Paper II.—GOLD FIELDS OF NOVA SCOTIA.

By Dr. ANDERSON.

[Read before the Society, 4th November, 1863.]

In the *Illustrated News* of 9th March, 1850, will be found the report of an address delivered by Sir Robert Murchison before the Royal Institution. It is there stated that Sir Roderick gave as an axiom, that gold ore never occurs in any great quantity except under certain conditions of "*constants*," viz.: when the ancient stratified rocks, constituting the backbones of continents, or great islands, have been penetrated, and altered, and crystalized by the intrusion of igneous or eruptive matter. In the course of his address Sir Roderick repeatedly dwelt on the *fact* that the auriferous veins invariably deteriorated in the per centage of gold to the weight of quartz, *the deeper they were traced.* That all the rich portions are found at or near the surface; hence the powerful attrition which the surface has undergone in ancient times had disintegrated the greater quantity, and distributed the freed gold in heaps of gravel and sand over plateaus or in valleys. He shewed that mining in the Ural Mountains and in Mexico proved *that gold decreased according to depth, when it finally ceased and was replaced by silver.*

Sir Roderick further remarked, that Job was a true and good geologist, when he said, "There is a *mine* for the silver, and the earth hath dust of gold." That it would be in vain to assign any limits to the productive value of silver mines, when science had been fully applied to them, for they increase in value as in depth, whereas gold diminishes as we descend to seek it.

Sir Roderick inveighed strongly against the popular delusion, that the Californian gold regions, then recently discovered, would be all equally productive, basing his opinion on the presumption that there could be no variation from the *constants*, which he appeared to view as a law of nature.

In connection with Sir Roderick's allusions to Job, it is interesting to turn to Job himself; and as some points of connexion are evidently wanting in our common version, I have had recourse to that of Good, which certainly proves Job to have been an excellent geologist.

Good thus translates the 28th chapter of Job: "There is a *mine* for the silver, and a *bed* for the gold which men refine. Iron is dug from the earth and the rock *poureth* forth copper. Man delveth into the region of darkness, and examineth to the utmost limit, the stones of darkness and death shade; *he breaketh up the veins from the matrice, which, though nothing thought of under foot,* are drawn forth and brandished among mankind. The earth itself poureth forth bread, *but below it windeth a fiery region; sapphires are its stones, and gold is its ground.*" "Man thrusteth his hand into the sparry oar; he upturneth the mountains from their roots; *he cutteth out channels through the rocks, and his eye discerneth every precious gem.* He restraineth the waters from oozing, and maketh the hidden gloom become radiance."

In a note to this chapter, Dr. Kitto gives an extract from Agatharchides, who lived in the first century before Christ, describing the mode in which the auriferous quartz mines of the Red Sea were worked by the ancient Egyptians,—all tending to prove that quartz mining and crushing, as well as washing gold from the sands of the beds of rivers, were about as well understood two thousand years ago as they are now.

I look upon Dr. Kitto's note as the more important, as it was published in 1837, before any new discoveries of gold had been made or thought of; consequently he could not have been influenced by the knowledge which has since been acquired.

I have thought it well to bring the views of Sir Roderick Murchison prominently before you, as they justly exercised an important influence, and it will be interesting to mark how far experience, to this date, has verified them.

We have now the advantage of a very extended field from whence to draw our conclusions: 1st. In the gold regions of Aus-

tralia, discovered by Count Strelecki in 1839, though not worked till 1851 ; 2nd. In California, discovered by Capt. Sutters, in 1847; 3rd. In Nova Scotia; and, lastly, in the gold regions of the Chaudière.

The coal mines of Nova Scotia have been worked for many years, and furnaces were erected, some time ago, for smelting iron ores, which, at Londonderry in particular, were found of great extent and richness. Specimens of copper ore had also been found in various localities, but the existence of gold was unsuspected till 1860. "It is strange," says Mr. Howe, the late Provincial Secretary, "that the auriferous deposits should not have been turned up by the agriculturist or roadmaker; still stranger, that they escaped the vigilance of the early pioneers of natural science. Dr. Dawson, in 1855, suggested the possibility of finding gold in Nova Scotia, and indicated, with some accuracy, the regions in which it might be discovered. But the doctor had found none, and no interest was taken in the matter until gold was discovered last summer (1860), in the neighborhood of Tangier."

Dr. Dawson, in a paper which he read before the Natural History Society of Montreal, in 1861, said : "It has been remarked, that it is wonderful, that in a district so thickly settled and so much subjected to the operations of the surveyor, roadmaker and agriculturist as the south coast of Nova Scotia, so numerous deposits of gold should so long have escaped observations. Geologists, also, and mineral explorers have repeatedly visited and passed through the district. Still, when it is considered that the country is netted with quartz veins, and that perhaps not more than *one in a million* of these is appreciably auriferous, the wonder ceases. Ordinary observers do not notice such things. A geologist not specially looking for useful minerals, soon becomes wearied of breaking up and examining barren veins of white quartz, and certainly cannot spare time to spend two years in *prospecting* like the persevering discoverer of the Wine Harbour district. My own field notes contain the record of many days of hard work among

these unpromising rocks, and countless quartz veins have suffered from my hammer without yielding a speck of gold. I believe I have visited all the localities of the discoveries, except Tangier, and in some of them, as at the St. Mary's, Indian Harbour, and Wine Harbour, I have spent days in examining the rocks, not certainly with a special view to the discovery of gold, but often with the assistance of intelligent friends who were good observers.—The truth is, that in cases of this kind, *it is difficult to make the initial discovery; but this once made, it is comparatively easy to trace* the productive rock over considerable districts, if the requisite knowledge of the geological character of these has been obtained."

I shall add, from my own personal observation, that there could have been little chance of the discovery having been made by the agriculturist, as the Nova Scotia gold fields present an aspect of "unpromising rocks" and soil totally unsuited for cultivation, and which must have ever remained waste or barren, the shrubs and scanty herbage occasionally affording a precarious subsistence to a few wild animals and birds, and possibly to the sheep or stray cattle of settlers on the adjoining cultivable lands.

One of the principal features in the geology of Nova Scotia is the mountain range extending along its Atlantic coast, exhibiting a series of metamorphic rocks, which Dr. Dawson supposes to belong to the lower part of the Lower Silurian system, the same as are found on the Chaudière, and extending along the Eastern Townships, may be traced south-westerly through New England, and along the Apalachian chain to Georgia, furnishing gold in greater or less quantity throughout the whole extent.

Dr. Dawson has given a map, shewing the geographical position of the beds, from Cape Sable in the west, to Cape Canseau in the east. The outcrop may be traced N.E. and S.W. along the coast about 250 miles, and inland, in some places from 20 to 30 miles; and when least altered or disturbed, it consists mainly of thick beds of quartz and slate alternating with each other. The order is: First, Secondary trap; second, New red sandstone; third,

Carboniferous; fourth, Devonian; fifth, Middle and Upper Silurian; sixth, Metamorphic, Lower Silurian, *Auriferous*, the gold occurring in irregular grains and masses, in white, milky, or translucent quartz, often stained by the hydrated peroxide of iron; and seventh, Granite.

Mr. J. Campbell, who carefully examined the gold districts of Nova Scotia, has furnished a map of a section from Halifax harbor to Renfrew gold field, a distance a little over thirty miles, shewing that there are no less than six lines of elevations or anticlinal axes, and that scarcely two miles of vertical thickness are brought in section to the surface.

According to him, the horizontal section of the strata shews, first, blue and grey slates; second, black rock; third, blue and grey slate; fourth, quartzite group.

Mr. Campbell has also pointed out that in the first great upheaval, the rent was east and west; but that a later one took place in a transverse direction from north to south, *and that it is chiefly where these intersect each other* that the gold bearing rocks are brought to the surface. Mr. Campbell appears to think that both these upheavals occurred anterior to the glacial period, as indicated by the small grooves on the exposed rocks, especially on the Halifax peninsula, and that the gold, which is found, in some instances, at a great distance from the quartz formation, was carried there by the denuding and desintegrating force of glaciers.

The conditions under which gold is found in Nova Scotia are very similar to those of other auriferous regions. The principal point of difference is, that *the great amount of gold is found in the rock veins*, and a comparatively small quantity in alluvial lands. Mr. Campbell thus accounts for this state of things: "From the close vicinage to the sea of the gold bearing rocks of Nova Scotia, the greater portion of the gold removed from them by glacial action is now dispersed through the submarine banks and the sands of Sable Island, where it is found in appreciable quantity." He also asserts, that though gold is found in nearly all deposits of glacial drift, or boulder clay, on the south coast, it would cost too

much to collect it by ordinary means, and that it is only when the drift has been *rearranged* in pockets that the gold can be found sufficiently concentrated to pay for working. From this we can understand how the fortune of gold diggers on the Chaudière has been so varied. By the merest chance one may stumble on a pocket where gold has been *concentrated*, as on the Poulin claim on the Gilbert, and a rich harvest may be reaped, while diggers on an adjoining claim may toil without any return.

The first discovery of gold in Nova Scotia was made by John Pulsiaver, in the summer of 1860. From what he had heard of the gold bearing quartz of California, he was induced to search among the rocks of the Tangier river, about fifty miles to the eastward of Halifax, and accompanied by some Indians he found several pieces of gold in quartz. On this being made known a number of persons rushed to the spot, for the purpose of prospecting, but gold not being found in remunerative quantity, the place was abandoned.

But in October of the same year, a fisherman at Tangier harbor, passing through the woods in the neighborhood of his own house, stooped to drink at a small brook, and noticed a small particle of shining yellow metal in a piece of quartz, which was there very abundant; he picked it up, and on examination it proved to be gold. Again a number of gold seekers flocked to Tangier, and on the 11th April, 1861, a deputy surveyor was sent out there, who took possession of the gold field for the Government, and immediately commenced laying off mining lots of 1000 feet across and twenty feet *along* the supposed course of the leads.

Nearly one hundred of these were soon leased at the rate of $20 per annum, paid in advance, and in a short time six hundred men were engaged in prospecting and mining, and the reported success which many met with occasioned a continued increase, till the discoveries in other districts were the means of attracting large parties thither.

Under similar circumstances, discoveries were successively made at Waverly, Oldham and Lawrencetown, in the county of Hali-

fax; Wine Harbour, Sherbrooke and Stormont, in the county of Guysboro; Ovens, in the county of Lunenburg, and Renfrew in the county of Hants; and there can be no doubt that gold will yet be found along the whole mountain range from Cape Sable to Cape Canseau.

In 1862, *twelve* distinct auriferous quartz veins, varying in thickness from three inches to three feet, had been discovered at Tangier. This quartz is highly transparent, and contains iron pyrites, native copper and arsenical pyrites. In that year 707 tons were crushed, yielding 865 oz. gold, or 1.22 oz. per ton. This, however, does not give the true return of gold, as the richest "sights" are always selected by hand and crushed in a mortar by the miner himself. The chief commissioner reports that the average number of men employed was *seventy*, and that he had reason to know that the average return to each, for the season, was 12 oz.

The discovery of gold at Tangier was immediately followed by a like one at or near the Barasois, between Wine and Indian harbours; and the leads which proved auriferous in 1862, were seven in number.

Both Wine and Indian harbours, as well as Sherbrooke, in the immediate neighborhood of which are the "Goldenville diggins," are, like Tangiers, easily accessible both by land and water.

Sherbrooke is situated ten miles from the Atlantic, at the head of the navigation of the beautiful St. Mary, where vessels of five hundred tons burthen can load; it lies about forty miles to the east of Tangier. Wine Harbour is nine miles distant from Sherbrooke, by a road, about half of which is the most execrable that can be imagined. Those who have travelled over the old road from Quebec to Lake Beauport, can form a correct idea of the road and the country through which it passes.

Wine Harbour is about the size of Lake Beauport, and at the time of the discovery of gold, there was only one old house there, that of Captain Robar; but now dwelling houses, shops and warehouses are springing up in every direction at the village on the

shore, while the whole face of the hill exhibits long lines of abandoned trenches, and shanties and shaft-houses dot the slope from the crest to the water. The ear is stunned with blasts going off every ten minutes; windlasses are at work raising the quartz from the shafts, and the steam crushers are thundering night and day at their work.

At the time of my visit, there were sixteen shafts being worked profitably; the other shafts were not in that state of advancement to justify expectation of remuneration. As a general rule, the shaft must be sunk fifty feet before the labour is remunerative. There were four hundred and fifty men engaged in mining operations. Many of the respectable married men had brought their families to reside there, and consequently silks and crinoline were to be seen in the streets.

At all the places I have mentioned, gold is found in the veins of quartz, which vary in size from one inch to four feet in thickness. At Wine Harbour these veins, which are generally white, are imbedded in blue slate or hard whinstone, and run in a direction nearly east and west; several of them have been traced from the head of the harbour to the point of the Barasois, a distance of three miles, where they dip into the sea.

The "Smith" lead, from which the largest quantity of gold had been obtained in 1862, showed at the surface five veins of quartz, from one to three inches thick and from three to six inches apart, running in a band of slate about three feet thick and quite soft, with hard whinstone on each side; but at the depth of fifty feet the slate had nearly disappeared, and the whinstone had become much harder; and here there were found seven veins of quartz of the same size as at the surface; it being usual to find the veins, as they descend, converging till they form *one* lead. The richest quartz had been found at the depth of fifty feet, which yielded *six ounces* to the ton. Five tons from the "Hattie" shaft, on the same lead, had produced 125 ounces of gold, or *twenty-five* ounces per ton.

As a general rule, the quartz at the surface yielded the smallest quantity of gold, which increased as the shaft was deepened.

The mode of working which prevails is, to sink a shaft five feet by twelve; eight men is the largest number employed at a shaft, and the mode of procedure is exactly that which may be seen in blasting the rock in the streets of Quebec; but as the shaft increases in depth, the windlass and tub become necessary for raising the quartz and rubbish and the *water*, which, according to depth and other circumstances, makes at from five to ten tubs per hour.

At first the quartz alone was sent to the crusher, the miners having first culled from it all the pieces in which there were "sights" of gold; but a more extended experience led to the sending of the greater portion of the rubbish, which, in some cases, was found to yield from one to one and a half ounces per ton.

There are now four crushing mills at Wine Harbour; three driven by steam and one by water. They are all in constant employment, crushing, each, from ten to fifteen tons in the twenty-four hours, for which they receive from three to five dollars per ton, according to the hardness of the quartz. The water mill cleared $1800 in 1862.

During the eight months of this year, the average number of men at Wine Harbour was one hundred and fifty-three; the yield of gold, *two thousand three hundred and forty-six* ounces, which were sold for $4,938; and since this return was made I have received information that two tons of quartz from the "Caledonia" lead had yielded *one hundred and thirty-three ounces* of gold: sixty-six ounces ten pennyweights per ton.

In 1862 the average number had been *one hundred and sixty* men; quartz raised, five hundred and seventy tons; value of gold, $21,918.

The discovery of gold at Sherbrooke took place in the summer of 1861. Nelson Nickerson, of that village, who had visited Tangier and made himself familiar with the appearance of the auriferous quartz there, on his return, being engaged in making hay on the north-west arm of the St. Mary, noticed quartz rocks scattered over the land. By breaking and examining them he found suffi-

cient gold to encourage him to make it the business of himself and family, in secret, for several months. Suspicion, however, was aroused: he was watched by some neighbors, who, following the sound of his hammer, discovered him while at work. The greatest excitement followed the discovery, and for several days the village was deserted, one bed-ridden old man alone being left there. It is estimated that at one time several thousands of people had flocked to Goldenville; but after a considerable amount of gold had been collected, the harvest was exhausted, and the majority returned home disappointed; and it is very possible that this might have been the end of the gold fever, had not several Californian and Australian miners been also attracted to the spot, who were enabled to turn their experience to good account. The amount of gold at first found cannot be fairly estimated, though it has been stated to have been great; but to anxious enquiries Nickerson has expressed himself satisfied with his *pile*.

The district was laid off by a surveyor, and in a short time several companies were formed, operations on the surface were abandoned, and the sinking of shafts commenced. In all four hundred and eighty claims were taken up—many by parties on speculation; some by parties who worked them for a month or two, and not being satisfied with the result, abandoned them. Others, who had energy and capital, continued their operations, and have been rewarded with success, several having made fortunes; among these stand prominent the Hewitts, whose good fortune has never varied, their quartz having averaged *twelve ounces* per ton.

When I was at Goldenville in July last, *one hundred and twenty* men were at work, and three steam crushers had been erected.

A company under the style of the "Olive Branch," composed of six individuals, subscribed twenty-two pounds ten shillings each to purchase tools and supplies, with which they might commence operations; they sank their shaft, and worked during 1862, and at the close of the season, had nothing to show for the labour and capital expended, but their tools and the shaft. Being much discouraged, they offered to sell out for £100, but could

find no purchaser. This season, after they had put in their crops, no other employment offering, but encouraged by the continued success of the "Hewitt" claim which adjoined them, they resumed operations, and fortune at once favored them; and when I visited "Goldenville" on the 17th July last, Mr. Archibald, the superintendent of the "Glenelg Crushing Mill," placed in my hands, warm from the crucible, a lump of gold weighing *eight pounds*, the product of nine tons of quartz raised from their shaft. This gold was worth $19.75 per oz., so the value of the lump was £472, or $1888. I was told that this would make the fifth dividend this season, which had averaged £80 per dividend to each of the six shareholders.

In concluding his report for 1862, the Gold Commissioner say: "The leads worked in this field, in general, increase in thickness with the depth; but it cannot be said that the quartz increases in richness as the depth increases. But in general, when gold is found in a lead at the surface, it is also found equally distributed to the depth as yet mined; and where it does not exist at the surface, it is seldom found below."

The past year, however, has given different results. Thus the "Cummings" lead, which last season gave, as a maximum yield, two and a-quarter ounces gold per ton, down to the depth of twenty feet, has, during the present, averaged *four ounces*; and a few weeks ago, five tons of quartz form this lead, yielded *fifty-three ounces* of gold, or very nearly *eleven ounces* per ton. This was the product of the labour of five men for five days, giving each $41.87 per day.

At Oldham, on the 21st August last, Messrs. Carpenter and Davis got crushed, at the Colonial Company's mill, *twenty-six* tons of quartz taken from their shaft at a depth of fifteen feet, which yielded *one hundred and thirteen ounces* of gold, being over four ounces six dwts. per ton. Their lead is from twenty to thirty inches thick, and the yield was the produce of one hundred days labour, giving $22.31¼ per man per day.

On "Hull's" lead, the Messrs. McAllister had one and a-half tons crushed, which gave sixty-five ounces, fourteen dwts., equal to forty-three ounces, sixteen penny-weights per ton.

From the same lead, Messrs. Oakes and Malcolm, from two hundred pounds quartz, received seven and a-half ounces, or at the rate of *seventy-five ounces* per ton; the largest yield I have yet heard of in Nova Scotia, unless where the quartz had been hand picked, which was not the case in any of these instances.

Ordinary labourers receive 4s. to 5s. per day; carpenters and other artizans, from 6s. to 7s. 6d.

Contracts have been taken to sink shafts, five feet wide by twelve feet long, to the depth of fifty feet, at fifteen dollars per foot in depth.

The quartz, when quarried, is taken from the mouth of the shafts by the owners of the several mills, crushed and amalgamated, and the gold, if any there be, returned to the owner, the charge being from *three* to *five* dollars *per ton*, according to the hardness of the quartz; the cost of mining, crushing and amalgamating, being about ten dollars per ton.

Gold digging has been truly described as a lottery, in which the fortunate *few* have drawn rich prizes. Official returns to the Victoria legislature show that in 1860, the number of men employed in quartz crushing was 18,296, and the whole produce of the mines for that year was 93,025 ounces two dwts., which would give to each miner only *five ounces* for the year, or in cash, thirty-one cents per day.

The chief gold commissioner for Nova Scotia has shewn, in his return to the legislature in 1862, that the average number of men employed in the several gold fields during that year was 484, and that the average earnings of each man per day, was $1.18 cts.

But I know of an instance of an Australian miner, now resident in this neighborhood, who took from his claim, at the depth of *ninety-feet*, *twenty-one* tons of quartz, which yielded *one hundred and one ounces* of gold per ton, which at £3 18s. sterling per ounce, was of the value of $41,000. At nine feet, the

quartz had yielded *twenty-eight* ounces, and at forty feet *sixty* ounces per ton. Experience in Nova Scotia, Canada, and Australia, has shewn that in no two localities is the gold of the same value or fineness. Thus Geelong gold was of the value of £3 18s., while Ballerat brought £4 4s. sterling per ounce. In Nova Scotia, the price varies, according to the quality, from $19 to $19.75. I have not yet personally tested the gold of the different tributaries of the Chaudière; but judging from appearance, I am disposed to believe that it varies in fineness.

Experience in Australia, I think, has also established, as it has done in Nova Scotia during the present year, that the quartz veins generally increase in richness as they descend, though in no regular or fixed ratio. I am not aware of any great yield being furnished at the outcrop, and I was informed that, as a *general rule*, little more was expected from the vein than sufficient gold to pay working expenses, down to the depth of fifty feet; but that from fifty to ninety feet a very remunerative yield was obtained. I have mentioned several cases where at a depth not exceeding fifteen feet, a very large yield was obtained; it will be interesting to observe whether in these instances the richness will increase with the depth. In the Hewit lead, the shaft has been sunk to the depth of ninety feet, the maximum yield having been sixteen ounces per ton, and the average of the whole ninety feet being *five ounces* per ton.

On my return from Nova Scotia in 1862, I recorded my opinion, "That the mining operations, up to that date, went to prove, that gold was to be found in large quantities; that unskilled labour had in some cases been successful, but more frequently a failure; that skill and capital united would generally prove remunerative, and in some cases highly so; that it was impossible to say how rich the veins of quartz might become as they descended; that the shafts would have to be sunk deeper, and covered in for protection against the rain, to enable the work to be prosecuted in winter, and that steam engines, crushers and amalgamators in greater numbers would be essential."

During my recent visit I found that these views had been realized to the fullest extent, and that gold digging in Nova Scotia is no longer a problem to be solved, but is now established as one of the great industrial resources of the province, which will continue to give steady and profitable employment to capital and labour every year, in an increased ratio. While proving also that we are not justified in laying down any fixed laws under which gold *may* or may *not* be found, I am convinced that the operations of the past season in particular have pretty satisfactorily established the important fact to which I have already alluded, that the quarts veins increase in richness as they descend.

The Government of Nova Scotia has been wise in its generation. It early perceived that great jealousy existed, lest privileges should be yielded, which would confine mining operations to the few rich, and check the enterprise of the energetic poor man. They therefore passed a measure through the legislature, which gave every facility and encouragement to the voluntary exertions of the people. Individual exertion was not discouraged, while science and capital were attracted, and the auriferous deposits have been tested to a far greater extent than they would, had a less liberal policy been followed. But it is now freely admitted that while the labour of the individual without capital has given a most valuable impulse to mining operations, and has proved the great riches of fields, which without it would never have been explored, it has generally entailed loss and disappointment, and the poor man has found that he will best consult his own interest by working under companies, at fixed wages.

I shall now leave every one to form his own conclusions from the statements I have furnished, and will only add, that in my opinion, the history of the gold fields of Nova Scotia will be repeated at the Chaudière. As soon as the supply of gold from the beds of the Gilbert, Du Loup, Famine and other tributaries of the Chaudière shall fail, as it undoubtedly soon will, those who engage in the enterprise must turn their attention to quarts crushing, which exists in great abundance on the adjacent ridges. I understand

that the attention of the Canadian Parliament has been directed to the subject, and that they are about to legislate on it. The Government of Nova Scotia have, by their legislation, the right to resume such lands as had been found sufficiently prolific to be laid off as gold fields, and had wisely and liberally laid them open to free competition. A year's experience has induced them to make some slight modifications in the law. The gold fields are laid off in claims of three-quarters of an acre, and in some peculiar cases of five acres. All are open to public competition, and the Government only requires from those to whom claims are assigned, that they shall faithfully perform a fixed amount of labour on each claim during each year, and make a true return of the gold found, on which a royalty of three per cent. is paid.

A similar law enacted in Canada, with the modifications rendered necessary by the tenure of lands, would open a field of active and no uncertain enterprize, of which many would be disposed to avail themselves,—would put a stop to wild speculation, and the formation of mammoth *bogus* companies, and would yield a source of large and permanent revenue to the province.

NOTE.—In reference to the opinion once entertained that gold decreases as we descend to seek it, it may be of interest to state a few well-ascertained facts bearing on the subject.

In Brazil, at St. John del Rey, there is a metamorphic rock, which has been worked by an English company to the depth of 450 feet. The gold is invisible and equally diffused through the rock, which throughout its whole course has given an *equal* yield of five-eights ounce per ton.

In Australia, at Ballarat one quartz vein has yielded 200 ounces gold per ton, and the Prince of Wales shaft, which has given large profits, has been sunk to a depth exceeding 480 feet, and was still productive.

In California, the blue lead, a *placer* digging, supposed by some to be the bed of an ancient river, is described by Hittel as

extending " for miles and miles, *a thousand feet below the summits of high mountains and entirely through them,*" and " millions of dollars have been taken from this bed, and its richness, in portions longest worked, *is yet undiminished.*"

In California, Australia and Nova Scotia, Professor Dana, Sir R. Murcheson, and Dr. Dawson severally indicated, from scientific deductions, the possibility of gold being found in the districts where it was subsequently and accidentally discovered; but in the actual discovery of mines, " chemists, geologists, mineralogists and *old miners* have not done better than ignorant men and new comers. Most of the best veins have been discovered by poor and ignorant men. Not *one* has been found by a man of high education as a miner or geologist. No doubt geological knowledge is valuable to a miner, and it should assist him in prospecting ; but it has never yet enabled anybody to find a valuable claim."