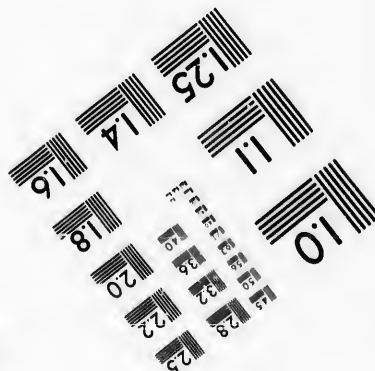
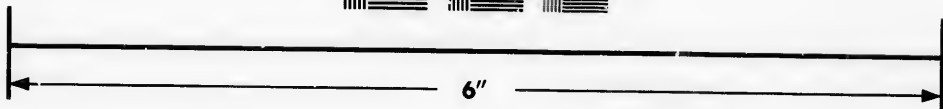
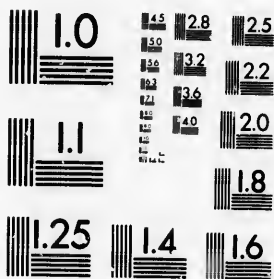
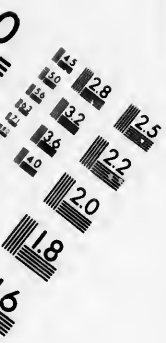


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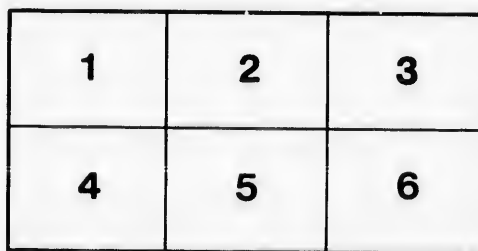
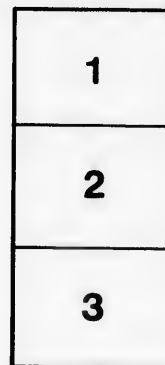
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**NOTES ON GOLD AND SILVER MINING IN THE  
PROVINCE OF QUEBEC.**

By JOHN FRASER TORRANCE, B. A., Member Can. Soc. C. E., and  
Member Am. Institute M. E.

It is too much the fashion with our local capitalists to seek for profitable mining investments as far as possible from home in British Columbia, Colorado, the Black Hills or even in Mexico, while totally ignoring the vast wealth of precious metals lying neglected at their very doors. Perhaps a brief résumé of some of the well-established facts about these resources might prove of service to counteract this tendency.

Quite recently a very valuable report on this subject drawn up by my friend, Dr. R. W. Ells, LL.D., etc., was published in Vol. IV of the New Series of Reports by the Geological Survey of Canada. It is a matter much to be regretted that the general public rarely consult these volumes. No doubt this arises in part from a vague impression that such reports must necessarily be too technical for any but trained geologists to comprehend, but especially from the size and absurd price of the volumes and all lack of public advertising of their contents.

In this paper I propose to use freely the facts so carefully collected by Dr. Ells and the other officers of the Survey, in the hope that they may thus reach some readers not familiar with the publications of the Geological Survey. Some notes of my own observations and experiences in this mining region are added.

My faith in the mineral resources of our central provinces was well grounded by Principal Dawson. It was strengthened and confirmed by the lectures of the famous geologist, Von Cotta, at the Saxon School of Mines. He pointed out very clearly that the forces to whose influence we trace the formation of ore-deposits have been operating ever since the earliest geologic ages. And he drew the logical conclusion that (other things being equal) the oldest geological formations should be the richest in valuable mineral deposits, because they have been subject to the action of those forces so very much longer than more modern formations.

As these palæozoic rocks are more widely distributed in this province and Ontario than in almost any other country, we might feel reasonably certain of the existence of many rich deposits of the precious metals and other minerals of economic value—even before such deposits were actually opened.

Comparatively little prospecting for minerals was carried on in Quebec until quite recently. But the successful development of our phosphate mines and the more recent exploitation of our valuable asbestos deposits lead me to hope that brighter days may be at hand for our gold and silver mines also.

The first published report of the existence of alluvial (or placer) gold on the Gilbert River in Beauce Co. appeared as far back as 1835—sixteen years before the first samples of gold dust and nuggets from Australia created such a profound sensation in Great Britain. It has always puzzled me why the nuggets and dust from Beauce Co. and Ditton never produced any similar effect.

Although Dr. T. Sterry Hunt published the results of an assay of the quartz from a vein in the Devil's Head on the Chaudière River as far back as 1851, and thus established the existence of gold in the veins of that region, and other observers noted the striking lithological resemblance between the formations on the Gilbert River and in Ditton, etc., to the auriferous belt in Nova Scotia, yet many geologists clung for a long time to the delusion that the placer gold of the district had its source in some hidden veins among the Notre Dame range of hills far to the North-East, and had been transported thence by glacial action. The first map of the Geological Survey that assigned these auriferous rocks to the same geological horizon as the similar deposits in Nova Scotia and Wales was not published until about five years ago (dated 1886). It covers only a portion of the gold field.

On referring to this South-East sheet of the geological map of the Eastern Townships, we notice that the area within its limits assigned to the Cambrian rocks is about one thousand square miles. We may safely assume that the N. E. Quarter Sheet will show about as much more. This leads me to estimate the gold area at 2,000 sq. miles. One of the richest belts lies close along the frontier, which it crosses from the sources of the Indian Stream in New Hampshire into Ditton and passes north-eastwards close to the flank of Big Megantic Mountain across Lake Megantic, and embraces the head-waters of the Samson and DuLoup. This belt re-crosses the United States boundary in the vicinity of the Penobscot Lakes and about the head of Sandy Stream. Let me here note some of the chief facts already established about the occurrence of gold and silver in this belt. We have the authority of Professor Hitchcock for the report that placer gold has been found upon the head-waters of Indian Stream in the State of New Hampshire. He says:—"The points examined were on and near Indian Stream about  $3\frac{1}{2}$  miles from the boundary. The stream here is quite rapid, and on either side the hills rise 300 to 400 feet above its bed, while every few rods, either from the East or the West, it receives a tributary. The rocks here, as elsewhere on Indian Stream, consist of argillaceous schists. These are often so wrinkled and corrugated that it is difficult to determine the dip, while elsewhere, especially where the rock is of a coarser texture, the flexures and contortions are not seen. In every respect the rocks are similar to those of Ditton. Immediately on Indian Stream the gold is chiefly found in the fissures of the schist, which is here so fragile that it is easily broken up by picks. A quarter of a mile from the stream we found the characteristic drift of this section. It consists of a bluish clayey gravel, and contains boulders of schistose rocks, and it has a depth, where we excavated, of three to four feet. The gold seems to be distributed through the entire mass, although it is nowhere very abundant. The streams are rapid and the descent of the bed rock is sufficient to carry away the loosened sand, if the hydraulic process is used."

The distance from the boundary to the Pope property in Little Ditton is not more than four miles. But we find the surface conditions here quite different to those described by Prof. Hitchcock, although the rock formations are the same. Here we find the country almost level and the surface from six to fifteen feet in depth. There is no chance of finding any suitable dumping ground for the tailings, even if a sufficient head of water could be obtained for hydraulicizing. There is no question of the productive value of the alluvial deposits on this stream, although no official returns have ever been made of the gold obtained. It seems that the grant to the Hon John Henry Pope was issued in such shape as to exempt him from the necessity of making returns. At any rate the returns were not made. But it seems probable that the total value of gold extracted there has exceeded \$100,000. On the death of Mr. Pope this gold property, embracing 4750 acres, passed into the hands of his daughter, Mrs. Ives, who leased it last spring to some Toronto people. Shortly after they took possession, I visited the place, and on my return to Cookshire I searched the title and found that they had paid \$5 000 for one year's lease of this property, being lots 52 to 61 (inclusive) in Range 7, lots 39 to 44 (inclusive) and lot 12 in Range 8, with lots 34 to 53 (inclusive) in Range 9, and the South half

of lot 14 in Range 10, with lot 8, part of lot 13 and the whole of lot 14 in Range 11—Ditton.

There is no doubt that much gold has been extracted from these lots by very primitive methods of washing. Most of the gold sold was very coarse. The natural inference is that the inexperienced workers left fully as much gold in their tailings as they secured. Dr. Ellis reports that the coarsest and most abundant gold was always found immediately below where quartz veins crossed the stream. But nobody seems to have tested any of these reefs as yet.

I have been thus particular in giving the numbers of the lots included in this Pope location and their total area, because Dr. Ellis has stated that "the Ditton area is inaccessible to the general miner and explorer." But his own map shows that the area of Cambrian rocks between Big Megantic Mountain and Chesham village on the north-east and the boundary on the south-west is fully 450 square miles, whereof the Pope property covers less than  $7\frac{1}{2}$  square miles.

The easiest way to reach this region is by Canadian Pacific Railway to Scotstown. On my flying trip I noticed a number of places that looked well worth prospecting. I feel quite satisfied that the Pope location does not include all of the best placer diggings or all the rich veins in that district. But a great obstacle in the way of prospecting any of the numerous quartz veins is the absence of any quartz mill in this province where working tests could be made. There are no available mills for this purpose nearer at hand than Nova Scotia.

Between Little Ditton and Lake Megantic no search for gold has ever been recorded, although the experience of the quartz miners in Australia would lead us to expect to find the richest veins in the immediate vicinity of large masses of intrusive granite such as the Big Megantic Mountain. A few miles after crossing Lake Megantic this same belt reaches the Samson stream, a rapid tributary of the Chaudière.

In a hurried *reconnaissance* thought this belt in the summer of 1891 I noticed a number of very promising-looking quartz veins traversing the black corrugated pyritiferous slates crossing the road near this stream. The owner of the saw-mill told me that specimens containing visible specks of gold had been repeatedly broken out of the quartz at his dam. But he had never sent any for assay. I am not aware of any attempts to prospect this stream for placer deposits. But it would be a very promising field for a party of skilled miners to explore.

The distance through the woods from the Samson to the Armstrong property on the Du Loup is only four or five miles. The same belt of rocks covers 750 acres on the left bank of the Du Loup. The main prospecting pits have been sunk on the brow of a hill about 400 ft. above the stream and half a mile back from it. In what was called the Main Shaft a vein of quartz averaging 11" in breadth has been tested to a depth of 26 feet. It contains a good deal of bleude with high-grade leaching ores of silver. There is very little galena to be seen. Our assays averaged about 30 ozs. silver with traces of gold.

Two other parallel veins were opened close by, one to the N. W. and the other to the S. E. Some of the assays ran high in silver. One piece from the "North" vein assayed by Rev. Mr. Pagé of Laval yielded 430 ozs. per ton. But none of our other assays approached anywhere near this. The course of these veins is N. 60° E. mag. The "South" vein is vertical and the "Main" vein dips towards it at an angle of 75°. If these attitudes were maintained in depth they would soon come together and form quite a bonanza.

About a mile from these pits to the S. W. a series of silver-bearing veins was uncovered and followed for 1000 ft. along their course. The two largest and most persistent veins are the outside ones of the series. The Armstrong vein averages 14" in width and assays high in silver with  $\frac{1}{2}$  oz. in gold. Its strike is S. 40° E. mag., dipping S. 50° W. 45°. At a distance of 173 ft. to the S. W. there is a vein of similar size called the "New Discovery." Between them lie the "Senator" and "Big Indian." An assay from the Senator gave 260 ozs. per ton. These veins all carry more galena than the veins previously mentioned. By concentration they would yield a very valuable smelting ore.

My report on this property strongly recommended its purchase at a moderate price and its equipment with a first-class modern concentrating plant. But it was impossible to get my employers to act before their bond expired.

It is a fact worth noting that both belts of veins are accompanied by heavy dykes of diorite and olivine, running parallel to them. Probably the same causes that led to their formation contributed largely to the origin and mineralisation of these veins. The presence of similar dykes elsewhere in the Cambrian formations should encourage prospectors to look for valuable veins of gold and silver in their vicinity. Such clues are often of very great service.

The ground along the Du Loup and its branches in this locality was all surveyed and laid off in so called mining blocks of about half an acre each many years ago, and eagerly bought up by speculators who never had any intention of spending their own money in its development. I believe that some gold has been found in the beds of these streams. But absentee proprietorship has been the curse of this whole region. Prospectors will not waste time and trouble in hunting for gold that legally belongs to others. Nearly all the tributaries of the Chaudière and Du Loup have been surveyed in the same way, and the mining blocks sold for a trifle to friends of the government of the hour. The results of such queer methods of encouraging the arduous search for gold might easily have been foretold. The banks of all these streams have remained an untrodden wilderness, although our geologists all agree that immense wealth of virgin gold lies hid in the prehistoric channels of most of these streams.

If we pause to contrast this lonely region with the rich and busy cities of the mining regions of Australia and California, we see how closely suitable mining laws or the reverse are connected with the growth or stagnation of large territories.

I have mentioned the presence of gold in the "Armstrong" vein. Two years ago I shipped some barrels of quartz to a Nova Scotian mill from a vein near the Kennebec Road quite close to the boundary of Maine. The milling test yielded \$4.07 per ton, which is considerably above the average yield of the quartz at the famous Homestake Mine in the Black Hills. As this vein is fully 6 ft. wide and has been traced for  $1\frac{1}{2}$  miles, it is well worth some attention.

On the Maine side of the boundary, gold and black sand have been found on Sandy stream. The usual stories are told of mysterious hunters who always had plenty of money although they never would work. An intelligent lumberman working limits on the head waters of the Penobscot told me that he had noticed much black sand in the streams and numerous quartz veins in the banks, but he never attempted any prospecting, not knowing how. The States of Maine and New Hampshire have one immense advantage over Quebec in the eyes of gold hunters. Mining laws are unknown there. The man that owns the soil owns everything under it. After coming to an understanding with the owner, there is no danger of interference with your freedom by anybody else.

The second belt of Cambrian rocks shown on this geological quarter sheet appears on the W. Shore of Lake Massawippi and to the East of Little Magog L. and along the valley of the Magog River. It has been traced through Stoke and Dudswell, etc., to Lake Aylmer and across Lake St. Francis into the county of Beauce. Its course is almost due north east to the De Lery Seigniory with the village of St. Francis in its centre. From Dr. Ellis' report we learn that several mining companies have done some work in the south-western part of this belt. The Goleonda Mining Co. and the Ascot Gold Mining Co. report that they found good workings on lot 11 of Range 11, Ascot, and on lots 2 and 3 of Range 13. The surface was about six feet deep, exhibiting the same sequence of stratified gravel and clay as on the Gilbert; but apparently they did not strike any old channel of the Magog. Dr. Ellis does not state the reasons for the winding-up of these companies.

Apparently the ground between Lakes Aylmer and St. Francis has never been tested. It is not until we enter the De Lery Seigniory



from this side that we learn of discoveries of gold once more. Very little prospecting has been done on the south side of the Chaudière in this Seigniorie compared to the great amount of work accomplished on the Gilbert, Des Plantes and other streams on the north side. But enough gold has been obtained on the Mill stream and elsewhere behind the village of St. Francis to give us a high opinion of the value of this half of the Seigniorie. Numerous large quartz veins are exposed in the banks of the streams and elsewhere. Inducements should be offered to enterprising prospectors to test some of these veins properly, and to hunt for rich alluvial deposits in their immediate vicinity.

Crossing the Chaudière we come to the famous Gilbert River, where fully three-fifths of all the gold mining in this province has been carried on. Gold was first discovered here by a French-Canadian woman about 60 years ago, but nobody seemed to trouble themselves looking for more until another woman ten years later found a nugget of 1,056 grains close to the same spot.

In 1846 the seignior, Mr. De Lery, was fortunate enough to obtain from the Crown a perpetual grant of all the gold and silver mines within his seigniorie, on condition of paying a royalty of ten per cent. upon all the precious metals obtained by smelting in furnaces. As no gold is ever extracted in this way from any such deposits, this proviso for royalty is not likely ever to enrich the provincial treasury.

After several temporary leases to other people, Mr. De Lery leased all his mining rights in 1864 to the De Lery Gold Mining Co. for a term of thirty years, with right of renewal for another thirty years on payment of fifty thousand dollars additional. The terms of this lease are of some interest to miners just now, as the first period expires in 1894; and it is exceedingly doubtful whether the long-suffering shareholders of the D. L. G. M. Co. will assess themselves to raise this fresh capital.

At the outset this company seemed inclined to work in a sensible way. They selected a mill site near Devil's Rapid on the Chaudière, and built a substantial quartz mill, close to the quartz vein assayed for gold and silver by Dr. T. S. Hunt in 1851. Unfortunately this mill proved a dismal failure from the very start. None of the prospectors ever got back enough gold from their sample lots of quartz to encourage them to keep on mining. After almost 30 years, stories are still rife of sceptical people throwing rich specimens and even gold coins into the batteries without obtaining any amalgam. It seems certain that a large part of the gold and quick-silver flowed off into the tailings and was lost. The total amount of quartz crushed in this mill can not have been large, although quite a number of large veins yielding high assays are known to exist within a radius of three miles.

This is greatly to be regretted, as all the miners on the Gilbert River are fully agreed in saying that the coarsest and most abundant gold in the old channels was always found just below points where quartz veins existed in the slates. Many of these veins are of such large size, give such good assays, and are so persistent that they might easily rival the great Homestake Mine of the Black Hills in their dividend-paying powers, if they were operated with equal skill and on the same scale.

The De Lery Gold Mining Co. began sub-letting portions of its territory to other companies from the very start. The amount of gold obtained by some of these lessees would have attracted notice in Australia or California. In 1866 some miners drove a tunnel across lots 15, 16 and 17 in the concession De Lery, and reported to the inspectors gold valued at \$142,581.00. Two of the heaviest nuggets found by them were valued at nearly \$1,800.00. In the following summer Mr. John McRae took fully \$15,000 out of a claim of 75 sq. ft. on the same stream.

It is no part of my purpose to write a history of all these undertakings. But I must call your attention to the operations of two companies in particular, to enable you to account for the disrepute into which the whole region has fallen.

An English corporation, named the Canada and North West Land and Mining Company, obtained a lease of no less than three large sections of the seigniorie.

At the time of Dr. Selwyn's first visit to this district in June, 1871, there was no mining going on (apart from a little prospecting by the local inhabitants) except by this company. The amount of capital permanently invested there was somewhere about £50,000 sterling (if I am not mistaken).

The only useful result of these operations was establishing the fact that the richest alluvial deposits about here are found in ancient river channels at considerable depths below the present level of the streams.

As an offset to this useful knowledge, we must charge a large part of the discredit into which this whole gold field has fallen to the reckless mismanagement and utter failure of this large corporation. My first meeting with its manager was very characteristic. Just as I entered the little shanty near the Gilbert that he occupied as an office, he was shouting angrily that he did not want any miner from Australia or California or anywhere else to come and try to teach him how to mine, that he knew all about gold-mining. On asking the gentlemanly victim of this tirade afterwards what was the cause of all this uproar, Mr. Attrill explained that he had ventured to suggest that, if the sluice boxes below the shaft were set in a straight line, they might save more gold than set as they were, in a slovenly serpentine fashion. Any sensible man would have been glad to receive such suggestions from this experienced Australian miner.

It did not surprise me to learn that no record was kept at this mine of the amount of dirt hoisted daily with the yield of gold per cubic foot or yard. I am afraid that the large majority of the English shareholders never learned the real causes of their total loss, but were led to attribute it to the poverty of the whole territory.

The entire district was condemned.

Other companies were equally to blame. One American company about the year 1865 secured a large tract of land on the Du Loup just below Marlow P. O., where the wreck of their immense two-story boarding-house still stands as a monument to the folly of spending a company's entire capital in preliminary building operations before testing the mine in any way.

The notorious failure of a hydraulic mining enterprise near the mouth of the Du Loup rendered the name of Beauce offensive in the nostrils of many Englishmen of high rank. This enterprise was entrusted absolutely to the skill and judgment of a gentleman who had been previously connected with the lumber trade in one way or another. He was entrusted with the expenditure of about \$200,000, involving elaborate surveys and the construction of a canal (or ditch) about 11 miles long, to furnish the necessary water under sufficient pressure to break down and disintegrate the gravel benches. This ditch cost more than would have been required to build a first class railroad along the same route. After it was finished, mining operations were carried on for a remarkably short period and then totally abandoned.

The failure of this enterprise seems to have led some others to regard its manager as a very competent mining engineer. Shortly after the collapse of the hydraulic company, I found him in charge of the operations of the St. Onge Company, on Slate Creek, right behind the village of St. George. The old channel here was 165 feet deep, and some of the overlying strata of sand and gravel were very wet.

More than a year's time and much money was spent in sinking a shaft here. It was finally accomplished by sinking a series of very heavy wooden boxes by the aid of pumps, which removed a vast quantity of semi-liquid material. Every stroke of the pump increased the fluidity of the surrounding mass, and threatened to collapse the structure. After passing through such ground, when a denser stratum was reached, the box lodged and could not be moved. Then a smaller box had to be started inside of the first one; and it was driven as far as possible before it lodged in turn. I believe that a third box was sent down before dry ground was reached. The natural result of these operations was the rapid diminution of the area of the shaft, until it was barely large enough for a tub to pass through. It was hard to find men willing to risk their lives in such a place. But the work proceeded for some time and a considerable amount of coarse gold was

obtained. One of the partners told me that the final abandonment of the work was caused by the manager's foolishness in blasting a passage through the side-rock of the channel to try and reach an imaginary Eldorado beyond. All the remaining capital was exhausted in this attempt. Then the sheriff sold out their rights.

I have gone somewhat fully into the record of this costly failure, because it shows clearly that this cannot be justly attributed to the poverty of the ground. There is no doubt in my mind that there are rich alluvial deposits as well as very promising quartz ledges on this creek. But the skill of genuine mining engineers will be required to exploit them with sufficient economy to reward the share-holders.

It is a serious misfortune to this region that no competent men have been employed as yet to sink through the deep wet ground which overlies nearly all these channels. If one such shaft had ever been sunk in the district and earned a rich reward for its owners, there would have been no lack of shafts sunk in search of similar channels.

As far back as 1851 we find Dr. Hunt reporting on the gold and silver contents of the vein exposed in the Devil Rapids of the Chaudière. In the same year Sir Wm. Logan organised a small mining company to work the deposits at the junction of the Du Loup with the Chaudière. Their operations showed a fair margin of profit, and were duly published in the reports of the Survey.

The joint report on our Quebec gold regions by Dr. Hunt and Mr. Michel, published by the Geological Survey in 1866 clearly established the wide distribution of placer deposits, while the accompanying assays of samples from numerous quartz veins demonstrated clearly the local origin of the gold.

When Dr. Selwyn arrived in Canada, fresh from the gold fields of Australia, his attention was at once directed to the gold fields of Nova Scotia and Quebec. His published reports show how much he was impressed with the similarity of these formations to the auriferous zone in Victoria. The few points of difference are all in favor of our Canadian gold fields. Our abundant water supply, our cheap labours, cheap food, low freights, etc., should stimulate mining operation, here.

The points of resemblance between the gold measures of Nova Scotia and those of Quebec have often been noted. But I have been often struck with the dissimilarity in size of the auriferous quartz veins of the two regions. It is comparatively rare in Nova Scotia to meet with one over two feet thick. Probably the average size of all those mined for gold in that province does not much exceed one foot. But on the Gilbert River and elsewhere in Beauce very large auriferous veins are the rule and small ones are the exception.

The samples of quartz selected by Mr. Michel for assay by Dr. T. S. Hunt were taken from veins ranging from three feet in thickness up to twenty feet and over. None of them showed any coarse gold where exposed. But several samples when crushed fine in a mortar and panned out yielded good "colours." The fire assays of many of them gave a large enough yield to justify the expenditure of large sums in their proper development on a large scale.

It is well established by sad experience that it is only 2 or 3 quartz veins out of every 100 that carry enough gold to pay for working, even in the richest gold regions. And it is equally well recognised that such veins generally carry their free gold in pay streaks or "chimneys," separated by large areas of comparatively barren quartz. There is no reason for considering the quartz veins of this province to be any exception to these general rules.

Dr. Selwyn has pointed out that the richest quartz veins in Victoria are generally found not very far from a mass of intrusive granite.

Prof. Hind was the first to point out the close relationship between the main anti-clinals of the Nova Scotian gold fields and the richest quartz veins.

It is a well-known axiom among competent engineers that the mineral deposits of every new district have their own peculiarities and are likely to present some characteristic variations from modes of deposit studied elsewhere. The prudent man will be cautious, therefore, about

committing himself too far to any very definite predictions about any undeveloped prospect, until he has had opportunity to examine and study closely some mines already operated in the same district.

If we bear in mind this caution, we may venture to lay down a few hints for prospectors in this region.

Enough work has been already done on the placer deposits to prove that the richest ground is always to be looked for : (1) in areas occupied by the black, greasy, highly contorted slates often impregnated with pyrites ; (2) more especially in the old channels buried deep below the present beds of these streams ; (3) and richest of all, just below the points where heavy quartz veins cross these channels.

In regard to quartz veins, prospectors are most likely to find paying ones : (1) among these black slates ; (2) close to the axis of an anticlinal ; (3) not very far from granite ; (4) or associated with dykes of diorite and olivine.

Perhaps we might help to avert some very foolish undertakings by adding that it is never wise to sink deep on any quartz vein that yields no gold at the outcrop, in sanguine hopes of finding a bonanza somewhere below. From what has been stated already, the chances are at least 53 to 1 against its proving to be a gold bearer.

Even if you have a vein that carries some gold at the outcrop, but not quite enough to pay the cost of mining it, the chances are always against its becoming richer as depth increases. We all know that veins are sometimes found to gain in richness with depth. But such cases are the exception. The general abandonment of the theory of vein-filling by injection from below has destroyed all cause for maintaining this costly delusion.

On the other hand, if any company is lucky enough to secure a good vein of paying quartz, and begins to exploit it successfully, the directors should lose no time in establishing a substantial cash reserve, to provide funds for the necessary dead work in sinking shafts or driving galleries to pass through the inevitable barren zones between one pay-streak or chimney and the next adjacent one.

Fifteen years ago I published in the *Gazette* of this city my opinion that, when capital and skill combined should enter this field, the results would astonish the world. I am still of the same opinion.

But the investigations and reports of such men as Sir Wm. Logan, Dr. T. Sterry Hunt, Dr. Selwyn and Dr. Ellis of the Geological Survey carry a far greater weight than the opinions of any private individual.

