from other claims, but, as in other localities, lack of means prevents developments.

Kootenay Division is traversed by the Canadian Pacific Railway, and important water stretches, such as the Columbia and Kootenay Rivers and Lakes, also exist, so that prospectors have been able to travel about in the mountains, and the result of their labour is shown by the large number of rich and promising ledges discovered in the following localities:—

Illecillewaet,	Deception Creek,
Field,	Windermere,
Fish Creek,	Big Bend,
North Arm of Arrow Lake,	Bugaboo Creek,
Toad Mountain,	Horse Thief Creek,
Eagle Creek,	Toby Creek,
Hot Springs,	Otter Tail,
Hendryx Mines,	Finlay Creek,
Spillemcheen Mountain,	Copper Creek,
Jubilee Mountain,	Bull River,
McMurdo District,	

Of these localities I can only speak briefly, referring more particularly to those which have been developed to the greatest extent.

The *Illecillewaet Mines* are situated near the station of that name on the Canadian Pacific Railway, and are within a short distance of the track. The Selkirk Mining and Smelting Co. own a number of claims, and have erected sampling works, offices, boarding houses, etc., and have also built roads to their mines. They shipped, in 1887, some 300 tons of ore to smelting works in Omaha, the average value being 70 ounces of silver and 14 of lead to the ton. This company is now confining itself chiefly to developments in the Lanark Mine.

Corbin & Co. also own a number of valuable claims upon which they

have expended a large amount of money in developments. Mr. McKinnon holds the Maple Leaf Mine, adjoining the Lunark, at \$80,000. Claims at Cariboo Creek are said to be equally rich.

At the *Field Mines*, close to the Canadian Pacific Railway station Field, a large amount of development work has also been done; ore houses, offices, etc., having been built, also a tramway along the vein and down to the railway track. They have shipped a large amount of ore to smelting works. The ore is lead carbonate, and a low grade, but as it is easily smelted, and conveniently situated on the railway, the mines are certainly valuable. To the other localities, I can give only passing notice, confining myself mainly to giving working tests on shipments of ore made from various mines.

At McMurdo's we find galena ores, rich in silver, and apparently in well-defined veins. Two car loads of ore shipped from the Wells, Pollock and Aylmer property averaged 160 ounces of silver and 63% of lead to the ton.

There is also a well-defined gold belt which is said to average about \$20.00 to the ton. A stamp mill is now at Golden awaiting shipment in the spring to this field.

The *Spillmehven* and *Jubilee* districts also promise well, and are conveniently situated near the Columbia River. The ore bodies are enormous, and are chiefly sulphides of copper and lead, which, however, are of a low grade character.

The *Hot Springs* are situated on Kootenay Lake, about 30 miles from Nelson. The parallel lodes exist in tiers on the mountain side, the lower ones being low grade galenas, which become richer as the mountain is ascended, till the summit lodes are reached, where we find rich carbonates and sulphides of lead containing Wire and Ruby Silver.

Hendrye Mines are just on the opposite side of the lake from Hot Springs. Development work is being vigorously pushed on by means of an Ingersoll drill. The lode is said to be a mass of galena, 36 feet wide, which assays about 20 ounces of silver and 23% of lead to the ton. Perhaps the best way to convey an idea of the richness of these claims is to give the following milling tests from various mines in 1889:

No. 1 claim.....	146 tons,	87 ounces of silver per ton.			
Little Donald.	85 "	90 ounces silver	35%	lead	per ton.
Silver King....	40 "	299 "	"	20%	copper "
" "	30 "	230 "	"	20%	" " "
Spokane	65 "	40 "	"	70%	lead "
Della	20 "	120 "	"	" "
Skyline.....	15 "	225 "	"	" "
Gallagher	14 "	119 "	"	\$14.00	in gold "
Krao.....	12 "	95 "	"	50%	lead "

Or altogether 427 tons, yielding 50,393 ounces of silver.

Big Bend Mines are situated on the bend of the Columbia River, and are gold-bearing, though galena is also found. From the richness of the placer deposits, there is every reason to suppose that they may be valuable. But as the region is inaccessible, and as little development work has been done, it is impossible to say much about their future. For the same reason little can be said about the other localities mentioned in the list, excepting that good assays are obtained and the surface prospects are promising.

Lillooet Division.—In this division the principal discoveries have been made in the vicinity of Cayoosh Creek, where a great number of claims have been staked off. The ledges are gold-bearing, and the gold seems to be uniformly distributed through the quartz in a fine condition, as colors can be obtained almost everywhere. The average assay value is said to be about one ounce to the ton. These veins are undoubtedly the sources from which the rich placer deposits of this locality obtained their gold, and there is therefore a strong probability that they will prove remunerative in the future. Ledges have also been discovered in the vicinity of Sontou and Anderson Lakes, that at Anderson Lake being described as a strong lode of quartz carrying galena assaying \$46.00 in silver and \$14.00 in gold to the ton. In a few of these claims a considerable amount of prospecting work has been done, but in the great majority we find nothing beyond assessment work.

Cariboo Division, from the richness of its placer deposits worked in

early days, has always been looked upon as a locality from which much in the way of developments in quartz might reasonably be expected. Many ledges were known even in these early days, from which in several instances \$3.00 to \$5.00 a day per man was made by washing the decomposed and oxidised rock matter at the surface of the veins. We accordingly find that in 1877-8 companies were found to operate mines here; but from exaggerated ideas of the richness and erroneous views regarding the methods and cost of working the ores, these efforts failed, and quartz mining received a severe check. Within the last few years, however, attention has been again turned to these ledges with what now appears to be a fair chance of success. From what is known of the district, it is clear that a great number of well defined quartz ledges exist, from which good prospects are obtained. As is well known, much of the gold obtained from quartz is contained in sulphurets, which on the surface has become oxidised, allowing the free gold to escape, and on several of the veins such bodies of sulphurets have been discovered. The Government has established a small testing plant in this neighbourhood, to assist the development of the mines, and several small stamp mills have also been erected. From the Black Jack Mine, two lots of ore have been worked as follows:—No. 1 of 100 tons yielded \$523.00 in free gold and 12 tons of sulphurets, worth \$24.00 to the ton; No. 2 of 202 tons, yielding \$4.50 in free gold and \$13.00 in sulphurets per ton. By means of these stamp mills and testing works, the miners will be able to realize from their ores, and thus obtain money to go on with development of their mines, and there is every hope that in a short time they may be able to prove the value of their own claims, and with them assure success in quartz mining in the district as a whole.

Omineca Division.—The remote situation of this district will for the present prevent the development of vein mining, but there is no doubt that it is rich in minerals. Its placer deposits would seem to indicate the existence of both gold and silver bearing ledges. On Vital Creek, of the metal found was a pyrite or silver amalgam. A large number of ledges containing highly argentiferous galena ore in large bodies are also known to exist, which assay from 30 to 130 ounces of silver to the ton. A number of these claims were at one time taken up, but have since been abandoned. When taken in connection with discoveries in more accessible regions, the probability is that nothing will be done to develop this district till it can be reached in a more convenient manner than it now is.

Cassiar Division.—Almost the same remarks may be applied to this district, in which many well defined ledges are known to exist, on which surface indications are promising, and from some of which rich assays have been obtained, indicating in connection with the rich placers which have been worked that the district in the future will become valuable from the mineral deposits in its veins and ledges. As regards its situation it could be made accessible with a comparatively small outlay.

The vast *Youkon District* to the north is apparently equally rich in mineral deposits.

In addition to the minerals enumerated above, many others are also to be found; such as molybdenum, mercury, antimony, plumbago, bitumen, asbestos, mica, platinum, coal and iron.

The *platinum* is found associated with the gold in placer mining in many localities throughout the province; but its principal source is Granite Creek, where, since 1885, some 4,000 ounces has been collected. It is the most important field for this mineral which has been discovered in North America.

The deposits of *coal* in the province, as is well known, are of vast importance. The mines on Vancouver Island were mined before the discovery of gold in the province. They are important, both from their extent, quality, and favourable position. The output for 1889, from the various mines in operation, was as follows:—

Nanaimo Colliery	223,870 tons.
Wellington "	273,353 "
East Wellington Colliery.....	51,372 "
Union "	31,204 "

Total.....579,929 tons.

The total output of coal for the province, up to the end of 1888, was 4,358,221 tons.

These coals are of cretaceous formations, and they are now admitted to be superior to any other coals on the Pacific Coast.

In addition to the above, we find tertiary deposits scattered throughout the province, both along the coast and in the interior. The tertiary area in British Columbia is estimated to be 12,000 square miles.

Deposits of iron also occur in many places in British Columbia. At present, only such as are situated on the coast are available; but, as the country becomes developed, the others will also be valuable. In some cases, they occur as clay ironstone in the coal series; but principally in the form of magnetites. Little attention, as yet, has been devoted to this branch of mining. The only ores being worked are those of Texada Island, which is magnetite of excellent quality. The mines are most favourably situated, either for shipment or smelting, as the Comox coal fields are only about twenty miles distant. The following shipments have been made:—1885, 190 tons; 1886, 3,941 tons; 1887, 1,410 tons; 1888, 7,300 tons. Similar deposits occur elsewhere along the coast, also favourably situated as regards shipment.

As may be seen from the foregoing, the province possesses important mineral deposits in many different localities, and extending over a vast extent of country. It may very reasonably be asked, then, how so little has been done towards the development and working of these deposits!

Want of capital and the inaccessibility of the country have been, and still are, the principal reasons. The completion of the Canadian Pacific Railway has opened the Kootenay District, and witness the developments and discoveries which have been made since that time. The discoverers, almost without exception, are poor men, and development of quartz mines requires capital; for, in most cases, no returns can be obtained, even when valuable ore is lying in the dump: the great hope, then, is that monied men may be induced to invest and help in the development. In many cases, the miners are themselves to blame—they give exaggerated values to their properties, based upon fictitious results obtained from picked assays, or hold undeveloped property at fabulous prices. This is more likely to do harm than good, and is bound to delay developments. Average results are what are required, and if these can be obtained from a quantity of ore, they give undoubted proof as to the value of the mines. But, in the absence of capital, these working tests can only be obtained under favourable circumstances, both as regards situation and richness of ore, which has usually to be packed for long distances to the nearest shipping points. Low grade ores cannot be tested in this way, except when reduction works are near, even though such deposits are equally as valuable as the richer ores. The following examples will give an idea of the present cost of shipping ore from mines which are favourably situated:—Silver King Mine, Toad Mountain to Nelson, a distance of seven miles, by pack train, \$10 per ton, and from there to Butte, Montana, including smelting, \$47 per ton; in all, \$57 per ton. The cost of transportation from Hot Springs to the same destination, including smelting charges, \$40 per ton. This does not include the cost of packing from the mines to the water edge, which, of course, varies with the distance. The erection of such reduction works in the province, then, is of great importance: First, because it allows miners to receive some returns from their ore, and thus aids them in going on with development. Second, the erection of such works by experienced men is a direct proof that the importance of the deposits are recognized. It is not out of place, therefore, to shew what has been done in this way.

In the *Cariboo District*, stamp mills have been erected as follows:—
Island Mountain Mining Company.—One ten stamp mill, operated by a fifty-horse power engine, with the view of working a larger number stamps as required.

British Columbia Mining and Milling Company, Stout's Gulch.—One ten stamp mill and engine (on the ground, but not erected).

Black Jack Quartz Mining Company.—A one stamp test mill, capable of working $1\frac{1}{2}$ tons of ore per day (operated by water).

Nason & Co., Conklin's Gulch.—One four stamp mill, worked by water.

In addition to the above, the Government, with the view of encouraging and assisting the miners, has erected a small testing and chlorinating plant, with a capacity of about three tons per day.

NEW WESTMINSTER DISTRICT.

At Vancouver, a smelter and sampling works, with a capacity of 50 tons per day. Through some faults in construction, not working at present.

KOOTENAY DISTRICT.

At *Golden*, a smelter, 20 tons capacity per day, with roasting furnace, 14 tons capacity per day.

At *Revelstoke* a smelter, owned by the Revelstoke Smelting Syndicate, capacity 60 tons per day; also, sampling works, having a capacity of 100 tons per day, operated by a 50 horse-power engine.

At *Summit of Tone Mountain*, the Collingwood Gold Mining Company has two Huntington Mills of five tons capacity each and two Frue vanning concentrators.

At *Eagle Creek*, one ten stamp mill and four Frue vanners, capacity 15 tons per day, operated by a Pelton water-wheel.

A stamp mill now at Golden, awaiting shipment to mines in the spring. Its capacity I am unable to give.

In addition to the working tests already given, some 205 tons of ore were also tested, yielding 69,530 ounces of silver; or say, on an average, 340 ounces of silver to the ton.

In many of the localities the success of the camp as a whole depends to a great extent upon the successful development perhaps of single claims, where owners are more fortunate as regards capital and means to prove the value of their claims.

Another reason which has retarded actual working developments and erection of reduction works is the fact that a large amount of preliminary work is necessary, both to ensure a constant supply of ore, and also to determine the methods by which it is to be worked, for in many cases the character of the ore changes after a certain depth is reached. As the coarse gold of the placer deposits is derived from ledges in the immediate vicinity, we might fairly assume that these ledges would be gold-bearing. If this were the case, it would simplify matters considerably, and at the same time materially assist in the immediate development of mines throughout the province, for ores, if free milling, are worked by machinery—inexpensive when compared with the cost of reduction works required for the treatment of silver ores when associated with the baser metals. When a portion of the ledges is destroyed, the gold, from the fact that it is acted upon by few agents in nature, is left, while the more alterable associated minerals, copper, lead etc., are destroyed and carried away. In this way in many cases the gold of the placer deposits may be robbed from ledges which will in all probability turn out in many cases to be silver-bearing, the principal associated minerals being copper and lead, with the probability that silver-bearing copper ores will be more plentiful than silver-bearing lead ores, though surface indications show the latter more abundant.

Next in importance to the mines themselves is the ways and means of reaching them.

The Columbia and Kootenay Railway is now under construction, and will, I am told, be ready to carry ores next summer. If so in connection with steamboats, now built and operated on the Columbia River, miners will be enabled to ship ores direct to the smelters at Revelstoke and Golden at a comparatively small cost, and there is no reason to doubt that these smelters will be kept steadily at work and in a short time prove inadequate to treat the amount of ore coming in. In the Kootenay District at least, then, we may look forward to important developments in a very short time. Elsewhere throughout the country railroads, wagon roads, etc., for reaching the mines are badly required.

This paper has assumed dimensions far beyond what I had intended. It has been impossible to mention individual claims, except where from more important developments I have been warranted in doing so. You will, therefore, understand that this has been avoided, not because they were unworthy of mention, but simply because space would not allow

me to give it. From the accessibility of the Kootenay district I have given it more space and attention, probably at the expense of other districts equally as promising and valuable, but at present not so favourably situated. This is simply because, in this district, as a whole, more developments have been made, affording me more tangible proof to present to you.

Mining in British Columbia has now reached that stage when examination of its mines is courted and invited. Let us hope, then, that with the completion of the Canadian Pacific Railway, and improved facilities for travel, capitalists will visit the country and judge for themselves.

Let me state, in conclusion, that the existence of rich, valuable and extensive mineral deposits within the boundaries of British Columbia is now admitted, and that it is only a question of a short time till this will be definitely proved. The development and working of these deposits will create a vast and permanent industry, supporting a large population. Important towns and mining centres will spring up at various points, railroads will be built, and British Columbia, I venture to say, will become one of the richest, if not the richest, and most valuable province of our Dominion of Canada.

