

The Island of Cape Breton is becoming thoroughly advertised. American capitalists are seeking information in all directions, and our own people are fast acquiring an edge for speculation. A strong company was organized last week in Montreal for the purpose of mining coal at Port Hood, Inverness county. The area there are reported to contain a large amount of coal and of good quality. Our Inverness friends will in a very short time appreciate the full meaning of the Fielding Government's efforts to introduce capital. Give Inverness county the necessary capital and a free market in the United States, and in less than five years the development of her great stores of coal and iron will astonish Canada. Inverness county has advantages which have never been appreciated.—*Island Reporter*.

THE OCCURRENCE AND REDUCTION OF GOLD.

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In this paper I propose to deal with points of interest that have struck me in the Gold fields of India, Africa and Nova Scotia, and as my acquaintance with the latter is very short, I put forward my views with considerable diffidence, trusting that other members with far greater experience of this Province will not hesitate to criticise and explain the errors I fall into, for, in my opinion, it is the discussion and not the paper that educates.

The subject Gold has a fascination for every one, and if termed the "root of all evil," is decidedly a blessing to civilization when properly employed. Gold is, I believe, the only mineral for which a market is always ready, and is the standard by which all products are valued.

Although Gold occurs usually in very small quantities compared with other metals, it is probably one of the widest distributed, as traces of Gold are found almost everywhere, but not generally in payable quantities.

My experience in different countries has shown that the profitable working of Gold does not necessarily follow the existence of the metal in payable quantities, and I therefore propose to point out in this paper some of the causes of failure.

This King of metals occurs in three forms as follows:—

1. In veins of quartz or other hard substance embedded in the matrix.
2. Associated with sulphurets of Iron, Copper, Lead, etc., either chemically combined or otherwise.

3. In alluvial, that is in the detritus formed by the erosion of auriferous rocks from action of weather, sun and atmosphere, by which the particles of gold have been liberated, and owing to specific gravity, the lighter grains of ground or powdered rock are carried away, leaving the heavier mineral near the original source. I do not purpose entertaining the disputed question of nuggets, as their origin is practically theoretical.

These three occurrences of gold are far too extensive to be dealt with in one paper, and I will therefore confine myself to the first, or occurrence in quartz and other hard silicious matrix.

Although one continually hears that gold occurs in some particular district in quite a different way from any other country, my experience tends to prove that *practically the same Laws of Nature* govern all districts in different parts of the world, and I have found practical knowledge in any one country proves invaluable in new fields.

The miner, however, must expect to find *local characteristics*, and probably no two districts have the same, but if parallel veins of quartz occurring in identically the same formation and lying only a few feet apart, differ so entirely not only in yield of gold, but actually in the nature of matrix, we may reasonably expect very great differences in two districts thousands of miles apart; and to sum up, I wish to convey the probability that gold occurs in veins of quartz in all countries, following certain laws of Nature, affected by certain local characteristics, and that the difference in yield of two parallel veins in similar formation tends to prove that our knowledge of the origin of gold is even to day very limited.

A visitor to Nova Scotia hears a great deal about the Anticline (or Anticline) Angars etc., but does the anticline affect the richness of the ore or do the veins nearest this point prove richer than those farther away? I think we must look further for the cause of rich streaks or deposits.

"Angars" is a good local name for the numerous veins, strings or drop-pers of quartz that fall into and in some cases cross the true or formation veins or leads. These small angars are not confined to Nova Scotia, but are generally found in all countries under the name of Feeders, and have leached the country rock of mineral matter and fed them to the Mother or Formation veins.

All Angars, however, do not bring in a deposit of gold, and therefore certain Angars must have special advantages, if these are *really* the only source for introduction of gold, which theory I cannot agree with.—Owing to the entire absence of a system of cross cutting in settled ground below, little is known of parallel veins except from surface indications, which are usually most deceptive, but I think it probable that it will be found many of these angars are merely strings of quartz connecting two parallel veins. Angars do not always terminate on contact with Formation veins, but pass clear through and continue on the opposite side, or they may continue parallel with the vein for several feet and then cross over; in these cases they should, I think, be called "Cross Courses," and these cross courses do in my opinion play a very considerable part in the occurrence of gold, and I have found by experience the nearer the cross course approaches to a parallel with the true vein the richer the deposit of mineral matter.

In the Montagu district the gold "Chutes or Streaks" usually occur from 200 to 250 feet apart and dip to the west at an angle of 43° to 45°, and their irregularity indicates that the "Chutes" owe their origin to something more than angars or cross courses.

If it is acknowledged that the precipitation of gold and metals is caused

by certain laws of nature, and not by chance, then we have reason to expect that the same laws have placed the gold in Nova Scotia mines that occasioned the deposit in other countries.

The following will illustrate one theory how gold may have been deposited in "Chutes" or "Streaks":—

All will admit that originally the formation of Slate and Quartzite was in a horizontal position as it was deposited under water probably containing mineral matter in solution, now it follows that this mineral matter would be precipitated provided certain foreign elements were introduced, say for instance, some vegetable matter.

No doubt everyone has seen the peculiar streaks or lines of seaweed on the ocean carried in comparatively parallel lines by currents, the water between these lines of seaweed being entirely clear of foreign substance. Precipitation of mineral matter will be far greater on the line of seaweed or foreign substance than in the clear water. This illustration merely shows the possible theory of Gold Deposits in streaks by vegetable or other matter carried in parallel lines by currents over the newly deposited muds, since converted into slate and quartzite.

Interesting as the theory of formation may be, I propose confining myself to the practical and profitable side of gold mining, that is, following and extracting to the greatest advantage this valuable metal.

In commencing mining operations the Engineer's first work is to very thoroughly inspect his ground, locating as much as possible his different leads and learning where gold has been found by former owners, making careful notes of past results (though in all probability no two accounts will entirely agree) but from his notes he will be able to make a rough plan and form some fair idea where gold may be expected below. With this knowledge he locates the position of his first attack, by Adit if possible, if not by Main Shaft, selecting a position as convenient as possible to the Mill Site which should be chosen well above the flat ground, so that no trouble will occur in the future from Tailings. As the main workings and mill site form the centre of all future operations, too much care cannot be given to the selection of a place which offers the greatest facilities for permanent works, as the past proves. Managers often forget to look ahead to the future, when the mine requirements may assume very great proportions, and instead of adding to the original works, a *fresh start* has to be made on a more suitable site.

The works should be laid out *originally* with a view to future contingencies and the plan of operations carried out by degrees systematically as funds will permit. Above all things the reckless cutting up of the surface by what are termed trial shafts should be avoided, as these become reservoirs to catch water and flood the future workings, necessitating costly pumping machinery, and once the mischievous work is done, it can never be repaired.

Having located the Main Shaft, the manager should decide to sink a certain depth, say 120 feet for first level, and steadily continue to this depth, no matter what rich rock is met, the gold will not run away, and can be far more cheaply raised by overhand stoping from below, than from the system of burrowing or underhand stoping so common in the Province.

I very strongly advise following the value of the rock passed through by saving "the drillings," the miners being supplied with marked tins for this purpose, and it should be the Foreman's business to see these are delivered regularly to the Manager, who should pan them off and enter result in a book kept for the purpose. Many rich deposits have been found by this method when the gold occurred too finely distributed to be visible and would possibly otherwise have been overlooked.

As a rule the gold, or rather the payable portion of the lead, will be found to occur principally in Chutes or Streaks, the quartz rock between two Streaks proving unpayable, and yet too often this unprofitable rock is taken out and crushed, not only with a loss on the work, but also to the wear and tear of the machinery.

It is true every mine cannot maintain an assay department, but the manager can always follow his ore with the pan, and I am surprised to see the pan so seldom used in Nova Scotia, knowing from experience its great value as a guide.

The question of vertical or inclined shafts is one that is attracting practical attention, the inclined shaft for prospecting work has the advantage that the lead is tested as sunk upon, but any fault, slide, or change in dip of the vein at once causes trouble, and with the numerous quartz leads found in most districts of Nova Scotia which must be cross cut afterwards, I consider vertical shafts are most desirable for permanent works, as it is *only the one vein and that at one point* which can be tested by the incline following the lead. When the vertical shaft has been sunk to a level, it is easy to rise up or sink a winze on the vein which must be carried out before stoping can be commenced.

Working capital is provided to carry out the dead work which opens a mine, that is, sinking a shaft and drifting on the various leads as met in the cross cutting, and further, when the mine is proved, for the purchase and erection of the necessary machinery. When this has been accomplished, the cost of developing fresh ground to replace that extracted should be added to cost of breaking and crushing a ton of ore.

With the shaft down to first level the pan should prove the value of rock passed through, and the result carefully noted on the large working plan of the mine, so that the position of the gold streaks on the next level may be fairly located. And my experience has shown, that once the occurrence of the gold is determined, that nature is wonderfully true to herself and unless from some fault or intrusion of trap, the gold will be found where looked for. If more careful attention was given to this matter, much useless work would not be attempted to the greater profit of the owner.