

Technical and Bibliographic Notes / Notes techniques et bibliographiques

The Institute has attempted to obtain the best original copy available for scanning. Features of this copy which may be bibliographically unique, which may alter any of the images in the reproduction, or which may significantly change the usual method of scanning are checked below.

L'Institut a numérisé le meilleur exemplaire qu'il lui a été possible de se procurer. Les détails de cet exemplaire qui sont peut-être uniques du point de vue bibliographique, qui peuvent modifier une image reproduite, ou qui peuvent exiger une modification dans la méthode normale de numérisation sont indiqués ci-dessous.

- | | | | |
|-------------------------------------|---|-------------------------------------|---|
| <input type="checkbox"/> | Coloured covers /
Couverture de couleur | <input type="checkbox"/> | Coloured pages / Pages de couleur |
| <input type="checkbox"/> | Covers damaged /
Couverture endommagée | <input type="checkbox"/> | Pages damaged / Pages endommagées |
| <input type="checkbox"/> | Covers restored and/or laminated /
Couverture restaurée et/ou pelliculée | <input type="checkbox"/> | Pages restored and/or laminated /
Pages restaurées et/ou pelliculées |
| <input type="checkbox"/> | Cover title missing /
Le titre de couverture manque | <input checked="" type="checkbox"/> | Pages discoloured, stained or foxed/
Pages décolorées, tachetées ou piquées |
| <input type="checkbox"/> | Coloured maps /
Cartes géographiques en couleur | <input type="checkbox"/> | Pages detached / Pages détachées |
| <input type="checkbox"/> | Coloured ink (i.e. other than blue or black) /
Encre de couleur (i.e. autre que bleue ou noire) | <input checked="" type="checkbox"/> | Showthrough / Transparence |
| <input type="checkbox"/> | Coloured plates and/or illustrations /
Planches et/ou illustrations en couleur | <input checked="" type="checkbox"/> | Quality of print varies /
Qualité inégale de l'impression |
| <input checked="" type="checkbox"/> | Bound with other material /
Relié avec d'autres documents | <input type="checkbox"/> | Includes supplementary materials /
Comprend du matériel supplémentaire |
| <input type="checkbox"/> | Only edition available /
Seule édition disponible | <input type="checkbox"/> | Blank leaves added during restorations may
appear within the text. Whenever possible, these
have been omitted from scanning / Il se peut que
certaines pages blanches ajoutées lors d'une
restauration apparaissent dans le texte, mais,
lorsque cela était possible, ces pages n'ont pas
été numérisées. |
| <input type="checkbox"/> | Tight binding may cause shadows or distortion
along interior margin / La reliure serrée peut
causer de l'ombre ou de la distorsion le long de la
marge intérieure. | | |
| <input type="checkbox"/> | Additional comments /
Commentaires supplémentaires: | | |

TABLE OF CONTENTS.

	PAGE.	Correspondence :—	PAGE.
Enquiry Department - - - - -	5	From S. J. Marsh - - - - -	23
Publishing Department - - - - -	5	The Spokane Mining Convention - - - - -	23
Purchasing Department - - - - -	5	Why Mining Becomes a Failure - - - - -	23
Mineral Exhibits - - - - -	6	Cariboo Gold - - - - -	23
Mining Papers on File - - - - -	6	A New Map - - - - -	23
Editorial Notes - - - - -	6	Fort Steele Mining Association - - - - -	24
Mining Lectures :—		British Columbia Association of Mining Engineers	24
No. 4, Mines, Mining, and Ore Deposits - - - - -	10	The C. E. Exploration Syndicate, Limited - - - - -	24
Lectures on Chemistry :—		A Boon to Mining Men - - - - -	24
No. 1, History - - - - -	14	Happenings at the Mines :—	
The Yukon - - - - -	17	Alberni - - - - -	24
Railway News - - - - -	18	Ainsworth - - - - -	24
Rossland - - - - -	19	Boundary Creek - - - - -	24
Oil in East Kootenay - - - - -	19	Cariboo - - - - -	25
The Rich Jumbo - - - - -	20	East Kootenay - - - - -	25
Dredging - - - - -	20	Slocan - - - - -	26
The Blue Bell Mine - - - - -	20	Trail Creek - - - - -	26
Mines of Trail Creek - - - - -	21	West Kootenay Generally - - - - -	28
Report of the Minister of Mines - - - - -	21	Province Generally - - - - -	28
The North Star - - - - -	21	Hotels - - - - -	28
A Canadian Mint - - - - -	22	Province of British Columbia - - - - -	29
A Sight Worth Seeing - - - - -	22	Gold Commissioners - - - - -	29
It Pays to Mine in Kootenay - - - - -	22	Assayers - - - - -	29
Cariboo Prospects - - - - -	22	Mining Centres in British Columbia and How to Reach Them - - - - -	29
Examinations for Assayers' Certificates - - - - -	22	Synopsis of Mining Laws - - - - -	31

(ESTABLISHED 1862.)

WEILER BROS.

VICTORIA, B. C.

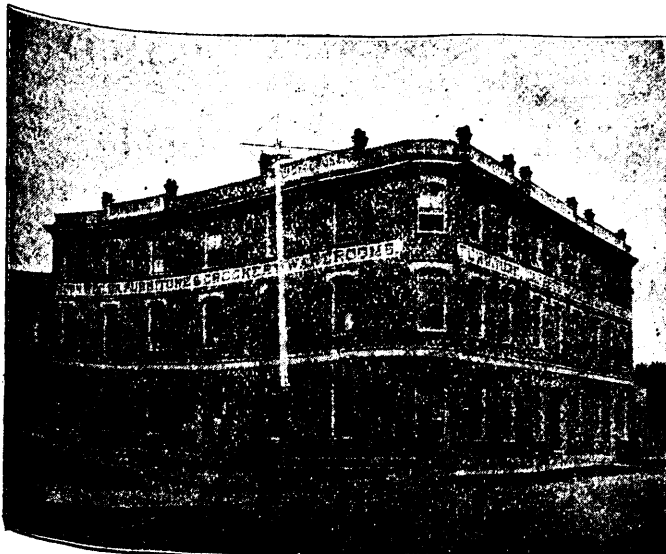
**MANUFACTURERS OF FURNITURE,
UPHOLSTERY, ETC.**

**IMPORTERS OF CROCKERY, GLASSWARE, WALL
PAPER, CARPETS, LINOLEUMS, ETC.**

Special attention given to Bank and Office Fittings, and Hotel
and Bar Fixtures. Residences and Hotels
furnished throughout.

All orders, no matter how large, promptly filled, as we
have the **LARGEST STOCK IN THE PROVINCE.**

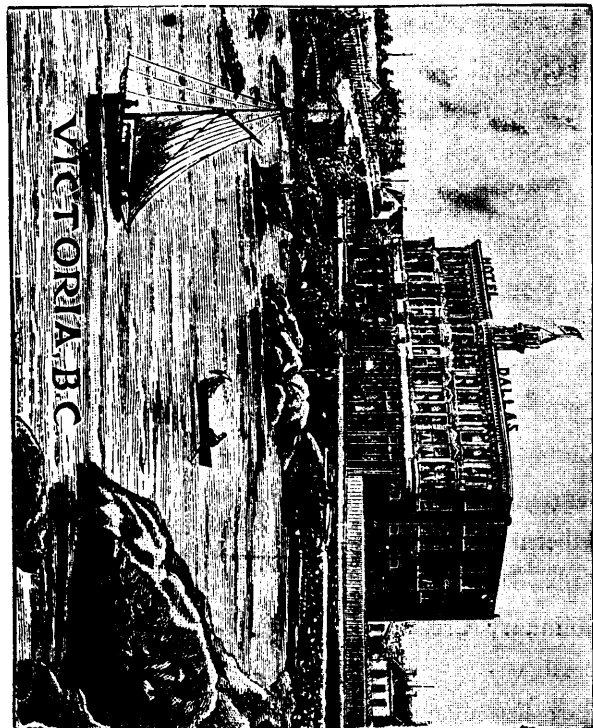
WRITE US FOR CATALOGUE AND PRICE LIST.



WEILER BROS.' WAREROOMS.

HOTEL DALLAS,

VICTORIA, B. C.



HOME FOR TOURISTS.

Strictly First-class. Rates, \$2.50 to \$5.00 per Day.

W. JENSEN, Proprietor.

Cowper=Coles & Johnson,

Mining Brokers and Agents.

ROSSLAND, B. C.

Clocks,

Diamond Settings, Wedding Rings, and Special Designs in Jewelry made to order.

Watches,

MAIL ORDERS SOLICITED.

Silverware.

GEO. E. TROREY,

MANUFACTURING JEWELLER AND
WATCHMAKER..

CORDOVA ST., VANCOUVER.

—THE—

MANOR HOUSE

VANCOUVER, B. C.



FIRST CLASS IN EVERY RESPECT.

RATES: \$2.00 Per Day and Upwards.

THE HICKMAN, TYE HARDWARE CO., LTD.,

32-4 YATES ST., VICTORIA, B. C.,

IMPORTERS OF

Iron, Steel, and Hardware.

MINING AND MILLING

SUPPLIES A SPECIALTY.

GOLD! GOLD! GOLD!

— HOW TO REACH IT.

TAKE THE

ASHCROFT TRANSFER and FEED STABLES'

Rigs to any part of the famous Cariboo and Lillooet gold mining districts and also to the Chilcotin stock ranges. Special attention given to miners, prospectors, and commercial travellers. Saddle, pack, driving and work horses for sale or hire. Stables close to C.P.R. depot, Ashcroft, B.C.

COLLINS & HADDOCK, Props.

P.S.—If going to Cariboo write us in advance, and mention this paper.

MINING PROPERTIES
FOR SALE IN
Cariboo, Lillooet, Similkameen,
Kootenay, Big Bend,
and other districts of the
Province.

C. S. DOUGLAS & CO.,
Mining, Financial, and Real Estate Brokers
139 CORDOVA STREET, - VANCOUVER, B. C.

**MINING SHARES BOUGHT
AND SOLD.**
Good Real Estate Investments
in Vancouver,
Kaslo, Nelson, Rossland,
Ashcroft.

Cable Address: "Stanford," Vancouver.

For Mining Supplies Send your orders or
Write for prices to
Thos. Dunn & Co., Ltd.
We have the Largest Stock of this class of Goods on the
Coast—Steel Picks, Shovels, Hammers, Coal, Wire Rope,
Manilla Rope, Blocks, Dynamite, Fuse Caps.
VANCOUVER.

**OPPENHEIMER
BROS.**
Wholesale Grocers.
VANCOUVER.

W. Pellew Harvey, F.C.S.
(Mem. Fed. Inst. M. and M. E.)
ASSAYER and MINING ENGINEER
Appliances for testing parcels
up to 200 lbs.
PENDER ST., VANCOUVER, B. C.

THE
CASSELL GOLD EXTRACTING CO., LTD.,
OF GLASGOW.
THE MACARTHUR-FORREST PROCESS (CYANIDE).
Send samples for experimental purposes
and full treatment report. Full partic-
ulars on applying to the Canadian
agent of the Company,
W. PELLEW HARVEY, F.C.S., VANCOUVER, B. C.

NICHOLLES & RENUOF
(LIMITED)
IMPORTERS OF
**IRON, HARDWARE,
MINING MACHINERY**
Of all Kinds, Etc.
61 YATES STREET, VICTORIA, B.C.

Transportation Companies.

CANADIAN PACIFIC NAVIGATION CO., LD.
TIME TABLE NO. 27.
(Taking effect June 21st, 1895.)

VANCOUVER ROUTE.
VICTORIA TO VANCOUVER daily except Monday, at
2 o'clock.
VANCOUVER TO VICTORIA daily except Monday, at
13 o'clock or on arrival C. P. Railway No. 1 Train.

NEW WESTMINSTER ROUTE.
LEAVE VICTORIA—For New Westminister, Ladner's
Landing, and Lulu Island, Sunday at 23 o'clock;
Wednesday and Friday at 7 o'clock. Sunday's
steamer to New Westminister connects with C. P.
R. Train No. 2 going East, Monday.
FOR PLUMPER PASS—Wednesdays and Fridays at
7 o'clock.
FOR MORESBY AND PENDER ISLANDS—Fridays at
7 o'clock.
LEAVE NEW WESTMINSTER—For Victoria, Monday
at 13:15 o'clock. Thursday and Saturday at 7
o'clock.
FOR PLUMPER PASS—Saturday at 7 o'clock.
FOR PENDER AND MORESBY ISLANDS—Thursday at
7 o'clock.

FRASER RIVER ROUTE.
Steamer leaves NEW WESTMINSTER for CHILLI-
WACK and way landings every Tuesday, Thursday,
and Saturday at 7 o'clock during river navigation.

NORTHERN ROUTE.
Steamships of this company leave Victoria for
Port Simpson via Vancouver and intermediate ports
on the First (1st) and Fifteenth of each month. If
sufficient inducements offer will call at points on
the West Coast and Queen Charlotte Islands.

BARCLAY SOUND ROUTE.
Steamer AUDE leaves Victoria for Alberni and
Sound ports the 10th, 20th, and 30th of each month.
The company reserves the right of changing this
Time Table at any time without notification.

G. A. CARLETON, JOHN IRVING,
GENERAL AGENT. MANAGER.

UNION STEAMSHIP CO., B. C.,
LIMITED.
VANCOUVER.

VANCOUVER TO NANAIMO—SS. CUTCH leaves C.P.
R. Wharf daily (Sundays excepted) at 1:15 p. m.
Cargo at Union S.S. Co.'s Wharf at 11 a. m.
NANAIMO TO VANCOUVER—SS. CUTCH leaves daily
(Sunday excepted) at 8 a. m.

NORTHERN SETTLEMENTS.
SS. COMOX leaves U. S.S. Wharf every Monday for
Port Neville at 11 a. m. Butte Inlet every six weeks,
calling at all way ports. Will proceed to any part
of the Coast when inducement offers.

**MOODYVILLE AND NORTH VANCOUVER
FERRY.**
LEAVE MOODYVILLE—7, 8:30, 11:45 a. m.; 2:30, 5 p. m.
LEAVE VANCOUVER—8, 10:15 a. m.; 1:15, 3:30, 6 p. m.
Late trip Saturday and Sunday.
LEAVE MOODYVILLE—7 p. m. Leave Vancouver,
7:30 p. m.
Steamers and Scows always available for excur-
sions. Towing and Freighting Business. Storage
accommodation at company's Wharf.

H. DARLING, MANAGER.
Telephone 94; P. O. Box 771.

THE
**Columbia and Kootenay Steam Navigation
COMPANY, LIMITED.**

REVELSTOKE ROUTE—Str. "Nakusp."
Leaves Revelstoke, southbound, Mondays and
Thursdays at 7 p. m.; at 1 a. m. for all points in West
Kootenay and the South.
Leaves Robson, northbound, Wednesdays and
Saturdays at 8 p. m. for all points East and West via
the C. P. R.

NORTHPORT ROUTE—Str. "Nakusp."
Leaves Robson, southbound, for Trail Creek and
Northport Tuesdays and Fridays at 6 p. m.
Leaves Northport, northbound, Wednesdays and
Saturday at 1 p. m.
Stages run in connection with steamer from Trail
Creek Landing to Rossland.

KASLO ROUTE—Str. "Nelson."
Leaves Nelson for Kaslo: Tuesdays at 5:40 p. m.,
Wednesdays at 4 p. m.; Thursdays at 5:40 p. m.; Sat-
urdays at 5:40 p. m.
Connecting on Tuesdays, Thursdays, and Satur-
days with N. & F. S. Ry. for Kaslo and Lake points
Leaves Kaslo for Nelson: Mondays at 4 a. m.,
Wednesdays at 4 a. m.; Thursdays at 8 a. m.; Fridays
at 4 a. m.
Connecting on Mondays, Wednesdays and Fri-
days with N. & F. S. Ry. for Spokane.
Close connections with Columbia & Kootenay
Railway at Nelson for points North and South.

BONNER'S FERRY ROUTE—Str. "Nelson."
Leaves Nelson for Bonner's Ferry Mondays and
Fridays at 8 a. m.
Leaves Kaslo for Bonner's Ferry Mondays and
Fridays at 4 a. m.
Leaves Bonner's Ferry for Pilot Bay, Nelson, Ains-
worth and Kaslo on Tuesdays and Saturdays at 2 a. m.
Connections with east and westbound trains on
the Great Northern Railway.

The right is reserved to change this schedule at
any time without notice.
For tickets, rates, etc., apply at Company's
office, Nelson.
T. ALLAN, J. W. TROUP,
SECRETARY. MANAGER.

PUMPS FOR MINING.

FOR ALL DUTIES.

STEAM
AND
POWER.

NORTHEY CO., LTD.,
TORONTO, ONT.

Wrought Iron Pipe, Lead Pipe, Sheet Lead, Pig Lead, Ingo Tin,
Cast Iron Soil Pipe, Brass and Iron Valves, Pipe Fittings. - - -

Engineers' and Plumbers' Supplies. John Boyd & Co. Metal Brokers, Vancouver, = B. C.

SINKS, BATHS,
MARBLE
SLABS.

PLUMBERS'
BRASS
GOODS.

Injectors, Lubricators, Oil Cups, Steam and Water Gauges, Sheet
Iron, Sanitary Earthenware, Sheet Zinc, Etc., Etc. - - - - -

THE MERCHANTS' AGENCY RED BOOK,

A - GAZETTEER - AND - TRADE - DIRECTORY - OF - BRITISH - COLUMBIA.
(ISSUED SEMI-ANNUALLY.)

THE ONLY DIRECTORY OF BRITISH COLUMBIA IN TWO YEARS.

A Handy Gazetteer of Every Point in British Columbia. A Complete Directory of all Trades and Professions in
Business. Commercial and Mining Enterprises carefully enumerated.

Advertising Space Reserved for Representative Firms.
Also issued (to subscribers only) with Capital and Credit Ratings of the Trades.

Address: The MERCHANTS' AGENCY of British Columbia, Victoria and Vancouver, B. C.

The Red Cross Brewery,

VANCOUVER, B. C.

LAGER BEER,
EXTRA PALE.

All orders promptly attended to by our traveller, Nat
Darling, who makes his rounds in the
Interior every sixty days.

H. J. SCOTT, INCORPORATED 1861. W. A. YOUNG,
Agent for British Columbia. Supt. Nanaimo Works.

BRITISH COLUMBIA BRANCH

HAMILTON - POWDER - CO.

MANUFACTURERS OF
HIGH EXPLOSIVES, BLASTING, MINING,
AND SPORTING POWDER.

DEALERS IN
ELECTRIC BLASTING APPARATUS, SAFETY
FUSE, DETONATORS, ETC.

Head Office, MONTREAL. Branch Office, VICTORIA. Works, NANAIMO.
Local Offices, VANCOUVER and NELSON.

The Mining Record.

VOL. II.

MARCH, 1896.

No. 3.

BRITISH COLUMBIA MINING RECORD.

Devoted to the Mining Interests of British Columbia.

PUBLISHED MONTHLY BY
ALEXANDER BEGG.

SUBSCRIPTION TERMS:

Canada and the United States, 1 year - - - \$1.00
Great Britain and Foreign, " - - - 1.50

ADVERTISING RATES ON APPLICATION.

OFFICES:

VANCOUVER:

618 HASTINGS STREET (P. O. Box 763).

VICTORIA:

26 Store Street, Henry Croft, representative.

NEW WESTMINSTER:

607 Columbia Street, A. Bell, representative.

EASTERN CANADA—16 Market Street, Montreal, John Parrat, representative.

CALIFORNIA—21 Merchants Exchange, San Francisco, I. P. Fisher, Agent.

TRAVELLING REPRESENTATIVE, B. R. ATKINS.

THE RECORD is on file at all our offices and at 253 Broadway, New York.

All communications relating to the business or editorial departments of the British Columbia MINING RECORD to be addressed to

ALEXANDER BEGG,
B. C. MINING RECORD,
P. O. Box 763,
Vancouver, B. C.

VOL. 2.

MARCH, 1896.

No. 3

NOTICE.

We have organized the following departments in connection with the B. C. MINING RECORD, with the view of forwarding the interests of our many readers, especially those living in the mining districts.

ENQUIRY DEPARTMENT.

In connection with the B. C. MINING RECORD we have established an "Enquiry Department" for the purpose of furnishing information about the mining resources and mining industries of British Columbia to parties outside the Province who may desire to obtain the same. For this we make no charge, but, on the contrary, will only be too glad to reply to any communications addressed to

ENQUIRY DEPARTMENT,
B. C. MINING RECORD,
P. O. Box 763, Vancouver, B. C.

PUBLISHING DEPARTMENT.

Any of the following standard works on geology, mining, metallurgy, assaying, etc., issued by the Scientific Publishing Company of New York, can be procured by addressing the editor of the British Columbia MINING RECORD, P. O. Box 763, Vancouver, B. C., and enclosing the price thereof:—

	PRICE
Practical Geology, by G. A. J. Cole, F. G. S.	\$ 3 00
Ore and Stone Mining, by Clement Le Reve Foster, D. Sc., F. R. S.	10 00
Coal Mining, by H. W. Hughes, F. G. S.	6 00
Blasting and the use of Explosives, by O. Guttman, A. M., Inst. C. E.	3 50
Assaying, by J. J. Beringer, F.C.S., F.I.C., and C. Beringer, F.I.C., F.C.S.	3 25
Elements of Metallurgy, by J. Arthur Phillips, M. Inst. C. E., F. C. S., F. G. S., &c.	9 00
The Metallurgy of Gold, by T. Kirk Rose, B. Sc.	6 50
An Introduction to the Study of Metallurgy, by W. C. Roberts-Austen, C. B., F. R. S.	4 00
An Elementary Text-Book of Metallurgy, by A. Humbolt Sexton, F. I. C., M. I. M. and M., F. C. S.	2 50
Tables for the Determination of Minerals, by Persifor Fraser	2 00
A Treatise on Electro-Metallurgy, by Walter G. M. Millan, F.I.C., F.C.S.	3 50
Mine Surveying, by Bennet H. Brough, F. G. S.	2 50
Matte Smelting, by Herbert Lang	2 00
Mining and General Telegraphic Code, by Bedford McNeill, F. G. S.	7 50

Readers of the B. C. MINING RECORD wishing to obtain any work on mining, metallurgy, geology, assaying, etc., may procure the same by addressing

PUBLISHING DEPARTMENT,

B. C. MINING RECORD,

P. O. Box 763, Vancouver, B. C.

PURCHASING DEPARTMENT.

For the accommodation of our readers and others living in the mining districts we have opened a "Purchasing Department" in connection with the B. C. MINING RECORD. In this we will act merely as a medium between buyer and seller—we keep no stock of goods on hand. But it frequently arises that people living in the mining districts require articles which they are unable to obtain near home, and which they do not know where to purchase. If these parties will write to us, we will either inform them where the articles can be had and the price of them or we will place their order with some respectable firm. As we have an intimate knowledge of the trade, not only in the coast cities, but also in Eastern Canada, the United States and England, parties writing us may be assured that if any article they require can be obtained we will get it for them. Where parties know the price of the article they should enclose a post office order for the amount, and we will forward the article. In such cases the express, postage, or freight should be added, as we charge no commission to those ordering through us.

We will be glad to furnish descriptive catalogues, price lists, etc., of machinery and supplies from the best houses in British Columbia, Eastern Canada, United States and England, and thus put mine owners in possession of the most varied and best information to be had in that direction.

Because we make no charge for this work, parties should not hesitate to write to us. Address either of the following offices

PURCHASING DEPARTMENT,
B. C. MINING RECORD,
618 Hastings Street,
Vancouver, B. C.

PURCHASING DEPARTMENT,
B. C. MINING RECORD,
26 Store Street,
Victoria, B. C.

MINERAL EXHIBITS.

We are placing mineral exhibits in the offices of the B. C. MINING RECORD at Vancouver and Victoria, and invite visitors and othersto inspect the same. Parties having mines or claims are asked to send in samples of their ores, with full particulars attached, in order to make these exhibits as representative of the whole Province as possible. The samples will be viewed by many passing through Vancouver during the coming season, and the co-operation of parties interested in mining in making a fine exhibit of our mineral wealth will well repay the trouble. All samples sent in to be addressed:—

MINERAL EXHIBIT,

B. C. MINING RECORD,

618 Hastings Street, Vancouver B. C.

Or. 26 Store Street, Victoria, B. C.

MINING PAPERS ON FILE.

The following papers are kept on file at the office of the B. C. MINING RECORD, for the use of visitors who may wish to consult their columns:—

The Mining Journal	London, England
The Engineer and Mining Journal	New York
Mining and Scientific Press	San Francisco, Cal.
Canadian Electrical News	Toronto, Ont.
The Commercial	Winnipeg, Man.
Mine and Quarry	Chicago, Ill.
Pacific Coast Bullion	Los Angeles, Cal.
Canada Lumberman	Toronto, Ont.
Western Mining World	Butte, Montana
Spokane Miner	Spokane, Wash.
Inland Sentinel	Kamloops, B. C.
The Golden Era	Golden, B. C.
The Prospector	Rossland, B. C.
The Ledge	New Denver, B. C.
The Claim	Kaslo, B. C.
B. C. Mining Journal	Ashcroft, B. C.
The Advance	Midway, B. C.
The Miner	Nelson, B. C.
The News	Vernon, B. C.
Rossland Miner	Rossland, B. C.
The Prospector	Fort Steele, B. C.

Editorial Notes.

We call the attention of our readers to the various departments which we have organized in connection with THE RECORD. We trust our friends will make the the fullest use of them. The "Purchasing Department" will be found a great convenience by parties living at a distance from trade centres. If they cannot obtain what they want, let them write to us, and we will send them what they require, if it is possible to obtain it, without any delay or extra charge for our trouble.

We charge no commission to the seller of the articles, so that parties ordering through our "Purchasing Department" will obtain the lowest prices we can secure them. Only in cases of large transactions in the way of milling machinery and supplies obtained through our instrumentality will the sellers be expected to pay a commission, but in the supplying of minor articles to residents in the mining districts we make no charge.

We are content if people subscribe for THE RECORD, which will well repay the small subscription price

charged, and if, in addition, we can be of any use to our subscribers, and cause them to look upon this journal as helpful, we will have all the reward we desire.

In this offer to our subscribers we refer only to special articles, which cannot be obtained from merchants near home. It would not pay, nor would it be right to apply to us for articles which can easily be procured at the stores near by. Our offer applies to many articles which are not in stock, except in the larger towns and cities.

Examinations in assaying, etc., are to be held by Professor Carlyle next month, and certificates granted to those who pass. These examinations are to be held in Victoria. Now we would like to suggest to the Government that examinations be held in Vancouver as well as at the Capital City. Our reason for this suggestion is, that quite a number of young men in Vancouver have been studying hard to take part in these examinations, and the expense of going to Victoria and staying there a week will virtually prevent their attending, and all the labor of the past months will go unrewarded. Everything necessary for holding the examinations can be had in Vancouver, and it would only mean a short trip on the part of Professor Carlyle. It would be a graceful act on the part of the Government to do what is here suggested, and one that would be much appreciated by the people of Vancouver.

We intended, in this number of THE RECORD, to give the balance of the full course of Mining Lectures, delivered under the auspices of the Provincial Government, but we found that to do so would necessitate the exclusion of much interesting matter relating to mining development in the Province.

We have therefore concluded to continue the lectures from month to month until finished, giving at least two in each issue of THE RECORD. The information contained in these lectures is most valuable, and of such a character that the little delay in publication will not detract from their value.

It is different with information of a current nature, which, unless published on time, is apt to become stale and its usefulness marred. Our readers will, we think, appreciate the motives which induced us to decide as we have done. It is only prolonging the treat which the reading of the lectures must be to all who peruse them.

From all parts of the mining districts the information received is of a most gratifying nature, and gives promise of an exceedingly active season. People are already pouring in in numbers, to spy out the land, or to take part in the active development, which is everywhere going on. Railway men are realizing that they must be

up and doing in order to keep pace with the times, and as a consequence, we hear of new lines being projected, and others being built, to tap our rich mines.

Capital is coming into the country in larger sums than most people have any idea of. Foreign syndicates are sending expert engineers to report upon the various mines, as well as on the general outlook in the Province, with the view of making investments. We hear of a number of such experts on the way or about to start for this country.

All this mean that the season of 1896 will be a memorable one in the history of the Province, and the prospects are that, where a little over \$2,000,000 were taken from our mines during 1895, the output this year will exceed \$10,000,000, from Kootenay alone.

The Provincial Government has been severely criticized in some quarters in regard to their proposed mineral assessment tax. It is well that measures of this kind, which have an important bearing on the development of the country, should be fully discussed beforehand by the parties most interested. In this way the Government may be warned of possible mistakes, and induced to rectify them in time. But there is no necessity to go off at half cock, and abuse the authorities before the measure is passed.

Bills are frequently so amended and altered after being introduced, that when passed, the semblance to the original draft is almost entirely lost. This will probably be the case with the Mineral Assessment Tax Bill, now before the Provincial Legislature.

The chief objection to the measure, so far as the tax on minerals is concerned, seems to lie in the fact that it proposes to levy a tax of 2 per cent. on the value of the ore on the dump, or, as it is described, on the premises. It is held that this will not only be unfair but that it will retard the development of the mines. It is also held that such a mode of levying the tax will give rise to much trouble and will result in fraud being practiced. We must confess that there seems to be much truth in these contentions.

It seems to us the better way would be to tax the net returns from the smelter and in order to secure accuracy, they should be made out under oath. Where ore is sent to foreign smelters, the mine owners could be called upon to swear to the actual returns received by them, and in the case of hydraulic companies the returns could be also made under oath.

Objection is raised also to the proposed rate—two per cent. being declared excessive. On this point we can only say that the Government should be most careful to avoid anything like excessive taxation on our mining

industries at this stage in their history. It would be much better for them to err on the safe side at the commencement. True, it is much harder to increase than to diminish a tax but the fact that mining is in its infancy in this province should have some weight with the Government at the present time.

We have grave fears that the levying of an assessment on the ore will give rise to much trouble and will be a most expensive means of collecting the tax. The simpler the method the better it will be for the government and the parties taxed. The placing of a value on the ore is likely at any time to be a subject of dispute and to cause friction between the assessor and the assessed. Besides, this manner of levying the tax will be expensive and will reduce the actual revenue received by the government.

It appears to us that it would be better to reduce the rate of taxation to such an extent that it could be levied on the smelter returns. We understand that some of the mining companies object to any examination of their books and accounts by the Government for the purpose of ascertaining the cost of production. The necessity for this would be done away with by levying a tax on the smelter returns, less, if necessary, the cost of freight on the ore and the smelter charges. Lower the rate of taxation so as to levy it on the actual returns, and there ceases to be any necessity for prying into the private business of mine owners.

On the other hand, if it is thought necessary to deduct the cost of production from the returns, the only way to be just to all parties is to have the statement of cost made under oath. We cannot see how any arbitrary rule for a uniform rate of cost can be made to work equitably.

Any mine producing less than a certain amount to be fixed by the act should not be assessed, and in this way parties developing their claims would not be retarded in their efforts.

We offer these suggestions for we believe that the Government will do what is right in this matter, as we are not of those who think that the authorities are indifferent to the success of the mining interests. On the contrary we have reason to think that they take an earnest and lively interest in the encouragement of mining. They are doing what they can in the way of roads, etc., and the establishment of the Mining Bureau under Professor Carlyle shows that they have the welfare of the mining industry at heart.

The tax proposed by the Government does not strike at the poor man, or at non-producing mines or claims, and we do not think that mine owners who are receiving returns from their properties, will object to contribute fairly to the general revenue of the Province.

The mining districts require roads and other improvements, and unless the Government is provided with the means to prosecute these necessary works they cannot be had, and mining will be checked in consequence. We cannot go on borrowing for ever. But in levying the tax, too much care cannot be taken in seeing that nothing excessive or unfair be done to throw a damper on what is destined to be the salvation of the Province—mining.

Another important matter which is agitating the public mind is the proposed use of traction engines on the Cariboo road for the hauling of freight to the mines of that district. Here is a question which, like others, has two sides to it. The heavy cost of transportation, especially on machinery to the Cariboo country, is certainly a drawback to the development of the mining industry in that part of the Province.

On the other hand the employment of traction engines on the only road leading into the country is likely to interfere with the general travel of the people living along it. Accidents to horse teams and conveyances are liable to occur, and unless the parties using the traction engines are restricted in some way, much damage to life and property may be the result.

In England, we believe, where traction engines are in use, the owners of them are restricted in several ways and held responsible for any accidents that may occur through heedlessness of the rules laid down for their guidance. The practice of the old country might perhaps be applied to the traction engines of Cariboo.

It seems hard that a road which has cost the people a great deal of money should be rendered almost useless to them. On the other hand, unless freight rates into the Cariboo country can be lowered considerably from what they are at present, the development of the mines will likely be slow. The success of these mines means much to the farmers of the district. It would therefore be a good thing if some middle course satisfactory to both the interests involved could be discovered.

We do not pretend to know how the matter can be satisfactorily arranged unless the traction engines should run at night, leaving the road open during the day for ordinary travel. But this we do know, that a monopoly should not be granted in any case, and there should be restrictions for the protection of life and property. The traction engine company should also be obliged to repair any damage to the road bed from running the engines over it.

Although the traction engine Bill was rejected by the committee of the Legislature, it does not mean that it is killed, and our notes apply to any further application on the part of the promoters.

The idea of building a narrow gauge railway into the Cariboo country is a good one and we hope the C. P. R. may be able to see their way clear to employing the rails of the old Lethbridge road for this purpose. See our Railway news in this issue.

The Provincial Government did a wise thing in reserving a tract of timber land on the west bank of the Columbia for the use of the smelter near that point. Every encouragement should be given to smelters erected in the mining districts so that the ores may be treated at home and the whole benefit arising therefrom enjoyed by the Province.

The Dunsmuirs, we understand, are erecting a number of coke ovens at their mines on Vancouver Island, the foundations being already laid. This is a step in the right direction and the undertaking is one of the marks of progress in the Province which will well repay the promoters.

The Dunsmuirs, with their immense wealth and the great resources at their command, can do much to promote the mining industry of this Province, especially on Vancouver Island. They are, as it is well known, keen men of business, and we are not astonished therefore to hear that they are awake to the great possibilities of the mining industry of British Columbia.

The great Yukon country with its wealth of places mining, much of which is in British Columbia, has attracted the attention of the business men of Victoria, as will be seen from the report of a committee of the B. C. Board of Trade to be found in another column. There is no reason why an immense trade should not be done with that country by the coast cities, and the Dominion and Provincial Governments should lend their aid to so worthy an object without delay.

It is about time the Dominion Government should awaken to the fact that the Kootenay country has wants which are not being supplied as they should be. Proper public buildings in that part of the Dominion form one of the things much needed, and a better mail service is another. Kootenay East and West are not only large producers of wealth, but they are also large consumers of supplies, and in this way the treasury of Canada is enriched. Over \$130,000 has already been paid in customs duties at the port of Nelson alone, and this is only a drop in the bucket to what the revenue during the coming season will be from Kootenay. It should not be all "take" without a proportionate "give." At present the mining districts of the Province are being starved by the Ottawa authorities.

A great deal of responsibility rests with the member representing this Province in the Commons to constantly urge upon the Government the needs of the country.

but it is the duty of their constituents to strengthen their hands by making known to them the wants of the various districts. The press may be relied upon not to overlook this important matter, but something more is required in sending direct representations to the members. Is this being sufficiently attended to?

Manufacturers are already looking to the Kootenay to establish branches there. The towns are in some cases asked to bonus them. Municipalities who receive bona fide offers from reliable companies or individuals will be wise if they do not refuse any reasonable proposition of the kind. Manufactories established in a town mean increased population, increased wealth, and generally speaking cheaper supplies.

We note some of our exchanges are speaking of an expected boom. Boom is a word we do not like. It generally means a sudden inflation, to be followed soon afterwards by a collapse. We want no such boom. But if our contemporaries mean that there will be unusual activity in the mining districts this year we agree with them.

Kaslo wants a smelter, and there are good reasons why Kaslo should have one. The excellent water power there, the presence of iron ore and lime in the neighborhood, and the proximity of the town to the head of the famous Slocan, all point to Kaslo as a most advantageous point for a smelter. By all means let Kaslo have one.

The outlook for placer operations in Cariboo, Yale, and Lillooet during the coming summer is excellent and with the preparations made last year for a plentiful supply of water the hydraulic companies will undoubtedly show immense yields this season. Dredging and hydraulic operations on the Quesnelle River will be very active and everything points to a season of great activity in the upper country.

The next issue of THE MINING RECORD will be devoted chiefly to a description (with illustrations) of the Alberni district and the mineral resources generally of Vancouver Island. It will be a very fine number.

The ways of the *Mining Review*, published at Ottawa, are—to say the least of them—peculiar. A few days ago we received, for the first time, a copy of that journal and we hear that a number of other parties in the province were treated in like manner. We supposed it was an effort on the part of the publishers to increase their circulation by sending out sample copies, until we opened the paper and scanned its columns. Then the true inwardness of the whole business dawned upon us. It looks very much like a deliberate attempt on the part of our Ottawa contemporary to injure the professional reputation of a gentleman who is well known and highly respected in British Columbia.

The circumstances are these. The Christmas number of the RECORD contained an article on "Ore Treatment," from the pen of Mr. W. Pellew-Harvey which we may say has, been favorably commented upon by practical men who consider it a most valuable contribution. It was not to be expected, however, that all would agree in endorsing it and a fair criticism by the *Mining Review* or any other mining paper would have been read with interest.

Instead of this the *Mining Review* devotes two columns to correspondence (? ?) on the subject. Three letters are given, two of which are *anonymous* and the third signed by one Wm. Smail. The last mentioned is beneath notice, while the two anonymous communications are so bespattered with personal abuse of Mr. Harvey that it is only too evident the writers had some ulterior object in view in writing as they did. They certainly had not the courage of their convictions else they would have signed their full and true names to their letters.

There are differences of opinion on ore treatment and we do not object if the *Mining Review* differs with Mr. Harvey on the subject, but we do object to the manner in which one of our valued contributors has been treated by that journal. In British Columbia we have very little respect for a man who will deliver a blow "under the belt" and the sooner the *Mining Review* understands it the better it will be for itself.

As for Mr. Harvey his professional record places him above such attacks as that of the *Mining Review*. He has had experience in various parts of the world, especially with the great smelting house of Vivian & Sons, Swansea. He also acts for Messrs. James Lewis & Sons, the noted ore buyers of Liverpool, and has the confidence of this firm. For two years he has acted as Canadian representative of the celebrated Cassel Gold Extracting Co., of Glasgow, who operate the cyanide process all over the world, and more recently he has been offered and accepted the position as local representative for the MacArthur-Yates process, worked by the Australian Gold Recovery Syndicate and the Cassel Co. with so much success in Western Australia. In addition to this Mr. Harvey is a respected correspondent for several influential mining journals in different parts of the world and can afford to ignore, and we certainly think he should ignore, such effusions as those which appeared lately in the *Mining Review*.

New Zealand shares in the great world-wide revival of gold mining, and will make a large showing this year.

About 500 miners winter at the Forty Mile in Alaska, while as many more working there during the summer, go to the Coast in the fall.

The Tacoma smelter has run continuously for five years, except a close down of thirty days during the strike on the Northern Pacific last year.

MINING LECTURES.

Lecture 4.—Mines, Mining, and Ore Deposits.

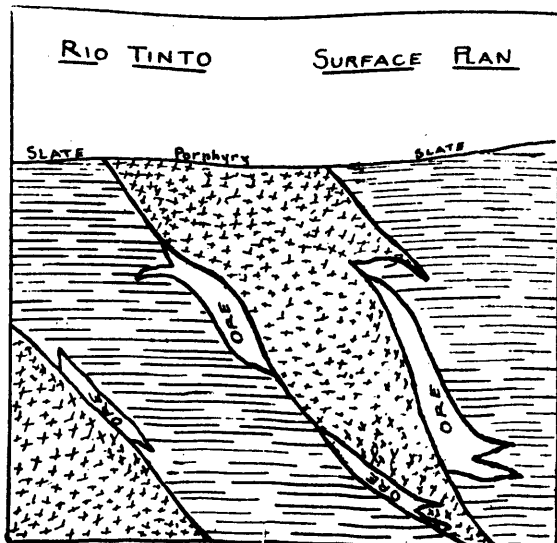
BY W. A. CARLYLE, PROVINCIAL MINERALOGIST.

Before discussing placers and placer mining to-night—and I have no doubt there are some here who are past masters in that class of mining—I would like to speak of one more form of ore deposit which may be of great interest in this Province. There is one camp at present attracting the greatest attention and many hopes are centered there, and though I have not yet been there it will be of great interest to me to learn whether the ore deposits in that camp at Rosslund conform to the class we will now speak of, namely 'concentrations.'

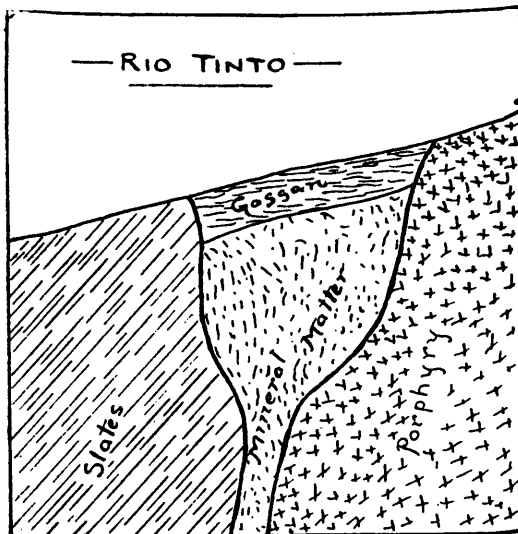
With the exception of 'concentration' deposits, all deposits of ore already described, have been found by this precipitation of the mineral from aqueous solution, but 'concentration' deposits have been formed from cooling masses of molten igneous rock, when certain minerals crystallizing first such as magnetite, pyrite, pyrrhotite, chalcopyrite, etc., have sought parts cooling first, or the outer limits of the mass and concentrated there in large irregular masses. Hence such deposits are almost invariably found only along the outer limits of the area of igneous rock, as diorite, gabbro, and next to the rock that surrounds the eruptive mass.

In the great Sudbury mines in Ontario they have enormous bodies of pyrrhotite, a combination of sulphur and iron, a mineral in many localities of no value whatever, but nickel is generally found associated with pyrrhotite. Large bodies of this pyrrhotite are being found in this Province, especially at the now famous mines at Rosslund, where most of the ore shown is this same mineral with chalcopyrites and also gold, and now in many other localities this mineral is being exploited. The fact that lying against these ore deposits are large masses of diorite—an igneous rock, sometimes known as gabbro, and in some places as porphyry—make that camp one of great interest to me, apart from the great deposits of rich ore they are finding, for if this ore has been thus deposited, it will help in the search for other bodies and their mining.

Let us refer for a moment to the diagram of the Rio Tinto mine in Spain, one of the greatest copper mines in the world. It has been worked for a thousand years and more, and at the present time, has millions of tons of ore in sight blocked out and ready to be mined.



In this mine, the Rio Tinto, beside these enclosing slates, there are large areas of igneous rock known as 'porphyry,' which is much the same as our 'diorite,' and you will notice that these large deposits are found along the edges of these masses of igneous rock, forming the copper deposits of that mine 300 to 650 feet wide, which are simply quarried out from the top after working of



the covering of gossan. The working out and study given to this and other deposits in other places have been of very great practical benefit in the mining of other deposits formed in this way, and have been of very great utility to the miner, prospector and investor. These enormous bodies of sulphides concentrated in the outer limits of the masses of diorite are never found at any distance within the diorite itself, hence it is almost useless to look, or prospect for the mineral except along the edges of the igneous rock. Sudbury has been carefully studied to see whether conditions there conformed to this rule, and it was found that the enormous masses of pyrrhotite were also found only along the edges of the diorite, and this again may be found to be the case at Rosslund. Fissures are sometimes found leading into the enclosing rock and these fissures have been filled with mineral, while it has been found that the mineral decreases, as would be expected, as they run into the diorite or igneous rock away from the edge until it peters out and becomes too poor or valueless to mine. At Sudbury above these vast ore bodies you can see along the surface the brown, reddish, stain caused by the decomposition of the pyrites to gossan which may be traced for long distances and conforming with conditions found elsewhere. In some places there was but a small percentage of nickel from 1-10th to 2-10 per cent. when the mass of diorite was small, but where the diorite was in large areas the percentage became merchantable, from 2 1-2 to 3 per cent.

Whether the ore in the new camp of Rosslund will be found in deposits of this sort I do not know, they may be, and if it is found that the deposits are of this character it will be of advantage to miners, prospectors, and in fact, all interested, to know how such are found in other parts. These deposits are large and fairly regular as formed along the edges of the igneous rock, but subsequent breaks and faults may have disturbed them, at least such has been more or less the case at Sudbury.

Turning now to a short and elementary discussion of 'placers,' or gold as found in alluvial deposits. The vast bulk of the gold that has been redeemed to the world has been got from placers, nearly 90 per cent, in fact. From the placers of California during the 35 years prior to 1883 there was taken an almost unconceivable

amount, estimated at \$1,100,000,000, while as vast an amount was also taken from the placers of Australia, and in this Province, it is estimated, \$45,000,000 was recovered in 22 years.

As to the formation of placers, we know that many rocks carry gold, especially most of the older rocks, and many igneous rocks, as granite, carry gold, not in veins but in small particles scattered through the mass, perhaps of little value in the great mass of rock. As these rocks are rotted and decomposed—you must remember that these placers have been accumulating the gold for many thousands of years—these little particles of gold are separated from the low grade rock and gradually washed down and concentrated in the sands and gravels collecting in low-lying parts, as in gulches, lake and river or creek beds, and such particles of gold being from eight to ten times heavier than the sands and gravels in which they are found, gradually work their way down into the lowest positions in the deposit of alluvium. So we find gravel and sand carrying gold in varying quantities and in many different localities. We find the gold scattered through as fine as (1) dust, or in little (2) sheets or leaves of float gold—so called from the fact that if it becomes dry and is put in water it will float from ten to fifteen minutes, causing considerable trouble to the millmen and placer miners attempting to collect it and keep it from being washed away. In the placers we have also the (3) nuggets. There is one peculiar thing about nuggets, we never find in quartz or hard ore mining such large pieces of gold as are found in nuggets, and a theory has been given to account for this that carries considerable weight. It is well known that there are certain organic acids in Nature that will dissolve gold. An Australian chemist happened to have, in a flask, some gold in solution, in which still remained a little pellet of gold, and a small piece of cork having fallen into the solution a change in the size of the pellet became apparent, and on making further experiments he found that if a piece of gold was put in a solution of gold and any organic matter, twig, cork or leaf put in, that this little nugget became larger and heavier. Whether this theory is true or not we do not know, but certainly it has led to much interesting but conflicting experimentation. You may have heard of the famous nuggets found in Australia, one weighing over 2,200 ounces, yielding about \$45,000 in gold, yet such masses of gold have never been found in hard ore mining. We find, generally, that gold is scattered through sands or gravels, it may be found in the soil at the very grass roots, but it is seldom found in clays; we often find in a placer deposit that certain layers of gravel are auriferous, while others are perfectly barren, nevertheless, the richest parts are usually found in the lowest beds, near the rock underlying the gravel, the bedrock, which in many placers is shale or slate rock, standing highly inclined where these upturned jagged edges have acted as riffles or obstacles to the stream running down over them, catching the gold working down through the gravel or sand. The greatest yield is found in just such a situation. In some cases the gold has worked its way several inches into the slate or bedrock, which then has to be worked out with a pick, so solid is it there. We may find along the bedrock the paying gold-bearing gravels, over them a layer of barren gravel, and perhaps over that again another gravel bed that pays, and the most probable reason for the change from gold-bearing to barren strata may be that at one time the stream flowed from a quarter through or across a gold-bearing region, gathering the gold in its course; then there was some radical change in the direction of the currents, and the water now coming from a direction in which it could gather no gold, would lay down the

barren bed of gravel or clay mentioned, and with yet another change in the surface of the country, and from new directions, the stream would then bring in other gold-bearing gravels.

In speaking of alluvial gold deposits, we may classify them into (1) modern and (2) ancient. Some of these ancient placers, occupying old river beds, are found in the most surprising places, and in unexpected localities. In modern deposits the gravels may be comparatively shallow, a few feet in depth, and, again, they may occur in great areas, from 200 to 300 feet, or even 600 to 700 feet in depth, as in the two large placer mines operated by Mr. Hobson in the Cariboo district, where they have gravel several hundred feet in depth, with gold scattered more or less all through the mass.

The first placer deposits to be worked were bars of sand and gravel formed along and in river beds, from which bars fabulously rich returns have been got. These bars are many times found at a bend of the river, and the gold bearing deposit is found on the inner part of the curve, as the river scouring around the bend works the gold up onto the inner curve. In some places the rivers have been worked in the deeper water or at the outer bend, and in most cases such places have been found to carry gold, but not always sufficient to satisfy the expectations of the miners. Besides the bars in the rivers, many people, Chinese often, are found working up the gulches, in the bottom of which much gold may be concentrated, and thus we have the river (1) bars and the (2) gulch diggings. At the mouths of rivers fine sand and mud are laid down in vast quantities forming extensive (3) flats, and often containing paying quantities of gold. This is found to be the case with the Australian and American rivers, as well as with the rivers which flow through the auriferous districts of British Columbia. Many important placers are on and along (4) benches. We know that rivers are constantly cutting for themselves deeper channels, whether running over loose ground or solid rock, and as they cut a deeper channel they usually are of less width, and leave above the present bed perhaps several benches or terraces on either side, showing where, at one time or at different times, the bed of the river, or of the older channel, had been. Where these terraces are of sand or gravel above and back from the present river, we may often get gold from them. Many of our important placers are on terraces, the river now occupying a much lower channel, and in the bottom of the present channel the gold may be concentrated for the second or third time from the old channels above.

Another interesting and surprising form of alluvial gold deposit is what is known as a (5) hill claim, of which many have been discovered and worked extensively in Australia, and to some extent in British Columbia. In a rolling country, on some of the hill tops or hillocks they have been surprised to find great deposits of gravel which were gold-bearing.

Another form of deposit, which in many cases has proved to be an "ignis fatuus," occurs along the (6) coast,—gold-bearing sands and gravels that are being washed continually by the tides, at one time exposed, only to be buried again by the next tide. In New Zealand they are able to gather these sands when the tide is out, and considerable gold has been got from such a source by different methods.

Of course the first method of working placer claims was by the miner's pan and shovel, but this soon gave way to the cradle, or rocker, still used in places, which was superseded by the sluice box, first the short, then the longer sluices, by shovelling into which much more but less paying dirt could be quickly washed. Then, miners becoming more ambitious and enterprising, the

first hydraulic mining was started, water being first carried to gravel from flumes or ditches in canvas hose and even in stove-pipes; of course it was impossible to get much force of water in this primitive manner, but it was the beginning of the development of the hydraulic process of to-day.

In working a placer deposit of any size, the first thing to be determined is the extent and possible yield of the claim, and this being of such vital importance, especially if it will entail the expenditure of much money in development work, money that must be spent before a dollar is returned, must be carefully spent and often freely. In prospecting these deposits, especially these large areas of gravel, shafts or tunnels are driven in different parts to bed rock, and the gravel carefully panned, to enable the prospector, by experience and from the number and size of the "colors," to determine the value of the gold in the area over which it is intended to work. By having the different pits sunk over the area, from each of which they examine dirt, there can be formed some good idea of the richness and extent of the gravel. Having made a careful and successful prospect the details and method of work may be planned and executed.

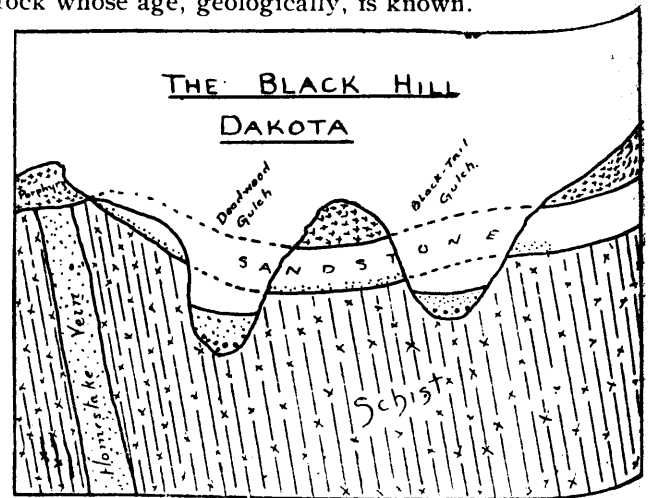
A great deal of gravel has been worked by the process called "ground sluicing," in which, instead of putting in wooden sluices with riffles, etc., a channel is dug in the bedrock, and rapidly flowing water is sent through carrying gravel and gold from the bank, the latter being caught behind the obstructions of the rough bottom. The gravels are attacked in several different ways by water, which may be brought to the edge of the bank, and running down over it may break loose and sweep into the sluices large portions of this bank; or else a very powerful stream may be thrown from the nozzle or monitor, mercury being placed along the upper end of the sluice to catch the gold in passing. At intervals the water is turned off while the sluice bottom is cleaned out and the gold removed.

Another mode of working placers is known as "booming." Where water is scarce, dams are placed across the stream, impounding a great mass of water. The gravel is worked loose, sometimes by using powder to loosen the banks, then the water is allowed to go through with a rush, washing or "booming" the dirt into the sluices.

Much interest is now being directed to dredging, as a great many of our river beds are found to be rich in gold, but it is very difficult, in many instances, to recover. Many streams have been deflected from a part of the bed by wing-dams, allowing the miner to work that part of the bottom of the stream, or by putting in large flumes the entire stream has been deflected from its bed, thus permitting the bottom to be worked, in some cases with very great profit, although at times, risks, as a sudden storm in the mountains, or a cloud-burst, may wash out everything in a few minutes, and the work be ruined. In some of our rivers the current is so strong that it is impossible to deflect it at all, and it is not profitable to carry it in flumes or sluices; then a method is tried that has been found very successful in New Zealand and Australia—dredging. This summer several new schemes will be tried, and the results will be awaited with interest.

We will speak for a moment about ancient river beds. High up, above the present rivers, we may find jutting out and facing on a cliff, an exposure of gravel lying in a gutter; we may trace this underground and find we have found a river bed, that once ran, perhaps, in a direction quite opposite from that of the rivers of to-day. The explanation given for these ancient rivers is that great ages back most of them were filled with overflows

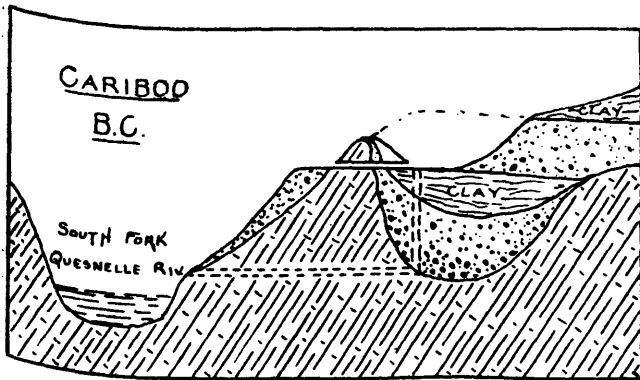
of volcanic rock, lava or basalt, spreading over great areas, those of our Province being covered with basalt of the same geological age as the gold-bearing lavas of Cripple Creek. After the basalt had spread out over the country, completely burying these rivers, there must have been great twisting and contorting of the strata which changed the entire contour or surface of the country, and down through new gullies the rivers have cut out new channels, those of to-day. Thus we find the remains of ancient rivers in most unexpected places, often at the top of our present mountains, where there will be seen a capping of basalt overlying the gravel of the old river bed, and the gravel lying in a trough in the tilted bed-rocks, while far down below in the valley we have the present river. This will give some idea of the situations in which such old river beds are found, and their great age is shown by the overflow of basaltic rock whose age, geologically, is known.



Before going further we will first refer to the diagram showing a section through the Black Hills Country, South Dakota, one of the most interesting of gold discoveries on the continent. In this famous district the early prospector took his life in his hand, as the Indians were very hostile, but in the streams and gullies they found extremely rich placers, which were the beginnings of a great mining camp. These placers are usually well worked out before the rock containing the gold, *in situ*, is located. It was so at Leadville, and in Australia, where, after exhausting the placer gold they have hunted for the gold leads and have found them. Here was found the great Homestake vein, 70 to 80 feet in width, from which, up to the present time, they have paid \$5,600,000 in dividends, from ore yielding only \$3 to \$4 per ton, by crushing it in large quantities, from 1,800 to 3,000 tons per day, with 750 stamps dropping. Lying on the top of these highly inclined hills is a small area of sandstone, while in the intervening spaces the rock has been gullied out, in other words, at one time the present gullies did not exist at all, but the surface once lay along this line at the base of the sandstone, where the gold was being washed out from the decomposing rocks and deposited in small placers before the formation of sandstone that buried them. Then over this sandstone there was a great overflow of lava rock, known in that camp as "porphyry." A further change took place and the two gullies we have at the present time were formed. Here we find several horizons in which the gold is found in paying quantities. First in order of discovery are the modern placers down in the gullies, secondly, the great vein with many smaller ones, thirdly, the ancient placers now found under the sandstone on all the hills, and now rapidly assuming great value; fourthly, gold ore deposited along crevices in the sandstone, and

fifthly, "hill" claims not shown in the diagram. Thus there are five different horizons in which they are finding gold, and this is a splendid example, showing both the veins, or source of the gold, and the ancient and modern placers. These sandstones have been considerably contorted and cracked, in places igneous rock breaks through, influencing a further deposit of gold ore, and these ores from this rock are being treated most successfully by the chlorination process. In places they are putting up large cyanide plants to treat ores of this character, and metallurgists are watching the results of both of these processes. Low grade ores are not the bug-bear they were in the past. In the great Alaska Treadwell the gold is deposited in a great mass of eruptive granite, forming a low grade ore yielding \$3.50 per ton, yet the company paid a dividend of \$600,000 in 1895. Of late years there has been a great improvement in gold milling, larger and simpler mills are built with concentrators to save the sulphides, now treated in one of four ways. The product of the mines in the United States last year amounted to over \$600,000,000 in value at the mine, and this year it will be greater than ever before, as they are opening up many new properties, and many of the old properties once abandoned as too refractory to mine with a profit, can be and will be now worked successfully.

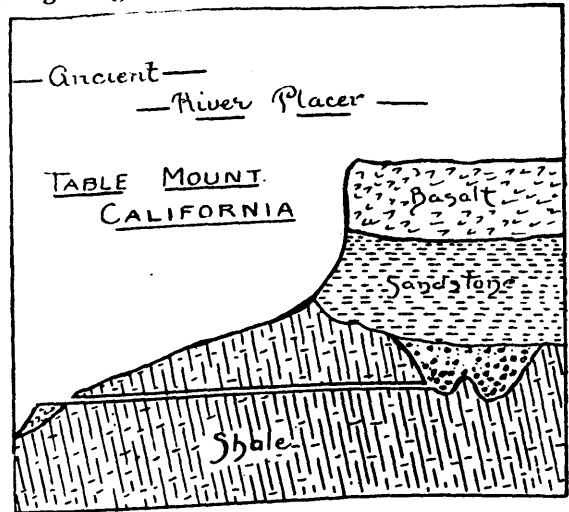
The different processes for treating gold ores may be counted on the fingers of one hand: amalgamation, smelting, chlorination, or by cyanide; any process outside of these has not yet been put on a sound practical basis.



I will now refer to a very interesting diagram, one that I have copied from a section by Mr. Hobson, manager of the Horse-fly mine, Cariboo, B. C., of one of their properties. A considerable area of gravel has been worked out. It was worked down as far as the cut shown when the holders got afraid of it, dropped it and the present company with a large amount of capital began their now extensive operations. There are many acres of paying gravel, the upper layer of gravel is the one that is being worked by hydraulic at the present time. In hydraulic claims the sluice must be run in to the bed of gravel so as to touch the lowest part, as whatever lies below the sluice is practically valueless, while everything on a level with or above the sluice may be hydrauliced out. This lower gravel will be worked as many of the great hydraulic properties have been worked in the United States. It has been carefully prospected and the lowest point of the bed-rock found before running in the tunnel. This is of vital importance. This tunnel will be run in below the gravel and then a shaft will be brought up through the bedrock and the gravel to the surface, into which all may be hydrauliced, but if the tunnel should strike 5 or 8 or 10 feet too high, it would be impossible to work out the lowest and probably best part of the bed. I have in mind one tunnel that reached the gravel 22 feet above

the lowest point and \$60,000 was thus thrown away. Another company ran a tunnel lower and made large returns. After tapping the lowest part by tunnel a shaft will be made to connect with the surface, water will be brought down and turned on through the monitors and the gold bearing gravel will be completely washed out, the gravel being carried to the dump and the gold caught in the sluices of the tunnel.

This gives an idea how some of these gravel deposits in the old river basins may be worked out where a tunnel can be run from the valley to tap the lowest point of the bed. Hydraulic mining was carried on to a great extent in California before the law forbade it, as they were filling up and destroying whole valleys with the washings of gravel.



A section is here taken from one of the famous mining regions, from Table Mountain, California, which will lead up to another method used in mining these old placers. In this case it is impossible to suspect that any old buried channel exists here, but somewhere further along it has cropped out, and by further exploration by drilling they have determined where to work in this particular region. The underlying shales have been tilted up on end and have been covered with the sandstones and capped over with basalts of the same geological age as shown in the Stickine section, in Australia, and at Cripple Creek.

Cement or hard-pan has caused much trouble to many properties. Hard-pan is gravel hardened nearly into rock, and this has been caused by circulating waters carrying in solution a great deal of lime or silica which has precipitated and solidified these gravels into hard, rock-like masses. In some places they have overcome this difficulty altogether by running in tunnels and putting in and exploding enormous charges of powder to shatter the mass. 100,000 pounds have been used at one blast for this purpose. Where Mr. Hobson tried it in Cariboo, he found it did not shatter the gravel as much as he had expected, and the monitor had practically little power to knock up such material.

At Table Mountain the gravel is not worked by hydraulic but by regular underground mining. In some of the large California deposits they have run in large tunnels with double tracks for a mile or more, using cars and locomotives for bringing out the gravel. By careful calculation they have struck below the gravel which is then stoped or breasted out. If they find it cemented the gravel is run through stamp mills and crushed, otherwise it is sluiced on being brought to the surface. There may be some here to-night, to whom much of this talk will be A. B. C., but to others it may, I hope, be interesting.

I might talk for a little while on prospecting, though to some of you this will be superfluous, yet we may in concluding touch on some points of interest. I have been out many a time and have had many a weary walk prospecting, sometimes in company with old timers of many year's experience, whose ideas of geology sometimes might be said to be fearfully and wonderfully made, yet who seemed to have that great intuitiveness in the finding of mineral, for when they quickly spy out traces of ore they have that eagle eye to follow it up. On almost any spring morning, if you would happen along some of the roads leading out of almost any of the mining centres of Colorado, you would see a solitary prospector, or perhaps two in company, driving or punching a "burro," or donkey laden with supplies for the summer; pick, shovel, steel, powder, and a stock of what the miners call "sow-belly," flour, and a small camping outfit, thus he will start out on his lonely, often perilous trip, seeing no other man perhaps till the snow falls and he returns back for the winter to camp. I have gone out repeatedly with prospectors who have located claims to see what they had, and on such trips I became quite proficient in the peculiar vernacular commonly used in talking to the burros while "punching" them over the trail, and the burros in time came to understand me quite as well. These burros are spoken of in Colorado as the "Salvation Army of the Rocky Mountains," and the title is not illy applied. A great many mines there have been developed by the aid of these burros, as 8 or 10 of them will pack out a ton of ore, and they will go anywhere a man can, except up a tree. When Leadville was discovered and the blue limestone was found to carry ore, hundreds of prospectors started out along the range looking for the blue limestone. Some crossed over to the Pacific slope, met with the hostile Indians and were massacred. But the ore was found on the Pacific slope. The prospector keeps his weather eye open, he looks along the beds of rivers and streams, watching for quartz and for crystalline limestone, or calcite, and also for that which resembles calcite, namely 'heavy spar.' He will watch for traces of iron and copper pyrites, as he knows these may indicate 'mineral' and when he finds 'float' that gives good indications he will notice if it is a fragment that is rounded, showing whether it has travelled some distance, he will follow up the stream, and if he finds the pieces of mineral increasing in number and having a more angular appearance he will become more hopeful and watchful. Prospectors have spent months and even years trying to find out where their mineral came from and I have seen districts where you could pick up pieces of pure argentite or silver ore, and though thousands of dollars have been spent there, the deposit has never yet been found. On one of our mountains there can be found the richest kind of float, and much of it, yet they cannot find its source. In finding ore in what appears to be 'rock in place,' the prospector must be sure that it is not a 'slide,' or his location may be practically worthless. When the ore deposit is located, you will find the miner of long experience expending all his labor and energy on that spot, unless it is practically inaccessible, tunneling or sinking a shaft or incline where he has actually found ore, and he finds out the direction of the lead if possible, though this is sometimes hard to trace.

The prospector must become familiar with the changes due to the decomposition of sulphides, of iron and copper pyrites, as the upper part of many ore bodies are much altered and disguised.

After finding the ore and sinking on it you are then in a position to ascertain something of its size and value should you wish to place it on the market, and in ninety-

nine cases out of a hundred it will present a more favorable aspect to the expert who may be sent to examine and report on it if you have done work that shows up the deposit itself. Other work is of no value or service to him, and any report otherwise would not be to the advantage of the prospect and capitalists would refuse to have anything to do with it. I have seen three men with only a grub-stake, a few tools, and some powder sink a shaft 200 feet deep, using a hand windlass, and finally on getting out considerable ore and packing it to the sampling works on the backs of burros they were able to make a little money to work on a larger scale. and many good mines have been developed in this way. The American plan of developing mining properties is to be recommended, in that they spend as little as possible on the surface. If the miner needs machinery he starts with a windlass for the first 100 feet; after that he buys, or rents even, some cheap hoist of 20 or 30 horsepower which will do for the next few hundred feet. It is not absolutely necessary that houses or cabins be put up early, mining men being content to live in tents while the mine is being proved up, and miners are usually able and willing to put up for themselves small cabins.

We have often seen fancy machinery, and unnecessary machinery, placed upon the property when every dollar so spent was required instead in opening up the property underground. If you wish to solicit capital from the East or elsewhere even though you show them big assays they will be suspicious. They have learned a thing or two, and if you have property you think is good try and get work done underground on it, if you do not know how to mine get someone with you who does and let him help you out, develop it and put it in such shape that a would-be buyer can form some idea of its worth.

I have exceeded the time I should have talked this evening. I think, however, this is one of the most vital points in opening a mine; *i. e.*, to spend your money *underground*.

If in these talks, with but a scant and hurried preparation, on mines, mining, and ore deposits I have interested you at all, or have brought before you anything that may prove of some little value and assistance I shall be very pleased.

Lectures on Chemistry.

BY HERBERT CARMICHAEL, PUBLIC ANALYST AND ASSAYER.

HISTORY.

In these lectures I do not profess to bring before you anything original, but to explain to you, as simply as I can in the four lectures at my disposal, the general principles of the science of chemistry.

We must look through a long vista of ages if we would discover, buried in the obscurity of earliest history, the origin of what is rightly called the Science of Chemistry.

We know little about the period when the few facts, which formed its beginning, were gathered together, but it appears probable that Egypt was the country where this took place.

In the works of the Byzantine writers of the fourth century the word "chemia" first occurs as the name of the art which treats of the production of gold and silver, and as all these authors were closely connected with the celebrated school of Alexandria, the last resting place of the proscribed secrets of the Egyptian priests, it appears probable that our science was first practiced in Egypt. Indeed Plutarch states that the old name

for Egypt was Chemia, and that the name was given to it on account of the black color of its soil. The same word designates the black of the eye as the symbol of the dark and mysterious. It is therefore pretty certain that chemistry originally meant Egyptian or secret knowledge, as it was afterwards termed the secret or black art.

The name of the first chemist, which we have on the records of history, was Hermes, but of him we have no very definite knowledge, as the records of his times are very unreliable.

I may say here that the Chinese claim to have been the first to have engaged in chemistry, and although we are not altogether in a position to deny this, still the very ancient dates, to which they lay claim, are open to criticism. We also know that a certain knowledge of chemistry and metallurgy must have been known at a very early period in the valley of the Ganges in India, as they have metallurgical works there which existed beyond any present history, and which would vie in magnitude with any we could show to-day, so that in giving a history of the art we must always bear in mind that we do it from our western standpoint.

From Egypt the knowledge of this new art and mystery was carried into Arabia. Here a celebrated person named Geber, a physician, paid great attention to it. The works of Geber, the most celebrated of Arabian Alchemists, are handed down to us through Latin translations. In these books, which may with truth be considered to be the oldest chemical writings, we learn that the aim of the science of which Geber treats was the transmutation of the base into the nobler metals. He describes many chemical operations, such as filtration, distillation, crystallization, and sublimation, and by these he prepared new substances or purifies the old ones. Bodies such as alum, green vitrol, saltpetre and sal-ammoniac are employed and we find he was able to prepare nitric acid or aqua fortis and from it the valuable solvent for gold, aqua regia.

It is probable that even sulphuric acid was known to Geber, and certainly a number of metallic compounds, amongst which were Mercuric oxide and corrosive sublimate, the preparation of which, he describes, were well known.

Geber was the first propounder of a chemical theory. He asserts that the differences between the metals are due to the preponderance of one or two principals, mercury and sulphur of which all the metals are composed.

The first principle is characteristic of the truly metallic qualities, whilst the latter causes the peculiar changes noticed when the metals are exposed to heat.

The noble metals were supposed to contain a very pure mercury and are therefore unalterable by heat, whilst the base metals contain so much sulphur that they lose their metallic qualities in the fire.

These constituents may, however, not only be present in different proportions, but also in different degrees of purity or in different states of division, and thus it might naturally be supposed that if not by a variation in their relation, at any rate by a change in their condition, such an alteration in the properties of one metal may be brought about as would produce from it some other known metal.

Thus, gold and silver contain a very pure mercury, which in the one instance is combined with a red and in the other with a white sulphur; and he explains the fact that these two metals amalgamate so easily, because they already contain a large quantity of mercury and are therefore quickly attracted by the liquid metal.

In China it appears certain that there was, at an early period, some knowledge of chemistry, for we find that the Chinese were well acquainted with many chemical processes and several metals, such as gold, silver, mercury,

lead, copper, iron and zinc, besides several salts, chemicals, and medicinal preparations.

In Egypt, also, the arts of working in metals, of manufacturing soap, and, more singular still, of manufacturing glass of the most beautiful description, were practiced, in all probability, even before philosophers in that ancient country caught a glimpse of the beautiful science, which was intimately connected with these processes.

Nevertheless, the mere knowledge of the right employment of the different substances used in these arts was a kind of chemistry, though not an enlightened one, it was the chemistry of experience.

It is very surprising to find how successful the Egyptians were in these arts, notwithstanding their deep ignorance of the laws of the science.

Some of the colors employed by the Chinese for their porcelain, and some of the dyes, cannot be equalled even in our day, when so much is known about the principles and practice of chemistry.

The Egyptians, before the exodus of the children of Israel, were well acquainted with the means of coloring glass in the most exquisite manner, so that they used to make artificial gems, such as the amethyst, of glass, which could not be distinguished from the stone itself. The Egyptians appear also to have prepared sal-ammoniac, soda, common salt, several metals and metallic alloys, soap, vinegar, various medicines and pigments; they seem also to have had some acquaintance with the use of mordants in fixing dye colors.

We are assured of the fact that they knew how to blow glass in the same manner as we do, and thus they may have formed useful chemical vessels for the early professors of this art. So far had the glass workers of Egypt advanced in their art, that even coffins were sometimes made of glass.

The knowledge of chemistry came at length into Europe during the domination of the Moors in Spain. Science of all kinds was much encouraged, and the arts and learning flourished luxuriantly.

An immense library of books upon every subject existed at Cordova, whither the learned of Europe flocked, and where, in all probability, they first became acquainted with the writings of the Arabian chemists; the knowledge they there obtained being afterwards communicated by them to others on their returning home.

The Crusaders, also, on their return from the Holy Land, are said to have brought the knowledge of chemistry into Spain, whence it spread into Germany, France and England.

As I mentioned before, one of the chief subjects studied by the earlier chemists, or alchemists (all being derived from the Arabic meaning "the," and used in the modern word "alkali") was the transmutation of metals, or, in other words, the converting of the baser metals into gold, this they hoped to do by the aid of a substance to be discovered, viz., the philosopher's stone. And, according to some of their accounts they were successful, but of these cases some, no doubt, were actual attempts to deceive, and in others the experimenters were themselves deceived.

We have here a solution of copper sulphate, and I will now introduce into it a clean knife-blade. You will notice that it is at once covered with a red colored substance, this is copper which has been transferred from the solution to the knife blade. This experiment will show what might have been a case of self deception, and when gold might have been supposed to have been formed in the same way.

A second object of search was for the elixir of life, which was to prolong life indefinitely, and the third object was the alchist, or universal solvent.

These old chemists had some strange names in their dictionaries, viz., the "Blacker than Black," and others like it, and we, in these days, are apt to laugh at their doings, but we must remember that they lived in days of darkness and superstition, and there is little doubt that these names were used to hide the real nature of the substance, with which the alchemists themselves by a species of free masonry were perfectly familiar. And just how much they did or did not know we, to-day, are hardly in a fair position to judge.

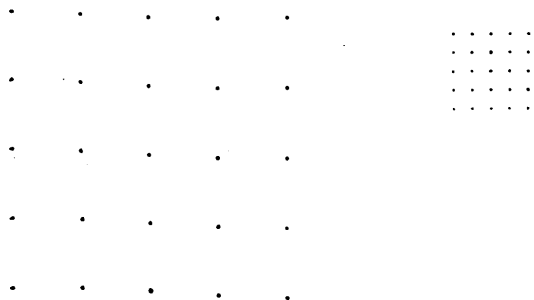
We now come to chemistry as it exists in our age, and in the short time at my disposal during this course of lectures, I have thought it best to dwell more practically on the general principles which govern the science than to go minutely into what I might call the individual chemistry of the element.

Our starting point in the exposition of modern chemistry must be the great generalization which is known as the law of Avogadro. It was stated by Avogadro in Italian in 1811, and holds the same place in chemistry that the law of gravitation holds in astronomy.

The law of Avogadro is, that equal volumes of all substances when in the gaseous state and under the same conditions contain the same number of molecules. Now to understand this law we must first know what is meant by the term molecule. It is of Latin origin, and simply means a "little mass" of matter. A short definition of a molecule is, that it is the smallest particle of a substance which still contains all the properties of a mass of the same substance.

Water can be easily changed into solid ice or æriform steam, and with this substance let me illustrate what I mean by a molecule. We believe that in a cubic inch of water (or any other quantity) small particles which we call molecules are not subdivided by heat, thus, if we raise the temperature of the water till the resulting steam fills a cubic foot we will not have a greater number of molecules in the cubic foot than we had in the inch; they will simply be further separated from each other. This diagram will serve to make my meaning plainer:

MOLECULES IN A CUBIC FOOT. MOLECULES IN A CUBIC INCH.



An experiment will make clear that there are spaces between these molecules. Into this globe, which we have made a vacuum, we will form a cubic inch of water and by heat we will convert this into steam. If the globe was entirely full of steam we would expect that vapor to fill it to the exclusion of everything else. Now, what is the case? If we add more water it will not evaporate, but if we add alcohol we will find that it at once evaporates as if there were no steam present, and if we add yet again a quantity of ether we will find that it will evaporate as if neither the steam nor the alcohol were present. Thus the globe contains all three at the same time; evidently then no vapor completely fills the space which it occupies although equally distributed through it; and we can give no satisfactory explanation of this phenomenon of evaporation except on the assumption that each substance is an aggregate of particles which become separated by heat.

Liquids and solids have each their own rates of expansion. If we take liquid ether, alcohol, and water we will find on heating them that the ether expands more than the alcohol and the alcohol far more than the water, but if we raise the temperature of these three liquids till they are all in the condition of gas, and continue to raise the temperature we will find that they now expand in exactly equal proportions. Why, now, this difference between the two states of matter? If the material fills space as completely in the æriform as it does in the liquid condition then we cannot conceive why the nature of the substance should not have the same influence on the phenomenon of expansion in both cases. If, however, matter in an aggregate of definite small masses or molecules which while comparatively close together in the liquid state become widely separated when the liquids are converted into vapors, then it is obvious that the action of the particles on each other, which might be considerable in the first state, would become less and less as the molecules were separated until at last it was inappreciable, and further, if, as Avogadro's law assumes the number of these particles in a given space is the same for all gases under the same conditions, then it is equally obvious that there being no action between the particles all vapors may be regarded as aggregates of the same number of isolated particles similarly placed, and we should expect that the action of heat on such similar masses would be the same.

Thus these phenomena of heat almost force upon us the conviction that the various forms of matter we see around us do not completely fill the spaces they appear to occupy, but consist of isolated particles separated by comparatively wide intervals.

I have shown, I am afraid, but imperfectly, the molecular structure of gases. I will now draw your attention for a few moments to the molecular structure of solids.

The structure of solids is most frequently manifested by their crystalline form, and this is one of the most marked features of the solid state, but although, under definite conditions, most substances assume a fixed geometrical form, yet to ordinary experience these are the exceptions and not the rule.

I will therefore make the crystallization of solid bodies the subject of a few experimental illustrations.

You will see sal-ammoniac crystallizing, and notice that as the crystalline shoots ramify over the plates, the sprays are always kept at right angles to the stem or else branch out at an angle of 45 degrees, which is the half of a right angle.

Here we have urea crystallizing. The general order of the phenomena in this experiment is the same as in the last: but notice how different the details.

We do not see here that tendency to ramify at a definite angle, but the crystals shoot out in straight lines and cover the plate with a bundle of crystalline fibres which meet or intersect each other irregularly as the accidental directions of the several shoots may determine.

You cannot see here crystals of large size, as they can only be grown slowly and with circumstances which favor their development.

In ice melting we notice how heat dissects it, showing crystals which Tindall called ice flowers. They are hexagonal or six sided and make with each other an angle of 60 degrees, and in snow crystals we notice that they have the same structure as the ice crystals.

You will now see the effect of a magnet on some iron filings that have been polarized by induction, and you will see how they have arranged themselves in a most wonderful way, radiating in lines from the poles.

Next we see the effect of polarized light on a plate

cut from a crystal of nitre. You will see what a striking analogy there is. The polarized beam reveals to us a similar structure.

May not this polarizing force, then, hold all things together; is there not some force in nature which, like the magnet in our experiments, shapes the crystals, adjusts the sprays of the snowflake, and holds the mountains in its grasp.

And might we not find our molecules after all, if we could get down to them, simply points of force.

The Yukon.

We clip the following from the report of the committee appointed by the British Columbia Board of Trade to enquire into the resources and trading prospects of the Yukon:—

"The greater part of the supplies going into the Yukon District is taken *via* St. Michael and the Lower Yukon River, which is a long route and is only open for a short time each year. We believe that it would be in the interest of the miners and British Columbia merchants to have a more direct and quicker route of travel to this northern part of British Columbia and Northwest Territories. It appears to us that a short route beginning at the head of Lynn Canal, at Skagnawa Bay, which is accessible by sea-going vessels, then following the White Pass to the navigable waters of the Yukon, is a feasible one. The distance over this route is said to be about thirty miles.

We refer you to a more detailed report of a committee of the Board appointed to report on this subject in 1888, with which in a great degree, we concur.

White Pass, to which we have referred, we believe is much the shorter route, and although there may be some differences of opinion as to the altitude of the Pass, it is not, we understand, more than 2,600 feet above the level of the sea. After passing over the range of mountains the route is comparatively easy. Dr. Dawson says of it:—

'The White Pass appears to offer better opportunity for making a trail or road which, if constructed, would render the entire region much more easy of access.'

In order to make this route of service, we believe boats could be utilized on the lakes and upper waters of the Yukon, for carrying passengers and supplies to the miners and traders of this region.

We therefore suggest that this Board urge upon the Dominion and Local Government the necessity of assisting towards the cost of a road over this route, by bonus-ing or otherwise providing for an expenditure of money in making such a road, or aiding the building of boats necessary for opening up the route.

We would add a report given by R. G. McConnell, B. A., in 1891, on the exploration of the Yukon and Mackenzie Basins, containing an economic synopsis of this northern region:—

GOLD.—As a full account of the discovery of gold and the progress and present condition of gold mining in the Upper Liard, Cassiar and Yukon Districts is given by Dr. Dawson in the annual report of the survey, 1887-88, part B, pp. 78-86 and 178-83, it will be unnecessary to go into the subject in detail here. "Colours" of gold occur in the bars of the Liard all the way to its mouth, but no deposits of economic value have been found below the Devil's Portage. A number of bars were worked between the Devil's Portage and the mouth of Dease River, for several years after the discovery of gold on the Liard by Messrs. McCulloch and Thibert in the year 1872, but these are now all abandoned and the records of them lost. At the present time no miners are employed on the Liard below the mouth of Dease River.

Gold in paying quantities has not been found on either the Mackenzie or the Porcupine, and the rock formations bordering these rivers do not appear to be gold-bearing.

On the Pelly-Yukon, above the boundary, and as far as the mouth of the Pelly, the limit of my examination, gold in varying quantities is of almost universal occurrence, but up to the present time active operations have been confined almost entirely to two of the tributaries. Of these, Forty-Mile Creek enters the Pelly-Yukon from the West, about forty miles above the boundary, and has its course mostly in Alaska, while Stuart River comes in from the east and flows through Canadian territory all the way. Gold was discovered on the Stuart in 1885, and in that and the following year the estimated yield of the various bars amounted to over \$100,000; but in 1887 it was almost deserted, owing to the discovery of coarse gold on Forty-Mile Creek and the consequent "stampede" of the miners to that stream. The gold on the Stuart is reported to be "fine" and the bars are often exhausted under present conditions in a single season's work; but as they are abandoned when the yield falls much below \$10 a day per man, it is highly probable that work on them will be resumed when improved methods of mining are introduced and the present exorbitant prices for labor and provisions are reduced. Extensive gravel benches of a more or less auriferous character border the Stuart in many places, and promise remunerative returns if worked on a large scale.

Forty-Mile Creek proved a veritable bonanza to most of the miners who reached it early in 1887, but in 1888 the returns, owing to the continued high water, were disappointing. In the former year the yield has been estimated all the way from \$75,000 to \$150,000, and was probably in the neighborhood of \$100,000. In 1888 the yield in consequence of the enforced idleness of the miners declined to less than \$20,000, most of which was obtained from the upper or Alaskan part of the stream. The number of miners employed on the stream during the two seasons varied from about 100 to 350. The gold on Forty-Mile Creek is coarser than that obtained from the Stuart, but the auriferous bars are usually of little depth, and are soon skimmed over. Some attention was paid during the season of 1888 to prospecting the gulches and gravel terraces bordering the stream, but these have not been worked to any notable extent.

The country rock bordering the Pelly-Yukon, all the way from the boundary to White River and beyond, consists of schists broken through by eruptive granites and diorites, geological conditions peculiarly favorable to the existence of metalliferous deposits. (See p. 140) They are traversed in many places along the river by promising quartz veins and ledges, but these have been very little prospected as yet, the miners contenting themselves up to the present with the development of the more easily worked placer deposits.

SILVER.—A small lode of argentiferous galena crosses Forty-Mile Creek a couple of miles above its mouth. A specimen of this brought back by Mr. Ogilvie and analysed by Mr. Hoffmann yielded 38 ounces of silver to the ton.

COPPER.—Copper pyrites, in small quantities, was noticed at several points between Forty-Mile Creek and Fort Reliance. It does not occur in veins, but appears to impregnate individual layers of the schist itself. Traces of copper were also observed in the Castle Mountain dolomites at the base of the Nahanni Butte section.

FIBROUS SERPENTINE.—Some of the serpentines in the vicinity of Forty-Mile Creek occasionally assume a fibrous structure and pass into a picrolite or coarse asbestos. A small specimen of good serpentine asbestos has also been brought from the Stuart River. (See Annual Report Geol. Survey, 1887-88, p. 27b.)

GYPSUM.—Gypsum occurs in large quantities in the Devonian rocks of Bear Mountain, at the mouth of Bear River. (See p. 102.)

SALT.—Several salt springs drain into Salt River, near Fort Smith, about twenty-five miles above its mouth. Some of the springs have basins ten to twelve feet in diameter, which are encrusted with crystalline salt of excellent quality. (See p. 65.) Salt is also reported to occur on the head waters of a small stream which enters the Mackenzie about fifty miles above Fort Norman.

SULPHUR.—Mineral springs of large volume occur at Sulphur Point, on the south shore of Point Brulee on the north shore. In both cases small quantities of sulphur are deposited in the basins of the springs and along the channels of the streamlets which drain them.

COAL.—Small seams of impure lignite were found on the Liard, a few miles above the Little Canon, and large blocks of drift lignite occur on the same stream at the mouth of Coal River. On the Mackenzie the Tertiary beds at the mouth of Bear River hold several seams of lignite, ranging in thickness from two to four feet, and one seam which was concealed at the time of my visit, is reported by Richardson to be nine feet thick. The lignite here is of inferior quality, and has been burnt in many places for some distance from the surface by fires, which have been in existence since the river was first discovered. West of the mountains a small seam of lignite was observed on the Porcupine, a few miles above the mouth of Old Crow River, and seams of coal are reported to occur on a small stream which enters the Pelly-Yukon from the east below Forty-Mile Creek. The latter is probably of cretaceous age.

We have every reason to believe that when the boundary award is made it will be found that the head of Lynn Canal is in British Columbia, and should this be the case shipping would be greatly facilitated. In the meantime we would urge upon the Dominion Government the necessity of making customs bonding arrangements with the Government of Alaska or the United States for the passage of goods in bond through the territory lying between Lynn Canal and British Columbia and the Northwest Territories. It is also necessary that the Dominion Government should have Customs Officers along the coast of this district.

At present the trade of the Yukon country is largely in the hands of the Americans, and we believe the time has come when steps should be taken to secure for the merchants and traders of this Province a portion thereof.

The great distance to be traversed and the difficulty of getting provisions into the mining regions necessarily make foodstuffs expensive. By establishing a route from the head of Lynn Canal the time taken in the transportation of goods would be shortened and miners thereby enabled to remain in the country later in the year, which would be a decided advantage to them.

Railway News.

The summer's work has already started on the C. P. R. A gang of masons is at work building a large stone arch near Keefers, and the filling of the approaches will keep a steam shovel going all summer. The quarry at Camp 16, west of North Bend, has been started. More work gangs will be put on, beginning at the first of the month to work west of Ashcroft, and repairs will also be made to the road bed between Kamloops and Revelstoke.

Considerable excitement was aroused in the Slovan lately, and all sorts of rumors were afloat on railway matters. The excitement was caused by some fourteen engineers arriving from Nakusp. They came, it is said, for the purpose of surveying a road from New Denver

to Slovan City for the C. P. R., which will branch at New Denver from the Nakusp and Slovan branch. Anything further is not ascertainable at the present time although many think the survey will extend down to the Slovan crossing of the Columbian & Kootenay Railway but this is a mere supposition.

A railroad in this direction is just that which is most needed in the Slovan, and will assist the development of the lower end of Slovan lake in a manner which this rich section deserves. It will also help greatly in the building up of Slovan City, Silverton and New Denver.

The route to be taken by the Columbia River & Western railroad as shown on the maps now before the private bills committee of the provincial legislature is as follows:

Beginning where the Trail Creek narrow gauge railroad ends on Nickle Plate flat adjoining the town of Rossland, it will skirt around the base of Red Mountain and cross Sheep Creek near Gold Hill. Here it will swing to the south, gradually ascending the range until it comes to the pass now utilized only by the Dewdney trail, about two miles from the boundary line. Here it will cross the range, and still keeping its elevation, run north up Main Sheep Creek about 30 miles and back south again till it crosses the main range between Sheep Creek and Christina Lake, also through a pass used by the Dewdney trail. Here it begins to descend, making about 25 or 30 miles of distance to the outlet of Christina Lake. From here it follows along the valley of Kettle River to Grand Forks, shortly after passing which point it turns north again and runs clear around the Summit camp and thence south and west down Eholts and Boundary Creeks to the Kettle River Valley once more. This valley it follows to Rock Creek and then from near the head of that creek it swings northwest to Incamp River. Crossing this river it keeps a fairly direct line to Okanagan Lake where it will connect with steamers, which in turn connect with the Shuswap and Okanagan branch of the C. P. R.

Branch lines are projected to all the camps in the Boundary district. From near summit camp a line runs south to Greenwood and Wellington camps and another northwest to the Long Lake camp. From the Providence camp a third branch runs to Deadwood and Copper camps.

An alternate route is shown for a portion of the distance. It extends from where the line reaches its most northerly point in the Sheep Creek Valley to the outlet of Christina Lake. This alternate route, instead of turning south again keeps on in a northwesterly direction and crossing over the divide, follows down McRea Creek to Christina Lake, joining the other line at the outlet of the lake.

The Commercial Journal says it is understood that the long talked of railway between Ashcroft and Barkerville, which will have the effect of opening up the great Cariboo country, is much nearer an accomplished fact than many people imagine. The latest report is that negotiations are progressing for the acquisition by the C. P. R. of the plant of the narrow gauge railway which formerly connected Lethbridge and Dunmore (the Galt railway as it is perhaps, more favorably known). The rolling stock is extensive and valuable, and has been lying idle ever since the gauge of the road was widened. The construction of a railway of the description proposed is much less expensive than one of the standard gauge, the cost of rock cutting and excavations being very much cheaper. We have always believed that the Cariboo railway would be an early development and with it

construction and operation, better days than those of old will be seen in Golden Cariboo. The C. P. R. people have enterprise which others would do well to emulate.

The engineer party that has been at work for the Canadian Pacific between the Columbia River and Rossland were suddenly ordered to move to Slocan Lake to make preliminary surveys for a road from the Nakusp & Slocan at Rosebery, south along the east shore of the lake to Slocan Crossing, on the Columbia & Kootenay. The country is an easy one in which to build a road.

Word is said to have been received from St. Paul that that one of the large mills in that city is engaged in rolling steel plates to be used in the construction of a large transfer steamer at Bonner's Ferry for the Great Northern railway. The story goes that broad gauge cars will be brought to Kaslo, and loaded directly from chutes built along the high ground on the water front, the Kaslo & Slocan constructing a high level spur to accomodate the traffic.

Rossland.

Rossland is the largest inland town in British Columbia, having a population at this date exceeding 3,000 people, and is situated at the head of Trail and Little Sheep Creeks at an elevation of about 4,000 feet above sea level, five miles north of the international boundary line and the same distance west of the Columbia River.

It is located right in the heart of the mines of the Trail Creek district, none of them being more than 20 minutes walk from town and most of them within five minutes of the post office. There are at present between 400 and 500 miners employed in the camp, and perhaps twice or three times as many will be at work inside of 60 days.

The town numbers among its business houses, 20 hotels, half a dozen general merchandise stores, one private bank, numerous restaurants, boarding houses, grocery stores, shoe stores, merchant tailoring establishments, gent's furnishing goods, notions, drug stores, etc. Almost all lines of business are well represented, but good openings exist for a wholesale liquor house and bonded warehouse, dry goods store and a few smaller investments. A chartered bank is the most urgent need of the town, and the first to locate a branch here will do a bigger business than both banks in Nelson combined. A good dentist is also badly needed.

There is a complete sawmill and also a planing mill. Lumber is worth from \$13 to \$30 per thousand feet and carpenters wages run from \$2.50 to \$3.50 per day.

A narrow guage railroad is now building from the smelter town of Trail to Rossland, and two more stand-

ard guage railroads connecting with the Canadian Pacific and Spokane & Northern Railroads will be built this summer. The combined mileage of these three roads and their branches within a radius of three miles of Rossland will exceed 25 miles.

Business lots are selling for cash from \$1,000 to \$5,000 while residence lots can be obtained on easy terms at prices ranging from \$100, or even less, upwards.

The town has four churches, a good public school and an opera house.

The town of Trail which is about seven miles east of Rossland on the Columbia River, has a population of about 1,000 and like Rossland is growing rapidly.—*Rossland Miner.*

Oil in East Kootenay.

One of the various resources of East Kootenay, waiting development is in the south-eastern portion of the district. This is a section of country but little known and which is separated from the remainder of the district by a high range of mountains. The natural outlet of the valley is down the Flathead River into Montana, and the nearest railway is the Great Northern. Some years ago attention was called to this section through the finding of crude oil in the possession of some Stony Indians, who annually hunted in that valley, and they were induced to show some miners where they obtained the oil, which they (the Indians) were in the habit of using as

a medicine for complaints of all kinds. The surface indications are good, and two different qualities of oil have been obtained. On Kisheena Creek, a short distance north of the international boundary line, a black oil, similar to the Pennsylvania and Ohio oils, is found. But on Sage creek, some eight miles north, there is found an oil that is nearly pure, of a light yellow color which will burn in a lamp as it comes from the ground. Close by there is a natural gas escaping from the bed-rock, which burns freely. Some of this



HAULING ORE AT ROSSLAND.

oil sent to the Geological Museum at Ottawa caused considerable excitement and comment, and was pronounced a fraud on account of its purity. Dr. Selwyn, the head of the department, made a special trip to the valley and was surprised to find the oil genuine, and also that this oil was found in the Cambrian formation, which was something unknown, as all oil fields hitherto discovered have been in the Trenton limestone. Directly due east of Sage Creek, and on the eastern slope of the main ridge of the Rocky Mountains, in Alberta Territory, there are plenty of surface indications of crude oil. And the finding of these indications over such a large area, and in the same formation, would go to show that there is a large oil field awaiting capital to develop it.

The Rich Jumbo.

The strike made in the Jumbo tunnel recently has developed into one of the largest and most important ever made in the camp. The men had gone through 11 feet of solid, clean, sulphide ore and were not in sight of the hanging wall. It runs fairly well in gold and carries some copper. One assay showed \$159 in gold, but careful sample tests made from day to day as the ore body was penetrated gave an average value in gold of about \$16. The value improves as the hanging wall is approached, as is generally the case in this camp.

The Jumbo is probably a great mine. Last August, the owners, Messrs. J. A. Finch and M. R. Galusha of Spokane, began development and have kept at it steadily ever since, doing all their work by contract. The claim runs southwest and northeast across what is known as Jumbo Hill, a low elevation west of Red Mountain. The east and west branches of Little Sheep Creek separate Jumbo Hill from Red and Granite Mountains respectively. On Granite Mountain, as the name implies, there is a complete change in the formation, the diorite disappearing, or nearly so, and granite taking its place.

Jumbo Hill is a solid diorite mass and the Jumbo ledge makes a very large surface showing: the well known iron cap being 40 to 60 feet wide. The theory most in favor is that the ledge is the same as that which cuts Red mountain from east to west and on which are located the Eddie J., Cliff, St. Elmo Con., St. Elmo, Mountain View and Nevada. Be this as it may, the Jumbo ledge is in the great ore zone which seems to have its western terminus at the eastern foot of Granite Mountain and which sweeps across the country to the eastern base of Columbia Mountain, a distance of over three miles.

The discovery of so strong an ore body in the Jumbo gives great strength to the whole west end of the camp. It is of especial value to the Gold King which adjoins the Jumbo on the south and southwest, the ledge apparently running right into that ground. But it strengthens immensely such claims as the Nevada, High Ore, Good Hope, Coxe and Mountain View, all of which are grouped in that vicinity.

Dredging.

Mr. E. J. Fader, manager of the Main Quesnelle Gold Dredging and Mining Co., and Judge S. D. Griffiths, of Tacoma, one of the directors, were in Ashcroft lately for the purpose of having their company, whose headquarters are at Tacoma, registered under the foreign companies act. The capital stock is \$250,000, and the head office in British Columbia is at Quesnelle.

The two gentlemen have just returned from an extended visit to the east and are arranging for the beginning of active mining operations. Mr. Fader, who is the inventor of an immensely powerful gold dredging plant, which it is intended to use on the company's lease on the Quesnelle River, stated that he had completed the shipment of all the machinery and supplies for the first dredging plant, and that they were now at Ashcroft. A considerable quantity of freight has already gone to the mine and the machinery will be moved shortly, it being intended to start operations about May 1. The boiler is of 40 horse power and the engines can gear the drum to over 100 horse power. This new method of dredging can be used in water even at as great a depth as 500 feet, the steel-toothed buckets of cast iron handling 400 square yards of dirt in ten hours.

Mr. Fader says that by careful prospecting last summer with a small plant, he had found on both the north

and south forks highly satisfactory results. The gold was coarse, running as high as \$17.50 a cubic yard, and the North Fork was found equally as rich as the South Fork. He had received information that the works on the Cape Horn lease on the North Fork were about completed; the cut across the point had been successfully made and the dam put in. From the prospects he had made last summer just below the Cape Horn property, would, he expected, turn out to be very rich. There were many points from that lease down that had never been worked, as they had hitherto been too deep for the individual miner to work with the rocker and cradle. Now, however, with the new methods and machinery this could be handled, as he had satisfactorily done with the small plant he had used last summer in prospecting.

The first work prosecuted by Mr. Fader, last summer, was on the South Fork, just above the bridge, and that proved to be very rich, the dirt going as high as \$17.50 a yard. An expert miner who had recently visited the Quesnelle River expressed his belief from personal experience that the South Fork from the lake to the forks, a distance of eight miles, was without doubt very rich in gold. In the canyons about the centre of that distance gold is still being picked in large pieces from crevices, when the water is low enough to allow the prospector to work.

"Speaking of the Quesnelle River in general," Mr. Fader said, "it passes through the rich gold belt of Cariboo and to my own knowledge, during the last year, companies have been formed representing collectively capital of millions of dollars, to operate in different ways on the river."

The Blue Bell Mine.

The Blue Bell Mine on Kootenay Lake, almost directly opposite the town of Ainsworth, was the first mineral discovery in West Kootenay, having been discovered by Douglas years ago. The property is owned by the Kootenay Mining & Smelting Company, composed of the Messrs. Hendry, Dr. Herrick, and other parties. In the fall of 1884, Dr. W. A. Hendryx visited Kootenay Lake for recreation, and found the silver prospects around Galena Bay, held partly by the Ainsworths, and partly by a man named Sproule. The Ainsworths were represented by Thos. Hammil, and between him and Sproule altercations and threatenings passed about their conflicting claims on the property, until one day Hammil was found shot and Sproule missing. Sproule was found and subsequently tried and convicted of the murder.

Some months before the murder, however, which occurred in 1885, the Kootenay Mining & Smelting Co. had been formed, and to this company Sproule had sold the Blue Bell, retaining an interest. Obtaining a charter from the Territory of Idaho, Dr. Hendryx put in a wagon road from the Kootenay Station to Bonner's Ferry, and over this route for many years the whole output of West Kootenay mineral was carried to the smelter. Until the close of the season of 1888, this road was maintained as a toll-road, but has since been sold to Kootenay County. Dr. Hendryx also put a small steamboat,—the Surprise—on Kootenay Lake in 1887. It was brought on wheels over the road already mentioned, and plied between Bonner's Ferry and where the port of Nelson now is. That year he also put on the same waters, the pioneer passenger boat, the Galena, which was a twin-screw propeller built at Bonner's Ferry, and which is still in existence. This boat and Mr. Fry's "Idaho" carried everyone into Kootenay from the south in the early days, and handled all the freight and one of the whole district.

From that time to the present, development has never ceased on the Blue Bell, and it is now much the largest single producer of ore, though of low grade, of any mine in West Kootenay. The mine is situated upon a bluff, of some fifty acres in area, and washed in front by the waters of the lake. At its apex it is nearly two hundred feet above the water level and is surrounded by lower ground. Tunnels have been run into the bluff from all sides and everywhere the mineral has been struck.

Mines of Trail Creek.

Mr. J. B. Jones, a distinguished Spokane lawyer, is one of the pioneer investors in the famous Trail Creek mines. He has just been on a visit to the camp and reports all life and bustle there.

"The Trail Creek Mines," said he, "are about to astonish the world. So far, they have been scarcely touched, but every day's development tends to show

people. This seems a most exaggerated prediction, but recollect that the ores of Trail Creek will all ultimately be matted at the mines. Low grade ores worth \$10 a ton can be reduced on the spot and made to yield handsome profits. If forty mines are worked in the Trail district and matted there they will employ 10,000 workmen in the producing and reduction of ores, and 10,000 workmen in the mines, mills, and smelting plants easily means a population of 50,000 people. And I do not hesitate to say that you will, in five years, have at least forty producing mines in the Trail district, and mines, too, that will enrich the Province and the whole of this country."

Report of the Minister of Mines.

The annual report of the Minister of Mines for 1895 is received just as we are going to press, and will be dealt with in our April number.



MINE TUNNEL.

that there is an enormous deposit of rich mineral in the camp. The Le Roi is beating all previous records in gold mining in the far Northwest, and the whole group of properties belonging to the War Eagle Company is showing up in splendid style. Development work is hindered somewhat by delay in patenting our mineral grants. In the case of the Great Western in which I am particularly interested, we have done no development work since last summer, but we shall begin rapid development as soon as our crown grant is issued. The Great Western and Golden Chariot is immediately east of the War Eagle and Centre Star. It has a vein of 50 feet, and if we get value as work proceeds, we shall have a mine of fabulous worth. Two miles to the west of the War Eagle, a rich strike has recently been made on the Jumbo, and this proves conclusively that the rich mineral is not confined to the group of properties on the Le Roi hill."

"Rossland, in five years, will be a town of 40,000

The North Star.

The North Star Company are taking out thirty tons of ore daily, there are about 2,000 tons on the dump, and 1,000 tons more at the landing ready for shipment. The company will have in the neighborhood of 5,000 tons—3,000 at the landing on the Kootenay River, and 2,000 on the dump—by the time navigation opens in the spring. A very important discovery has been made at the mine since the 1st of the month; heretofore the vein had seemed to dip out of the mountain, but in cutting a side drift to the west, following the foot wall, a certain amount of gangue was encountered, passing through this, the ore shute, or ledge, was struck pitching into the mountain. As the cut is not through the lead at the present time, we cannot say how wide the lead is, though eight feet of the cut is in solid galena, and the possibilities are that this is the true vein. The trend is

north-west to south-east, and it is evident that this will make one of the most valuable properties in B. C., in fact it is so at the present time, there being thousands of tons of ore in sight. One drift, for a distance of 140 feet in length, and seven feet in height, shows a solid mass of galena, and when we add that the width of the vein is some fifty feet, the reader can form an idea of the amount of ore in sight. The present output of 30 tons of ore per day could be easily increased to 100 tons. There are thirty men working at the mine, and in the near future, when the other properties in the vicinity are opened, there will be at least several hundred men working on Huckleberry Hill. Then, with the Sullivan Group in active operation, this district will rapidly advance to a prominent position in the mining industries of the Province.—*Fort Steele Prospector.*

A Canadian Mint.

Senator McInnis, in the course of the debate on the address to the Governor-General, made the following remarks regarding the establishing of a mint in Canada.

"In regard to the paragraph which relates to the development going on in British Columbia, more particularly in the mining regions, I may say that I am very much pleased to find that what I stated on the floor of the house some years ago, is receiving attention. At that time I urged upon the Government the necessity of establishing mints to enable us to coin our own money, pointing out that Canada has produced in the last 25 or 30 years over \$65,000,000 in gold, which has all been shipped out of the country or coined either in the United States or Great Britain. On that occasion I predicted that British Columbia would become one of the greatest silver producing countries in the world. A great many thought at the time that I was drawing on my imagination but I am happy to say that during the past year \$750,000 in gold and nearly \$2,500,000 of silver have been taken out of the Province.

In all probability the annual output of silver alone will shortly amount to from \$7,000,000 to \$10,000,000, because most of these mines are just now beginning to be developed. Many of them are only beginning to ship ore, but that ore yields from 100 to 600 ounces to the ton. It is too bad that a country producing the precious metals in such large quantities should have to depend on the United States for its gold coin. The gold coins of that country are legal tender in Canada and occasionally we get a few coins from the mother country, but they are shipped back again as quickly as possible. Our silver, even, is minted in England, and the deputy minister of finance boasts that nearly every year, enough is made on the silver coinage to pay the running expenses of his department. Even our copper coin is manufactured by a firm in Manchester.

A Sight Worth Seeing.

One of the most beautiful pictures of mineral wealth ever presented to the human eye may now be seen in one of the stopes of the No. 12 level of the O. K. It is about 400 feet from the mouth of the tunnel and is therefore well in the mountain which is quite steep. The ledge has been widened out to 7 or 8 feet with solid ore between the two well defined walls. Quite a large chamber has been opened out by the stopers and the entire roof and one side are be-decked with quartz carrying many beautiful colors. The metals in this quartz are native gold, native silver, copper, galena, pyrrhotite, arsenic pyrite, with the alternate productions of malachite or green copper carbonate, azurite or blue copper carbonate, black copper oxide, with here and

there bunches of crystalized azurite. Mineralogists can easily understand what a dazzling array this makes. Nothing like it can be seen in any other Trail Creek mine. No one needs to be told that this is a rich and high grade ore. It runs about \$50 per ton in value and just now there is plenty of it in sight.

It Pays to Mine in Kootenay.

Colonel W. W. D. Turner, the president of the Le Roi Company, is the authority for the statement that that famous mine will pay another dividend of \$50,000 on the 1st of March. He further says that this will be a monthly performance in the future. A larger dividend could be paid if transportation facilities were in keeping with the output of the mine.

The ore body struck in the east drift of the Nickel Plate, at a depth of 100 feet, is holding its own, while a two-foot streak of ore is the showing in the raise that has just been started on the cross-cut, about 85 feet to the north of the main shaft.

Work on the Union, in the north belt, four miles north of Rossland, still continues, and a shaft, which follows the hanging wall, is down 40 odd feet, and shows ore at the bottom. The owners, McGlynn and Morris, think that they are not on the main ore body, and say that at a depth of 50 feet they intend crosscutting to the footwall.

Cariboo Prospects.

Cariboo will apparently show more activity during the coming summer. Around Quesnelle Forks the Cariboo Company will be working, while at Keithly Point the Victoria Company is ready to begin piping as soon as the season permits. Twenty miles further down, the Montreal Company will be working before the season is over, and twelve miles below them, what is known as the French syndicate will be prospecting their ground. The Fishback Company is also about ready to work, while the dredging companies will soon begin operations. At Barkerville Mr. Laird's Company will resume work on its tunnel in March, and the tunnel at the mouth of Nelson Creek will be continued. The tunnel on the Cariboo Gold Fields property is in 1,800 feet, and will have to go from 800 to 1,000 feet further, while much of its pipes are still to be hauled. Six cars of additional pipe have arrived at Ashcroft for the Horsefly Company. Lillooet mines will also be developed. These enterprises will make a great deal of work, and will no doubt return good results.

Examination For Assayer's Certificate.

The above examination will be held during the last week of April, at the Government Assay Office, Bureau of Mines Victoria, B. C. This examination will be a practical one, the candidates to be asked to make such determinations by dry and wet methods as considered necessary, and such determinations to be made on accurately checked smelter pulps or samples from lots of ore bought and treated by smelters. A paper will also be given.

Subjoined is a list of substances the candidate must be prepared to be examined upon:—

Fire Assays:—Gold and lead, by crucible; silver, by scorification. Battery Assays:—Copper and nickel. Wet Assays:—Copper (1) Volumetric, (2) Gravimetric, Iron, Volumetric (1) Bi-chromate method, (2) Permanganate method. Zinc. Silica. Lime.

WILLIAM A. CARLYLE.

Provincial Mineralogist.

CORRESPONDENCE.

EDITOR B. C. MINING RECORD:—Some time since I read with much interest the article by Mr. W. Pellew-Harvey, F.C.S., in the Christmas number of your paper. On coming in from an extended trip in the mountains a few days ago, I was surprised to see the attack made on Mr. Harvey and his article, in the Canadian Mining Review. I desire to say that having watched for a year and a half past the endeavors of Mr. Harvey to build up the mining business in British Columbia, and knowing something of the reputation he enjoys among prospectors and mining men generally, I consider the attack unwarranted and uncalled for, and with your consent should like to fully answer it in the next issue of your valued paper.

Yours truly,

S. J. MARSH.

Mining Engineer.

Victoria, B. C., March 11, 1896.

The Spokane Mining Convention.

EDITOR MINING RECORD:—Below is the summary report of the meeting of the Northwest Mining Association, held in Spokane, Wash., February 22nd, 1896. Meeting convened at 9.30 a. m., with President G. B. Dennis in the chair, and about 100 officials of the Association being present. After an address of welcome by Mayor H. N. Belt, the secretary stated the objects of the meeting, and the president outlined, in an able address, the plans, purposes and work done by the association. He was followed by Judge W. B. Heyburn, of Osburn, Idaho, who spoke at considerable length on "Extra Lateral Rights" and presented the only true solution of this knotty problem yet offered to the miners of this section. In the afternoon, John C. Davenport, of Nelson, B. C., addressed the convention on "Pioneer Mining." N. E. Lindsay, of Spokane, followed with the subject "How can we Improve the Mining Industry through this Organization." "Needed Legislation" was the subject of an address by A. F. Parker, of Grangeville, Idaho. William M. Pinkston, of Boundary City, Wash., spoke on "Good Roads." L. K. Armstrong followed with a brief address on "The Importance of Geological Surveys." S. G. Cosgrove, of Pomeroy, Wash., spoke at some length on general matters. A large number of telegrams and letters were read from absentees. General discussion followed, being participated in by A. P. Curry, C. H. Thompson and others, of Spokane; W. C. Butler, of Everett, Wash.; D. M. C. Gault, of Hillsboro, Oregon; Judge Heyburn, of Osburn, Idaho; H. C. Walters, of Libby, Mont.; F. A. Weber, of Lakeview, Idaho, and others. The meeting then adjourned after a brief session of detail work, and in the evening the citizens of Spokane tendered a banquet to the visitors, which was participated in by about 125 persons.

The next annual meeting of the Association will occur October 3rd, next, and will be of three or four days duration. The Association has vice-presidents in all of the districts of Montana, Idaho, Oregon, British Columbia and Washington, and the membership is increasing daily.

It is stated that the citizens of Butte, Mont., propose to invite the officials of the Association to convene it in that city at an early date.

Very respectfully,

L. K. ARMSTRONG, Secretary.

Why Mining Becomes a Failure.

The question is asked: "What is the most common cause of failure in mining? Most people would probably reply: "Want of a good mine on which to work." But one whose business has caused him to observe methods of mine management in various regions, over long intervals of time, might question whether a better answer would not be: "Want of good mine management." So many instances are remembered where failures can be attributed to this cause alone, that the answer is at least worthy of consideration. Bad management takes such a multitude of shapes that it is

almost impossible to describe it, unless it be described in the general term "ignorance of mining." Its most common form is seen in the wasting of ore. A general proof of the facts is found in the hundreds of dumps which have been hand-sorted over and over at a profit. There is an old saying that "a good workman can be known by his chips," and with equal truth it can be said that "a bad mine manager can be known by his dumps." One thing that is indispensable in a mine manager, is an appreciation of the necessity of thoroughly understanding the nature and value of his ore. He may not be able to understand that ore himself, but if he appreciates its importance, he can employ someone who does understand it to take charge of necessary work. The world sees the evidence of waste in the dumps that lie in the daylight, but there is a still greater source of waste that is hidden from the public in the dark stopes of the mine. Every practical man knows how often the ore is knocked down in the stopes, and there partially sorted, and the supposed waste left upon the stulls. If ore sorted by daylight loses much of its value in the waste, what is the loss liable to be in the dark, narrow and cramped stopes? Who, that is competent to hand-sort ore, gives, in the great majority of instances, any attention to this portion of the work? As a rule, the miner is allowed to have his own sweet will in this labor, and his own sweet will is too often to do that which is easiest, instead of that which is best, even if he knows what is best. This is but one kind of waste, and the commonest one, of bad management, where scores might be mentioned. It is not all mines that require the constant services of an assayer, but a good many more than receive them do require them, and would find them the most valuable of all possible investments.—*The Ledger.*

Cariboo Gold.

The Cariboo Gold Fields, Ltd., a very strong English syndicate, with headquarters in London, England, and offices at Barkerville, B. C., is working the placer mines on Williams Creek, in the Cariboo, and the work is being done on a big scale. Williams Creek is the district where, a good many years ago, about \$25,000,00 in gold was taken out. Then, however, the ground was worked in a crude way, notwithstanding the fact that it yielded so generously. It is the opinion of experts that there is at least as much of the yellow metal in the ground now as was taken out. Considerable preparatory and development work has already been done, and the prospects are so bright that the company has decided to put in an extensive hydraulic plant. Williams Creek is about 270 miles from the Canadian Pacific road at Ashcroft, which distance has to be covered by stage. As an instance of the difficulties and expense to be met, it costs six cents a pound to have all the pipe and machinery necessary for the hydraulic plant sent up, and Mr. Whittier, the manager of the company, estimates that the cost of transportation will be \$50,000.

A New Map.

A new map of a part of the Cariboo District, drawn on a large scale, and showing the locations of the principal hydraulic mines on the Quesnelle River and its tributaries, has been published by Messrs. Thomson Bros., Stationers, Lithographers, &c., Vancouver, B. C. Price, \$1.00.

This map is compiled by Messrs. Garden, Hermon & Burwell, Engineers and Surveyors, from personal examination of the country and other reliable sources of information, and it is the only map showing the position of the different hydraulic mines in that district.

Fort Steele Mining Association.

The annual meeting of the Fort Steele Mining Association was held in the school house on February 22nd. After the usual business routine, the election of officers for the ensuing year was proceeded with, all being elected by acclamation as follows:—R. L. T. Galbraith, President; O. S. Frizzel, N. A. Wallinger, Robert Dempsey, Vice-Presidents; William Carlin, Treasurer; Thomas McVittie Secretary; John Grassick, A. B. Grace, H. W. Barnes, Board of Directors.

There was an unanimous expression of approval of the work done by the Association during the past year, for there was no doubt but that the efforts put forth had tended greatly towards the advancement of the mining interests of the country. Not only in drawing the attention of outside capital to our mining resources, but in bringing before the legislature the wants and requirements of this section of the Province, which is rapidly taking a front rank as an ore producing district, and in consequence is entitled to more attention than it has received in the past. The hope was expressed that more of those men who are interested in the mines of the district, would come forward and give their aid towards the welfare of the Association, so that it may be in a position to guard the interests of the genuine miner and prospector, and enable him to place his prospects before the world in a proper light.—*The Prospector.*

British Columbia Association of Mining Engineers.

The above Association has been formed with the following officers:—

President, R. C. Campbell Johnstone, M. E., Vancouver; Vice President, S. M. Robins (New Vancouver Coal Mining and Land Co.), Nanaimo; Secretary-Treasurer, G. F. Moncton, M. E., Vancouver. Council, Howard West, A. R. S. M., New Denver; A. H. Holditch (Hall Mines, Limited), Nelson; H. E. D. Merry, Rossland; J. Newlands, E. Bellamy, and two others yet to be appointed.

The Association comprises members who are actively engaged in mining in the Province; associate members who are not professional mining men, but are interested in the development of British Columbia minerals, and students. The annual fee is \$5.00 and \$2.00 for associates and students. The Honorary members are: The Hon. Col. Baker, Minister of Mines, Victoria; Dr. G. M. Dawson, C. M. G., Director of the Geological Survey; B. T. A. Bell, Secy-Treas. Canadian Mining Institute. The first regular meeting of the Association will be held at Nelson in April.

The C. E. Exploration Syndicate, Limited.

We have received the prospectus of the above association of Mining and Civil Engineers, with London (England) offices at 5, Cophall Buildings, E. C., and we observe that, in the long list of offers of business and professional support received by the Syndicate, British Columbia is well represented. In the list appear the names of: J. C. Ferguson, A. M. I. C. E.; G. Gordon, M. I. C. E.; V. Gandil, M. E.; G. A. Keefer, M. I. C. E.; C. E. Perry, M. I. C. E.; H. B. Warren, A. M. I. C. E.

A Boon to Mining Men.

Apart from a complete assaying plant and chemical laboratory, Mr. W. Pellew-Harvey has a plant for milling ores of a capacity of 1 ton daily. Also cyanide plant, amalgamating machinery, and German (Krupp)

ball mills for crushing, and he has also estimates in hand by Fraser & Chalmers of Chicago, for the erection of a chlorinating mill, concentrators and small reverberatory furnaces. In fact he intends having complete ore testing works, equal to any on the Pacific Coast and capable of handling all classes of ores for mill tests and check work on the smelters.

Happenings at the Mines.

ALBERNI.

Mr. Henry Saunders returned recently from Alberni where he went to take formal possession of the Alberni claim for the newly organized Consolidated Alberni Gold Mining Company. He has brought back with him some samples of ore from several of the mines, and also a fine specimen of copper pyrites from Mr. George Smith's farm, half way down the Alberni canal. Mr. Smith has found an immense body of ore on his property and has men at work developing it. The ore runs high in copper, and a mill run test gave \$16 a ton in gold.

Mr. Saunders found preparations for spring operations going ahead busily on the Duke of York and the Cataract claims on China Creek. The sawmill for the Duke of York has been hauled to the claim and in six weeks' time it is expected washing will begin. A general feeling of confidence pervaded the town of Alberni, where many prospectors are waiting to go into the hills just so soon as the weather permits. The snow seems to have gone from the upper part of the hills first this spring, and with a few day's work an opening into Mineral Creek can be cleared.

AINSWORTH.

The Britannia Mining Company, of Nova Scotia, of which Mr. Mosier is superintendent, has completed the purchase of No. One Mine. This is of the finest properties in the camp, and under the management of Assayer Stollberg has yielded a profit of \$1,800 per month. The No. 27, owned by A. L. White, of Spokane, shipped a car load of ore to Colorado last week, and the returns received show a handsome profit of \$25 per ton above all expenses. The tunnel for the Omaha Terminal and others of this group, is now in 108 feet, and a contract has been let to continue it 70 feet to strike the vein, when the owners propose to crosscut and open up the veins. The Little Phil is one of the solid mines of the camp. There are 25 tons of ore on the dump, but no shipments will be made at present on account of the low price of lead.

The prospects are growing brighter for the claims and mine owners around Ainsworth, and during the present year, work will be done on the following properties: Highland, Skyline, Rand, No. 1, 27, Terminus, Little Phil, Black Diamond, Tenderfoot, Glengarry, Old Timer, United, Union, Maggie, Anna May, Lady of the Lake, and others.

BOUNDARY CREEK.

On the Cariboo property a shaft is being sunk on the vein from the end of the tunnel, and by following the vein down, the owners will know at what level to run their next drift, and thus the quantity of ore will be proven. Another drift on ore started 60 feet below the present one would give them 120 feet of stoping, which extended at 800 feet in length, the distance drifted upon the ledge at the 80 foot level, would insure the ore for a four or five years' run with the mill's present stamping capacity.

Mr. Weir, who was in connection with the Fowler-Thompson deal, has gone to Spokane and when he returns the deals mentioned previously will be consummated. It is proposed to put a steamer on Kettle River between Midway and Cascade City.

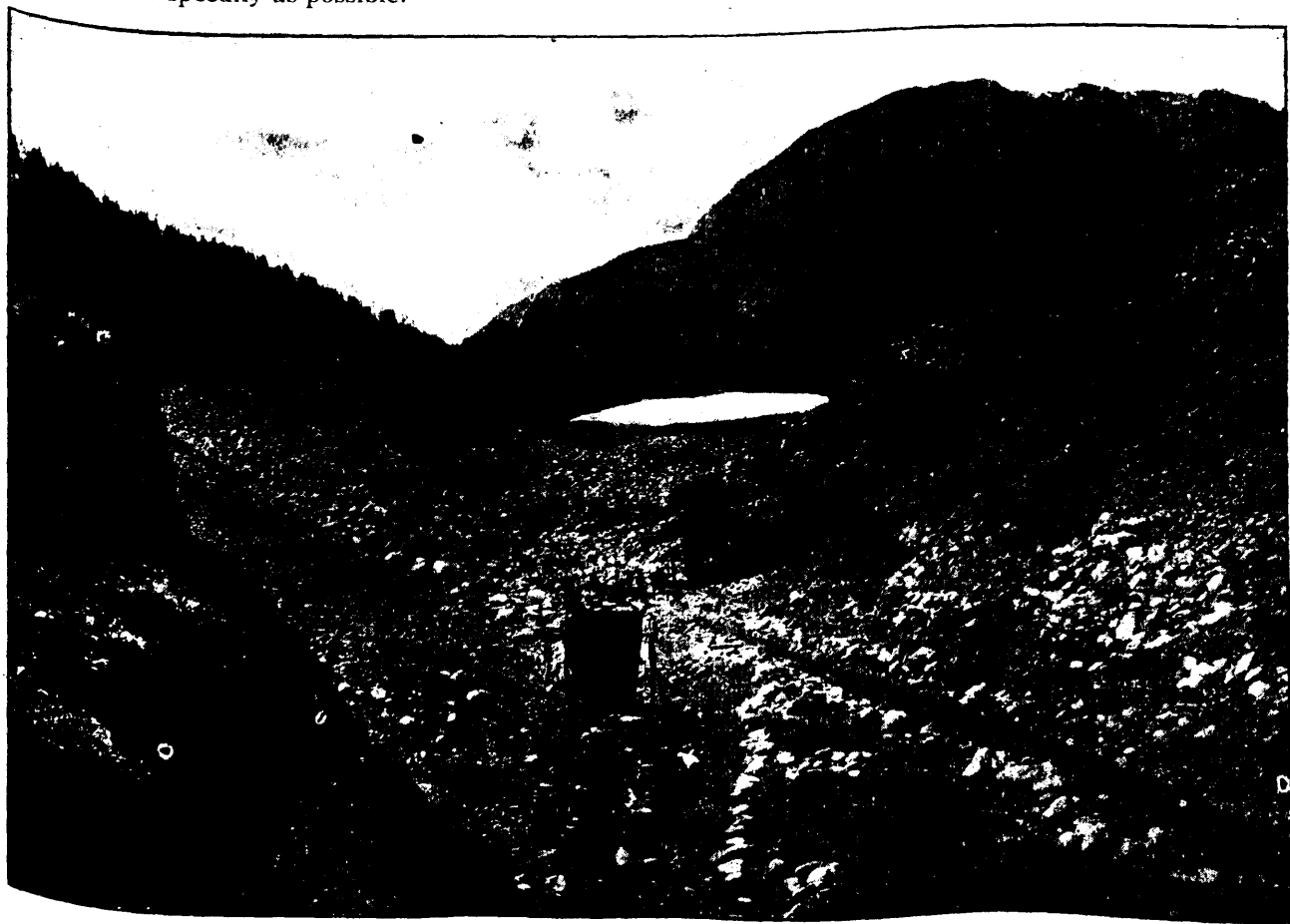
CARIBOO.

It is reported on good authority that a strike of unexampled richness has been made by Col. Lightner at the Cinnabar Mine at Savonas. The ore was rich enough anyhow, going as high as 65 per cent., but it is stated that some ore in the new strike will go as high as 80 per cent.

Senator Campbell of San Francisco, who is to superintend the work of constructing the hydraulic elevators for the Cariboo Mine, is expected up the first of April, and will probably be accompanied by Mr. Ward, the manager of the mine. The work of construction will be prosecuted as speedily as possible.

plant will be built and will be in operation in July or August. It is with gratification we note such men as Mr. Bellamy becoming interested in dredging on the Thompson and in this immediate vicinity.

Nearly 20 years ago, on the Fraser River, occurred a landslide into the river on the west side, about ten miles above Lillooet, which completely dammed the river for about 20 hours, till the water raised sufficiently to overrun the obstruction of earth and gravel and wash it down. A similar one occurred some miles below Ashcroft on the Thompson River and the water was raised so high that it backed clear up and onto the Ashcroft flat. It is quite possible that the water of this portion of the northwest at one time found its outlet by way of the Okanagan and Columbia Rivers. Some huge slide, such as those of recent date, may have occurred which threw the waters away from the old channels and out to the sea through the new ones. British Columbia offers a fine field of study for the geo-



VAN WINKLE BAR, LYTTON.

It is probable, says the *Ashcroft Mining Journal*, that a number of Puget Sounders will try luck in Cariboo this summer. A number of riveters have gone to the Horsefly to work on the pipes for the hydraulic lift.

H. R. Bellamy, a mining man of good qualifications, who has had experience in different quarters of the world, is now engaged in exploring on a lease of 8,000 feet of ground in the Thompson River, 4 miles west of Savonas, near Deadman's Creek. The benches and bars of the Thompson have yielded a great deal of gold, and Deadman's Creek has produced considerable, the gold in the creek being coarse. He states that the prospecting has given satisfactory results. The ground will ultimately be worked with a scoop-dredge. The prospecting is done from a scow, and will be continued for about a month. If at the end of that time his pros-

pecting shall have been satisfactory, a fine dredging logian, who can find rare traces of primeval times all through the mountains and valleys. Traces of old water courses occur at most unexpected places and often times far up the coulees, hundreds of feet from the water level, is found an old, dry channel, which only lacks the flowing water to make the river, as the old banks, bars and washes are plainly visible.

EAST KOOTENAY.

The Fort Steele *Prospector* is a curiosity in journalism. It is type written by the editor, who also composes the ads. From it we learn that mining affairs are fairly brisk in that section.

Work is being pushed on at the Dardanelles and the tunnel on the International placer claim is in 207 feet.

The Nip and Tuck has been leased by the purchasers to Mr. J. M. Buxton of Vancouver, who is well known in mining circles. Mr. Buxton has associated with him a number of English capitalists. They will put in a new hydraulic mining plant and will push work on the claim during the coming season. This property is situated on Wild Horse Creek and is considered very rich. We heartily wish the gentlemen engaged in the enterprise, success.

At the North Star in running a cross-cut they struck eight feet of solid ore. Twenty-two teams are hauling out ore at the rate of about 30 tons a day to the Kootenay River. A contract has been entered into to ship 5000 tons of ore during the coming summer.

A shipment of five tons from the Last Chance has furnished the following returns: 136 ounces in silver, \$1.75 in gold, and 3½ per cent. copper. Since the shipment was made the property has been bonded to a Montana syndicate.

The Utopia and Quantal are said to have been bonded to Montana parties. The Bard Mountain property is also under bond for \$35,000, and several parties are looking after the Sullivan group. There will be four steamers on the river as soon as navigation opens.

SLOCAN.

A big strike is reported on the Goodenough of fifteen inches of ore, eight inches galena and seven of carbonates on the lower tunnel.

The Noble Five, Goodenough, Last Chance, American Boy, and Deadman are said to be taking out 24 carloads of ore per day between them.

The Star is shipping two carloads of ore a day, one by the K. & S. and one by the C. P. R.

The Fisher Maiden has about 40 tons of ore ready for transport. Work is suspended on the Currie.

The Enterprise on Ten Mile Creek is progressing favorably on the lower tunnel, while the upper tunnel has for the first time pinched out, but work is continued on it with the expectation of shortly striking ore again.

The owners of the Silver King mineral claim, situated at Jackson's Basin, have struck a small vein of solid ore, which is said to be very rich. Development work is being prosecuted, and the outlook is very encouraging.

The Chambers group will soon be added to the list of shippers. It is situated on Carpenter Creek near Cody, and there is a carload of high grade ore ready for shipment. As the ore is estimated to run 150 ounces, the returns should show a handsome profit.

The Canadian Pacific Mining Co. have finished the flume at their property on Woodbury Creek, and will place in position four Burleigh drills that have been lying on the beach for some time past.

At the Skyline four teams are hauling away fifteen tons of ore a day. About 600 tons are piled on the beach owing to the fact that the terms of the Pilot Bay smelter are not satisfactory. The ore in the Skyline is shovelled into chutes after being blasted, and this enables each man to produce a large quantity with less labor than usual.

A well defined rumor, apparently from reliable sources, was current here the other day that Kootenay was to have yet another smelter, which will be built in Kaslo. It will be commenced in the early spring, it is said, and pushed rapidly to completion. The scheme is said to be backed by some wealthy people who have already made investments in the Slocan country.

The owners of the Goodenough, who have been putting in a drift tunnel to tap the ledge at a lower level struck it rich the other day, the pay streak being fully eight inches in width, and as fine a body of ore as could be wished. It is quite clear that the mines here have not been half exploited, and they will turn out to be far richer than the most sanguine expect. Whenever genuine development work is done good results follow. The only things needed to make this one of the richest camps are capital and labor.

Everything at the Slocan Star Mine is in good shape. The concentrator is practically ready for operation. Byron N. White, the manager, says it has not been decided whether work will be suspended on the stopes until the dump has been run through the concentrator or not. It is estimated that there are between 25,000 and 30,000 tons of ore on the dump, enough to keep the concentrator running for six months. Part of the ore now being shipped goes to Pueblo, Colorado.

The K. & S. is putting in spurs to several of the mines. The Iron Hand, bought by the Hall Mines Co., has developed a lead of silver-lead ore, which will pay the transportation of the iron ore, in which it was found, to the Hall Mines smelter, where it is required as a flux. Near Sandon the Reco Mine has from 30 to 40 men working, and the ore is being rawhided down to the railway. The Ivanhoe is also rawhiding and has 80 tons on the dump. The tunnel is in 400 feet. The Ruth employs 30 men and ships 100 tons a week.

Owing to mud slides at different points, and other difficulties, ore deliveries have not been as numerous at Kaslo lately as during former weeks. The following are the receipts for one week:

	Pounds.
Slocan Star Mine	180,000
Payne group of mines	60,000
Wellington Mine	60,000
Whitewater Mine	60,000
Ruth Mine	60,000
Iron Hand Mine (iron ore)	30,000

A total of 25 tons. The ore from the Slocan Star goes to Pueblo, Colorado, and one car from the Ruth goes to Tacoma. The remainder is about evenly divided between the Everett and Great Falls smelters. The ore from the Iron Hand went to the Hall Mines smelter at Nelson.

A shipment was made last week from the Little Phil. This property is rapidly developing into another Blue Bell. A concentrator will probably be put in this summer. At present developing work is going on 250 feet under ground. Drifts are being run and everything is being put in readiness for systematic mining. It is said that two men can stope 1,000 tons of ore in a month on the Little Phil. A great part of the ore will concentrate from two to four in one.

Luther Bros. have a contract on the Highland to run a tunnel to the line of the Josephine, and then to rise to the surface, a distance of 200 feet. The Josephine will be much improved in value by this work. The Highland has one of the best bodies of ore in the camp. In addition to a vast amount of concentrating ore it has four feet of the clean stuff. Another tunnel will be run on the property next fall, and it is likely a concentrator will be erected. A tramway along Cedar Creek is talked of. At present the freight on ore to the wharf is \$1 a ton.

TRAIL CREEK.

The ore now being brought up from the bottom levels of the Le Roi Mine is worth three hundred dollars per ton, and about 140 tons a day have been shipped during the week.

Mr. J. A. Kirk, P. L. S., of Rossland, has received word from General Warren, who represents a London syndicate, that he has been chosen to survey 41 mineral claims in Trail Creek and Slocan districts, for the syndicate.

The ore body struck in the east drift of the Nickel Plate at a depth of 100 feet, is holding its own, while a two foot streak of ore is shown on the cross-cut about 85 feet to the north of the main shaft.

The large compressor of the War Eagle Company is in place and about ready for use. Work on the War Eagle and Iron Mask will start up with a full force of men, about the 1st of March.

The *Prospector* learns on good authority, that two wealthy London syndicates have ordered their mining engineers to leave Coolgardie and Johannesburg and proceed direct to Rossland to inspect the Trail Creek Mines.

Mr. J. B. McArthur is collecting a fine lot of ore samples to be placed in the Toronto Board of Trade rooms.

The ore vein in the St. Elmo is widening. The tunnel is being extended one hundred feet by contract.

Colonel W. W. D. Turner, president of the Le Roi Company, says that that mine will pay another dividend of \$35,000 on the 1st of March and continue to do so monthly.

It is announced that a 50-foot contract is to be let on the Homestake. The additional work will be in the continuation of the No. 2 shaft which will now be put down 100 feet. The face of the drift from the No. 1 shaft is in solid ore which looks well.

General C. S. Warren, of Butte, has purchased the California, a claim lying west of the West Le Roi and Josie ground, and bonded the Spotted Tail group in the South belt. He owns a large interest in the Golden Chariot and Great Western and says these admirable properties will be worked this season. The general is one of the most enthusiastic believers in the Trail Creek mines and has already brought in a great deal of capital. He now has some good London connections.

In 1894 the output of Trail Creek Mines was \$125,000, while in 1895 it was 1,000,000, and it is estimated that the increase for this year will be in the same proportion.

The Crown Point is in the hands of a strong company. Nearly 1,000 tons of ore are already on the dump and will be shipped as soon as the Trail Creek tramway, now building, is completed. Much is expected of the Crown Point this year.

The Highland has a 7-foot vein of ore which runs fairly well in gold and high in copper. It looks like one of the biggest mines in the camp and the people who own it understand their business. The Highland will be heard from before the close of the year.

The O. K. is to have a new 10-stamp mill and within 60 days will probably be taking out 30 to 40 tons of ore per day. The ore is now in sight and could be taken out if the company had the facilities for handling it. The future of this mine is no longer problematical. It must take its position as one of the established mines of the camp.

The Cliff is to have a new drill plant and is to be opened up extensively. Part of the machinery is already on the ground and the whole of it will be ready and in operation within 60 days. The Cliff shipped a good deal of ore last year and will no doubt be a large

producer this year. The owners are well equipped financially and they intend to work the mine for all it is worth.

The Gold Hill is not far to the north of the Jumbo and is being worked on an extensive scale. A long tunnel is being run, and when completed, which will not be the case for several months, it is expected some fine ore will be uncovered. The company is in good financial condition.

The Josie is now in capital condition. The company has ample funds in the treasury for development work and is putting in a large pump, hoisting machinery and a fine new compressor for working seven power drills. The Josie shipped 1,300 tons of ore in 1895 and will probably ship four or five times that much this year. The new drill plant will be in operation before May 1st.

The Le Roi, Black Bear and Ivanhoe claims constitute the holdings of the Le Roi Mining & Smelting Company. The Le Roi is already a tremendous producer, yielding about 125 tons of good ore per day. New machinery is to be introduced within three months which will enable the company to double this output. In all probability the Black Bear will be opened during the year. A fine grade of ore has already been found there.

The Centre Star is now being opened up with great energy and very interesting results are looked for before the close of the year. The company is, financially, one of the strongest in the camp, has a fine drill plant and has a scheme of development laid out which will require several months to complete. No attempt has been made to ship ore, although a large quantity has been taken out, but before the close of the year the company will, no doubt, begin to ship, or erect reduction works at the mine. In any event, the Centre Star must be reckoned as a producer.

The Tramway Company is building a ferryboat at Trail. It will be 24x100 feet and will be worked on a cable supported on two lofty piers 125 feet high. The cable will have a span of 1800 feet.

There are many claims in Trail Creek, like the City of Spokane, Mountain View, Eddie J., Paul Boy, C. and C., Georgia, Alberta, Nevada, Red Mountain, California, West Le Roi and Josie, Giant, Gertrude, Phoenix, Nest Egg, Ontario, Green Mountain, High Ore, Sunset, Evening Star, Good Hope, Zilor, Hattie Brown, Palo Alto, Eleanore, Lookout, Pilgrim, Monita, Surprise, Little Darling, Commander, R. E. Lee, and Maid of Erin, for which development arrangements are now being made.

The No. 2 tunnel of the War Eagle is now well into the big ore chute found in the No. 1 tunnel 125 feet above. A large stoping area will soon be opened up, but owing to the conditions of the roads, no ore can be shipped. It is hardly probable that any of the shipping mines will send out any considerable quantity of ore before the completion of the Trail Creek tramway. The War Eagle is taking out no ore except what is encountered in the development work. The grade of the ore found in the No. 2 tunnel is about the same as that found above. Some of the ore now being taken out bears a striking resemblance to the rich ore found in the lower levels of the Le Roi.

The talk of Trail Creek camp is the recent big discovery made on the Jumbo, a claim situated toward the western end of the camp. Only a short time ago when piercing the tunnel, the men had gone 11 feet through solid clean sulphide ore and then had not reached the hanging wall. Assays as high as \$159 in gold were got,

but an average of the vein is \$16 in gold with some copper. The property is owned by John A. Finch and M. R. Galusha, of Spokane, who have lots of money to develop the claim. It is situated across Little Sheep Creek from Red Mountain, and appears to be on the same ledge as the Eddie J., Cliff, St. Elmo, and Mountain View claims.

A most encouraging fact in connection with the Trail Creek mineral bodies, is the increasing richness of the ore as depth is reached. This rule holds good in every instance so far, and it will no doubt encourage the owners of so-called low grade properties to sink shafts on their lodes till they reach the pay ore below. The great Le Roi itself was not a high grade proposition at the surface, but the ore has turned richer and richer as the shaft has grown deeper, till at the present moment it is classed as one of the highest grade mineral bodies in the country. The returns from 150 tons of ore recently shipped reached the handsome sum of \$9,000. As the daily output of the mine is between 120 and 130 tons, this \$9,000 represents just a little more than one day's work. Can any other camp in the Northwest beat that?

WEST KOOTENAY GENERALLY.

The Cordelia, a claim on the north fork of Carpenter Creek, shipped last fall 6,709 pounds of ore to the smelter at Pilot Bay. The returns were 203 ounces in silver, 19 per cent lead, and \$2.28 in gold. The shipment netted, after all charges were paid, \$365.70. Active work will commence on this property in the spring.

The Goodenough holds the record for the richest shipment of ore from the Slocan. The shipment returned a profit of \$524 to the ton with silver at 59 cents. The Reco will try to beat this record, and not long ago shipped 40 tons to the smelter, which J. M. Harris claims will net a profit considerably over \$20,000.

The Cariboo claim at Camp McKinney continues to increase in richness as it goes down, and from \$8,000 to \$12,000 in gold are now being taken out of it per month, besides a large quantity of rich concentrates, which are shipped to Tacoma for treatment.

Upon the Golden Crown, a claim near the famous Winnipeg, upon which Mr. W. J. Porter is busily engaged sinking a shaft, and taking out some very fine ore at the present time, the same being mined from a three-foot vein in which plenty of free gold is visible. Samples that have recently been assayed show the ore to be worth as much as \$1,000 per ton.

The Gold Drop, in Greenwood Camp, is looking as well as any property that has been developed in the Boundary district, as, besides being a large body of ore, the quality is very rich.

PROVINCE GENERALLY.

Within four miles of Victoria, on the north side of Esquimalt harbor and close to the water's edge, Messrs. John Sandycok and J. T. Pearse located the Daisy mineral claim two years ago. Not much attention has been paid to it and the locators not having money at their disposal for development purposes have quietly contented themselves with doing their assessment work. Recently they brought into town some fine samples of the ore, and announce that they have a vein of it at least three feet in width. The quartz carries iron and copper pyrites, some of it running very high in copper. Several assays have been made which have run \$2.50 in gold, and even as high as \$80 in silver. Not long ago Mr. J. M. Burke, of Rossland, visited the place and expressed himself as well pleased with the appearance of

the ore. Where the development work has been done is just at high water mark. The ledge can be traced at several points some distance back from the shore, but want of capital has prevented the locators from sinking a shaft further inland to strike the lead. Messrs. Sandycok and Pearse are now trying to interest capital in the undertaking, and the character of the ore certainly shows that they have a highly promising prospect, its proximity to town making it the more valuable.

Boring for precious metal is proceeding immediately below the Vancouver city limits. The mayor stopped similar prospecting on Stanley park last week, owing to its being a Government reserve. The excitement and consequent active prospecting for silver is occasioned by the fact that silver ore has been found in or near the park, just outside the city limits, running \$30 to the ton.

There is some talk of a Chicago and Victoria syndicate bonding certain lands on Texada Island, with a view to developing the mineral resources. The surface specimens of gold, silver, copper, tin and iron ores, have long been regarded as very rich, and a series of assays have fully borne out that opinion. Up to the present operations are being principally confined to prospecting and assessment work. The syndicate has, it is said, bonded most of the valuable claims, and is preparing to invest at least \$250,000 in the practical and scientific development of the mineral ledges. Work will commence in the early spring.

Below are the shipments of bullion, matte and ore from the smelters and mines in Southern Kootenay for the week ending February 15th, from returns made at the customs house in Nelson:—

	TONS.	VALUE.
Hall Mines smelter, Nelson.....	115	\$ 28,658
Pilot Bay smelter.....	61	6,100
Slocan Star Mine, Sandon.....	120	12,000
Reco Mine, Sandon.....	50	5,000
Alamo Mine, Three Forks.....	40	4,000
Monitor Mine, Three Forks.....	20	2,000
Last Chance Mine, Cody.....	80	8,000
Noble Five Mines, Cody.....	77	7,700
Deadman Mine, Slocan district.....	77	7,700
Whitewater Mine, Slocan.....	61	6,100
Ruth Mine, Sandon.....	30	3,000
Slocan Surprise Mining Company.....	13	1,300
Slocan Boy Mine.....	19	1,900
R. E. Lee and Madison Mine, Slocan district.....	14	1,400
Northern Belle mine, Slocan district.....	34	3,400
Wellington Mine, Slocan district.....	60	6,000
Mountain Chief Mine (Payne Group) Slocan dist.....	32	3,200
No. 27 Mine, Ainsworth.....	12	1,200
Total.....	915	\$108,658
Total, so far, for 1896.....	2,905	\$359,808

Hotels.

When visiting Vancouver, there is no more comfortable hotel to stay at than the Manor House. Elegantly furnished, it is conducted in a manner to make it home-like and most agreeable to visitors. The house is rapidly growing in favor. The cuisine is excellent, and the accommodation is altogether of a high order. We can safely recommend the Manor to our readers when they visit Vancouver.

In Victoria, the Dallas is the most pleasantly situated of any hotel in the city. It is really a charming house to stay at when visiting the capital city on business or pleasure. Then there is the Occidental, more centrally located and under the same management. It will be found comfortable, especially for families, and the rates most reasonable. Mr. Jensen, who manages both hotels, is one of the most popular caterers in the whole Province.

Province of British Columbia.

Minister of Mines.—Hon. Col. James Baker.
 Provincial Mineralogist.—W. A. Carlyle.
 Public Assayer.—H. Carmichael.

Gold Commissioners.

For the Province.—W. S. Gore.
 Alberni.—Thos. Fletcher, Alberni.
 Cariboo.—John Bowren, Richfield.
 Cassiar District.—James Porter, Laketon, Cassiar.
 Lillooet District.—Frederick Soues, Clinton.
 East Kootenay District.—J. F. Armstrong, Donald.
 West Kootenay District.—N. Fitzstubs, Nelson.
 West Kootenay District.—J. D. Graham, Revelstoke.
 Yale District.—Chas. Lambly, Osoyoos; G. C. Tunstall.
 Kamloops.

Assayers.

Public Assayer.—H. Carmichael, Victoria.
 W. Pellew Harvey, Vancouver.
 R. C. Campbell-Johnston, Vancouver.
 Mahon & Twigg, Vancouver.
 G. F. Monckton, Vancouver.
 Albert Strolberg, Ainsworth.
 Ed. A. Martin, Barkerville.
 W. W. Gibbs, Boundary Creek.
 W. V. Bowrow, Richfield, Cariboo.
 Crowells & Wallinger, Fort Steele.
 W. J. Thretheway, Kaslo.
 Harry A. Guess, Midway.
 Wm. F. McCulloch, Nelson.
 Frank Dick, New Denver.
 Howard West, New Denver.
 A. H. Holdich, Revelstoke.
 C. W. Cluett, Rossland.
 C. C. Woodhouse, Jr., Rossland.
 Frank J. Davey, Rossland.
 Chas. M. Wilson, Three Forks.
 M. A. Bucke, Sandou.
 F. H. Latimer, Vernon.
 A. L. McKillop, Nelson.

The above list of "Assayers" will be discontinued after this month, except in cases where parties wish to have their names appear. The charge for insertion under this heading will in future be \$1.50 per annum. Assayers wishing their names to appear will please communicate with the RECORD as early as possible after this issue.

MINING CENTRES IN BRITISH COLUMBIA

—AND—

HOW TO REACH THEM.

ALBERNI.

Alberni.—Steamboat communication with Victoria and by stage with Nanaimo.
Barclay Sound.—Forty miles from Alberni; communication by steamer with Victoria.

CARIBOO.

Barkerville.—Two hundred and eighty-five miles from Ashcroft; stage from Ashcroft. See stage lines.
Bonaparte.—Twenty miles from Ashcroft; stage from Ashcroft.
Big Bar.—Stage from Ashcroft.
Clinton.—Thirty-two miles from Ashcroft station; stage from Ashcroft.
Fort George.—Nearest post office, Quesnelle, where stage to and from Ashcroft changes.
Horsefly.—Nearest post office, 150-Mile House; stage from Ashcroft; change at 150-Mile House.
Lac La Hache.—One hundred miles from Ashcroft; stage from Ashcroft and Barkerville.
Lillooet.—Weekly stage from Clinton, where connection is made with stage for Ashcroft.
Lightning Creek.—Between Quesnelle and Barkerville, by stage.
One Hundred Mile House.—Stage from Ashcroft.

One Hundred and Fifty Mile House.—Stage from A shcroft.
Quesnelle.—Two hundred and twenty-five miles from Ashcroft; stage from Ashcroft.
Quesnelle Forks.—Stage and pack trail from Ashcroft.
Soda Creek.—Stage from Ashcroft.
Slough Creek.—From Barkerville, twelve miles.
Tatla Lake.—Stage from Ashcroft, changing at Soda Creek.
Willow River.—Stage to Barkerville or Stanley, thence rail.
Williams Creek.—From Barkerville, seven miles.

CASSIAR.

Dease Creek.—
McNamee Creek.—

COAL CENTRES.

Crow's Nest Pass.—
Nanaimo.—From Victoria, all rail, 73 miles. Steamer from Vancouver.
Union.—
Wellington.—From Victoria, all rail, 83 miles. Steamer and rail from Vancouver.

EAST KOOTENAY.


Cranbrook.—Nearest railway station, Golden. Communication by steamer from Golden to Windermere, thence by stage.
Fairmont Springs.—Nearest railway station, Golden. Steamer to Windermere, thence by stage.
Fort Steele.—Steamer and road from Golden. Steamer from Jennings, Montana, G.N.R.R.
Galbraith Ferry.—Steamer from Golden. Stage in winter.
Galena.—Nearest railway station, Golden; thence by steamer. Stage in winter.
Golden.—On the main line C.P.R., 475 miles from Vancouver.
Moyie River.—From Fort Steele, 25 miles.
McMurdo District.—Steamer and trail from from Golden, 35 miles.
Perry Creek.—Steamer from Golden to Fort Steele, thence by road.
St. Mary's.—From Fort Steele, 20 miles, trail.
Thunder Hill.—One hundred and fifteen miles from Golden. Steamer in summer, stage in winter.
Windermere.—Steamer from Golden. Stage in winter.
Wild Horse Creek.—From Fort Steele, two miles trail to Kootenay river.

McLENNAN, McFEELY, & Co., LTD.

VANCOUVER, B. C.,

WHOLESALE DEALERS IN AND IMPORTERS OF

MINERS' SUPPLIES, HARDWARE, IRON, STEEL.



ROPE, CHAIN, POWDER, AND DYNAMITE.

WEST KOOTENAY.

Ainsworth.—Twenty-eight miles from Nelson and twelve from Kaslo. Steamer communication.

Albert Canyon.—A station on the C. P. R., 400 miles from Vancouver.

Big Bend District.—Fifty miles from Revelstoke by trail and boat.

Cariboo Creek.—Steamer from Nakusp, ten miles.

Fort Shepherd.—Nearest post office, Trail Creek; communication by rail and steamer from Revelstoke.

Illecillewaet.—On the main line C. P. R., 407 miles from Vancouver.

Kaslo City.—Thirty-five miles from Nelson; communication by steamer.

Lardeau City.—Forty miles from Revelstoke; communication by steamer.

Lardo-Duncan.—Steamer from Kaslo to head of lake, thence river trail 40 miles.

Nakusp.—North-west terminus of Nakusp & Slocan Railway, 50 miles from Revelstoke. Steamer communication from Revelstoke tri-weekly.

Nelson.—Thirty miles from Robson; is the eastern terminus of the Columbia & Kootenay Railway, and also on the Spokaue & Northern Railroad. Steamer from Revelstoke.

New Denver.—Steamer from Revelstoke and rail from Nakusp; all rail from Kaslo. Distant from Revelstoke, 78 miles, from Kaslo, 28 miles.

Pilot Bay.—Eighteen miles from Kaslo, thence by steamer.

Revelstoke.—On main line C. P. R., 379 miles from Vancouver.

Rossland.—Seven miles from Trail Creek by road or stage.

Sproat's Landing.—One hundred and sixty miles from Revelstoke, and one and a half miles from Robson.

Springer Creek and South Slocan Camps.—From New Denver by steamer, twenty miles.

Sandon and Cody Creek.—All rail from Kaslo, 29 miles. Steamer and rail from Revelstoke via Nakusp and Three Forks. Distant from Three Forks, four and a half miles.

St. Mary's Country.—Steamer from Kaslo or Nelson to Darr Townsite, thence trail.

Three Forks.—Steamer from Revelstoke to Nakusp, thence rail; from Kaslo, all rail. Distant from Revelstoke, 82 miles from Kaslo, 24 miles.

Trail.—Rail from Spokane to Northport, thence steamer. All steamer from Revelstoke, or steamer and rail via Nelson. Distant from Spokaue, miles; from Revelstoke, 150 miles from Nelson, 50 miles.

Trout Lake City.—Steamer and stage from Revelstoke.

LILLOOET.

Bridge River, Cayoosh Creek, Fraser River.

YALE.

Boundary Creek.—Nearest railway station on the S. and O. R., Okanagan Landing, thence by steamer to Penticton and on by stage to Midway.

Fairview Camp.—Communication by boat from Okanagan Landing to Penticton, thence by stage.

Kettle River.—Steamer from Okanagan Landing to Penticton, thence by stage.

Midway.—Rail from Sicamous to Okanagan Landing, thence by stage.

Okanagan Mission.—Rail from Sicamous to Vernon, thence by stage, or by steamer from Okanagan Landing to Kelowna, thence by livery.

Osoyoos.—Rail to Okanagan Landing, steamer to Penticton and thence by stage.

Rock Creek.—Rail to Okanagan Landing, steamer to Penticton, and thence by stage.

Yale.—Nicola Lake Stage from Spence Bridge and Kamloops, 50 miles.

Any of these points may be reached by rail from Spokane to Marcus, and thence by stage, twice a week.

Mail stage leaves Penticton for Midway every Thursday morning.

.... SEND FOR

SHELTON & CO'S

ILLUSTRATED CATALOGUE OF

FURNITURE

The largest and most complete stock on the Mainland of FURNITURE,
CARPETS, LINOLEUMS, BABY CARRIAGES, Etc.

Warerooms. 507, 509, 511, and 513, Hastings Street, - - VANCOUVER, B. C.

MARCUS WOLFE,
Insurance, Loans, Real Estate.

JOHNSTON BLOCK, - NANAIMO, B. C.

P. O. DRAWER 17.

WM. K. LEIGHTON,
FINANCIAL AND MINING BROKER

P. O. DRAWER 33.

NANAIMO, - B. C.

GROCERY SUPPLIES

FOR MINERS AND PROSPECTORS

AT LOWEST POSSIBLE FIGURES.

E. J. SAUNDERS & CO.,

VICTORIA AND ALBERNI

Synopsis of British Columbia Mining Laws.

HOW TO LOCATE MINERAL CLAIMS.

Every person over eighteen years of age, and every joint stock company shall be entitled to all the privileges of a free miner, on taking out a free miners' certificate, the cost of which is \$3 a year.

Any Gold Commissioner or any Mining Recorder can issue free miners' certificates.

A free miner can locate and hold mineral and placer claims, under the mining laws in force at the time, during the continuance of his certificate, but no longer.

A mineral claim must not exceed 1,500 feet long by 1,500 feet wide, and must be marked by two legal posts, numbered one and two, placed as nearly as possible on the line of the lode or vein, and not more than 1,500 feet apart.

The line from one to two is the location line, and the claim may extend any number of feet to the right and to the left of said location line, provided the total distance on either side does not exceed 1,500 feet.

A legal post marked "Discovery Post" must be placed on the lode where it was discovered.

On No. 1 post must be written :

1. "Initial Post."
2. The name of the claim.
3. The name of locator.
4. Date of location.
5. Approximate bearing of No. 2 post.
6. Length and breadth of claim.
7. Number of feet to the right and number of feet to the left of location line.

On No. 2 post :

1. Name of claim.
2. Name of locator.
3. Date of location.

The line from one to two must be distinctly marked by blazing trees, cutting underbrush, or planting posts.

RECORDING MINING CLAIMS.

All records must be made at the Mining Recorder's office of the mining division in which the claim is situated.

An affidavit that mineral has been found in place on the claim must be made by the applicant, or someone in his behalf cognizant of the facts, and filed with the Recorder.

A mineral claim must be recorded within fifteen days after location, if within ten miles of the office of the Mining Recorder. One additional day is allowed for every additional ten miles.

The locator must furnish the Mining Recorder with the following particulars, in addition to the affidavit above mentioned, at the time the claim is recorded, paying a fee of \$2.50 for recording claim, and 25 cents for filing affidavit :

RECORDING MINING CLAIM.

1. Name of claim.
2. Name of locator.
3. Number of locator's Free Miners' Certificate.
4. Where the claim is situated.
5. Direction or bearing of location line.
6. Length and breadth of claim.
7. Number of feet to the right and number of feet to the left of location line.
8. Date of location.

ANNUAL WORK.

To hold a mineral claim, work to the value of one hundred dollars must be done on the claim each year from date of record.

An affidavit made by the holder, or his agent, giving a detailed statement of the work done must be filed with the Gold Commissioner or Mining Recorder, and a certificate of work obtained from the Gold Commissioner or Mining Recorder, and recorded (fee \$2.50) before the expiration of each year from the date of record.

The holder of adjoining mineral claims may, subject to filing a notice of his intention with the Gold Commissioner or Mining Recorder, perform on any one or more of such claims all the work required to entitle him to a certificate of work for each claim.

Any labor or money expended in constructing a tunnel to develop a vein or lode, will be deemed to have been expended on such vein or lode.

In lieu of the above annual work, the holder of a mineral claim may pay to the Mining Recorder the sum of one hundred dollars, get a receipt and record the same, each year from date of record.

(Placer mining laws, and laws in reference to hydraulic gold claims will be given in a future issue.)

CERTIFICATE OF IMPROVEMENTS FOR CROWN GRANT.

To obtain a certificate of improvements to a mineral claim the holder must have done work on his claim to the value of \$500; had the claim surveyed and marked out by a provincial land surveyor, whose field notes and plan must be immediately forwarded to the Lands and Works Department; posted notice on claim and in Mining Recorder's office for sixty days; filed copy of surveyor's field notes and plan with Mining Recorder; inserted copy of notice in *British Columbia Gazette* and in some newspaper published in the province and circulated in the district, for sixty days after posting notice on claim; and filed with Mining Recorder affidavit of himself, or his agent, in the required form and to the effect that the above conditions have been complied with.

CROWN GRANTS.

Applications for Crown grants must be made to Gold Commissioner within three months from date of certificate of improvements.

The holder of a certificate of improvements, on making application for Crown grant, must enclose certificate of improvements and the Crown grant fee of \$5.00.

A Crown grant issued since the session of 1893 conveys only the surface of the claim, for the purpose of winning and getting from and out of the claim, the minerals contained therein including all operations connected therewith, or with the business of mining.

TABLE OF FEES FOR REFERENCE.

For every free miners' certificate (for each year)	\$5 00
For every substituted certificate	1 00
For recording any claim	2 50
For recording every certificate of work	2 50
For recording any "lay over" or every other record required to be in the "Record Book"	2 50
For recording every abandonment, including the memorandum to be written on the record	2 50
For any other record made in the "Record of Abandonments."	2 50
For recording every affidavit, where the same does not exceed three folios of one hundred words	2 50
For every folio over three, thirty cents per folio.	
The above rate shall be charged for all records made in the "Records of Affidavits."	
For all records made in the "Record of Conveyances," where the same does not exceed three folios	2 50
For every folio over three, a further charge of thirty cents per folio.	
For all copies or extracts from any record in any of the above-named books, where such copy or extracts shall not exceed three folios per copy	2 50
Where such copies or extracts exceed three folios, thirty cents per folio for every folio over three.	
For filing any document	25
For a Crown grant	5 00

P. O. BOX 126.

OPPOSITE DRIARD.

BEAUMONT BOGGS

FIRE INSURANCE. LIFE INSURANCE.
 NOTARY PUBLIC FOR BRITISH COLUMBIA. COMMISSIONER FOR NOVA SCOTIA.
 Secretary "North Saanich Coal Company, Limited."

MINING BROKER, FINANCIAL AGENT,
 CORRESPONDENCE SOLICITED. VICTORIA

E. G. PRIOR & CO.

(LIMITED LIABILITY)

IMPORTERS OF

Iron, Hardware, Agricultural
 Machinery, and Vehicles
 ...of All Kinds...

SOLE AGENT FOR THE
 PLANET, JR., FARM AND GARDEN
 IMPLEMENTS

WAREHOUSES AT VICTORIA AND KAMLOOPS

Write for Special Catalogue and Prices.

R. P. RITHET & CO.,

Wharf St., Victoria.

Wholesale
 Merchants

SHIPPING AND INSURANCE

... AGENTS ...

Proprietors of Victoria Wharf, Outer Harbor,
 and Columbia Flouring Mill, Enderby.

AGENTS FOR

Moodyville Lands and Sawmill Co., Burrard Inlet.
 Victoria Canning Co. of British Columbia.
 Fraser River, Skeena River, and River's Inlet Can-
 neries
 Skeena River Packing Co., Skeena River.
 Lowe Inlet Packing Co., Lowe Inlet.
 Giant Powder Co.—Works, Cadboro' Bay.
 Pacific Coast Steamship Co., San Francisco.
 Puget Sound Tugboat Co., Port Townsend.
 Queen Insurance Co. of America—Fire.
 English and American Marine Insurance Cos.

LLOYD'S AGENCY. HAWAIIAN CONSULATE.
 VICTORIA.

R. E. PALMER, B.A., Sc.

A. M. CAN. SOC. C. E. P. L. S.

CIVIL, HYDRAULIC, AND CONTRACTING ENGINEER.

All classes of structures designed, superintended or
 erected. Examinations, reports, and estimates.

Mine development work reported or contracted for.
 Mineral claims surveyed in any part of British
 Columbia. Agent for owners. Refer-
 ences furnished.

OFFICES: ROGER'S BLOCK, HASTINGS ST.,
 VANCOUVER.

PIONEER STEAM COFFEE AND SPICE MILLS,

STEMLER & EARLE.

ESTABLISHED 1875.

MANUFACTURERS OF



COFFEE,
 SPICES,
 COCOA,
 CREAM TARTAR,
 MUSTARD, AND
 BAKING POWDER.

Pembroke St., between Government and Douglas Sts.,

VICTORIA, B. C.

LANGLEY & CO.,



Wholesale
 Druggists

—ESTABLISHED 1858.—



VICTORIA, B. C.

M. R. SMITH & CO.,

ESTABLISHED 1858.

BISCUIT
 MANUFACTURERS.

Gold Medal awarded at Royal
 Agricultural Exhibition, 1895.

VICTORIA.

NICOLA MAIL STAGE

—LEAVES

Kamloops every Monday at 6:30 A.M.
 Spences Bridge "Thursday" 7:00 "
 For all points in Nicola Valley both ways.

CLARK BROS., Proprietors.
 Kamloops, B. C.

P. O. BOX 176.

TELEPHONE 265.

WILSON & DIXON, COMMISSION MERCHANTS.

REPRESENTING

THE COPP BROTHERS CO., LTD.,

Manufacturers of Stoves, Agricultural Implements,
 Wood and Coal Furnaces, Hot Air Registers and
 English Grates, Mohawk Chief Plows, Queen
 Cultivators, Drag and Wheel Scrapers, Road
 Machines, and Rock Crushers.

BROWN, BOGGS, & CO.,

Manufacturers of Tinner's, Cannery, and Cornice
 Makers' Tools and Machines, Dies, Presses, etc.

WRITE US FOR CATALOGUES.

[ESTABLISHED 1890.]

B. C. FRUIT, CANNING & COFFEE CO., LTD. VANCOUVER.

Manufacturers of and Wholesale Dealers in

Jams, Jellies, Marmalades, Spices, Flavoring
 Extracts, Coffees, Sauces, Ketchups,
 Vinegar, Pickles, etc., etc.

Coffee Roasting and Grinding Mills of the
 latest improvement and patented.

All Goods bearing the Company's Trade
 Mark, the Sun, and marked Pure,
 are guaranteed in every way.

P. O. BOX 47.

Cash Registers.

A full line of samples of
 the famous National Cash
 Registers can be seen at
 the Company's branch of-
 fice, Sullivan Block, Van-
 couver.

A. H. WALBRIDGE,

SOLE AGENT FOR B. C.

P. S.—Write for Catalogue and Prices.