

FIELD EXCURSION, 1865.

THE Institute held a Field Day at the Waverly Gold Mines, on Saturday the 1st July.

The members assembled at the Steamboat wharf, Dartmouth, where carriages waited to convey them to the Mines, about twelve miles distant.

The village of Waverly is one of those new places in Nova Scotia, which owe their existence to the discovery of gold. It comprises a cluster of houses at the head of Lake William, which is there connected with Lake Thomas by a drawbridge; there are also a number of scattered dwellings and shanties in the vicinity of the various shafts, and within a circuit of about five miles. The country around is hilly and rocky, wild and desolate, much broken by mining operations, the debris of which is seen on all sides, and especially where shafts have been sunk, or excavations made. The scenery, however, has some redeeming features. It has all the components of natural beauty, and is rich in hill and valley, wood and water. It is also recommended by the charm of novelty; and is besides a prolific study to the geologist and botanist, and to naturalists generally.

The party first visited the "barrel quartz," so called, a few rods east of the village, near the summit of Laidlaw's hill. Let the reader suppose a series of trunks of willow trees some eighteen inches in diameter, unstripped of bark, laid side by side, close to but independent of each other, and he will have some idea of the appearance which the "barrel quartz" formation would present if fairly exposed; but the barrels or trunks are pure quartz, encased in "whin" rock, which is a highly indurated quartzite, and very different in appearance from the clay slate walls which in general enclose the quartz found in other districts. When first worked the "barrels" proved rich in gold, and led to much speculation, the hopes of which have not been realized, and the work is for the present suspended.

Various opinions have been hazarded as to the origin of this curious formation. It has been thought to be the summit of an anticlinal which has been greatly eroded and denuded of the overlying rock. There is ground for the supposition, inasmuch as the rock covering the quartz is plainly marked with glacial striæ which follow the usual N. W. and S. E. course, a fact which proves also, that here as well as every other part of Nova Scotia, there has been no geological change since the glacial era. Others suppose the quartz to have been deposited from super-silicated rocks, acted upon by chemical solvents. The containing rock, named "whin" by the miners, is of a grey colour inclining to light blue, and is usually compact and hard. The igneous theory is also brought to bear upon this peculiar formation; and hypotheses in connection therewith are hazarded, in an excellent paper by Colonel SINCLAIR, which was read in the afternoon, and will be found in its proper place further on.

Several shafts were visited. At one a ventilator was in use, the air in the pit being impure. The Taylor Company had sunk a shaft 150 feet, from which much valuable quartz had been extracted, and had then driven a con-

siderable distance to Mud Lake, underneath and across which they were preparing to tunnel.

Returning a short distance, and then proceeding onward southward of this small lake, by a road passable with care for a carriage, the shafts sunk by the German Companies, (so called,) and successfully worked, are seen. This part of the village of Waverly has been named Germantown; and some distance further on, the building containing the Crushers, and other processes for extracting the gold, come into view. The superintendent of this establishment, L. BURKNER, Esq., and another gentleman connected therewith, very obligingly accompanied the party, and explained practically the various processes of crushing the quartz and washing it, and amalgamating and retorting the gold. A large quantity of quartz, in lumps weighing from one to thirty pounds, in nearly all of which gold was conspicuous, lay around, ready for the crushers. The quartz then being worked was white, but with a perceptible and peculiar blush tinge. It occurs in veins of six inches thick, more or less, the gold disseminated throughout in small grains, which the miners designate as "sights." Galena frequently occurs in the quartz, and it has been remarked here, that the gold appears to be more plentiful when in contact with it. This was said to be contrary to the experience at Hammond Plains, a few miles west of this locality, where zinc blende is more prevalent, and with reference to the yield of gold appeared to take the place of the galena. Mr. BURKNER, in the most courteous manner, selected a handsome specimen of auriferous quartz from the heap, and presented it to the President for the Museum of the Institute. There were sixteen stampers at work, and more were to be added. The party were hardly prepared for the extensive operations they witnessed, and were deeply impressed with the industrial occupation of gold mining, and its importance as an aid to the progress of the country. It is chiefly from the works of this Company that every now and then an ingot of pure gold, as large and thick as a stock brick, delights the eyes of the people of Halifax, and convinces them that Nova Scotia is able to maintain its place among the gold producing regions of the earth. The last ingot brought into Halifax, was worth \$80,000 and was the product of a month's labour of the operatives of the Company.

After resting awhile at the office of the obliging superintendent, the party left the Mines, and were conveyed to Marshall's Inn, where they sat down, in number fourteen, to a substantial repast. When this had been fairly discussed, the President called upon the Members present to communicate the result of their observations, and an interesting desultory conversation ensued. The Secretary then asked permission to read a paper entrusted to him by Colonel SINCLAIR, a member of the Institute, who had been unable to attend, on the subject of the "barrel quartz" formation, before alluded to, which is as follows:—

THE CONTORTED QUARTZ LODE AT LAIDLAW'S "DIGGINS," WAVERLY.

THIS extraordinary quartz lode conclusively proves that it and similar formations were once in a molten and plastic state.

This has been, exceptionally, controverted; it has been held that the mineral seams, variously denominated according to their thickness, were originally cracks, subsequently filled by a process of deposition, for which present experience and hypothetical science fail satisfactorily to account.

The lode in question conclusively prostrates Mr. Evan Hopkin's theory that auriferous quartz *in situ*, and its contained gold, is the result of electrical action, or that in common with magnetic agency.

Remote hypothesis may postulate as an objection, rather than really conceive, that the electrical or magnetic formation of the Laidlaw lode may have been antecedent to its plastic state.

But no one would credit or advocate such a notion unless he were intent on establishing a favourite theory.

Natural philosophers have natural feelings; no one likes to be wrong in a matter to which he is committed in writing.

Quartz is crystalline, sometimes perfectly so, in common with volcanic obsidian, and factitious glass, which it resembles. It is a flux of silica more pure than glass or obsidian, which contain more alkaline fluxes, such as lime, potash and soda; but auriferous quartz, imperfectly crystallized, invariably contains iron, which can be drawn from the pulverized mineral with a magnet.

The arrangement of crystalline particles is an illustration of a certain kind of attraction; but this attraction or affinity resides in the substance itself; it is only analogous to magnetic attraction; it has no peculiar sympathy with external polar influence; it seems to have far more connection with chemical affinity than atmospheric or terrestrial electricity.

Were crystallization more than merely analogous to polar magnetism, in the formation of ice we should observe that the arrangement of successive atoms would follow or pursue some particular direction, but it is not the case; the acicular radiations from the point first congealed shoot out in *all* directions, and by interweaving eventually form a solid uniform mass of equal thickness;—a lake or pond, does not as a rule, freeze from one quarter of the compass to another.

Still less can electricity or magnetism account for the presence of metals in ores; rare specimens of crystallized gold have been produced in nature—in art crystals are produced by allowing substances to take their own form after fusion or solution, and electricity, to produce the same result, must either fuse or solve.

If by this or other means electricity can accelerate the formation of a crystal, it is merely as a local laboratory agent that it acts; its use and action in this respect as a natural agent, has neither been traced nor proved.

An attempt to account for the presence of gold in the lode, seems to be fraught with the same difficulties which would attend a similar investigation with respect to other metals, and the minerals with which they are usually associated.

Most of them have affinities in themselves, and with one another. The peculiar affinity which quartz has with gold has never been displayed or explained

—but until experiment and observation can very clearly establish the contrary, we must be content to assume that there is some affinity between them *in se*,—and if there be any peculiar operative external agency instrumental in associating them, it is rather an agent than a prime cause.

The presence of the metal and the material for its matrix, in a certain degree of proximity, must be pre-supposed as a normal condition — fusion by heat as a prime cause of the arrangement of mineral lodes; at any rate until we are in a position to establish a better theory, we must accept this.

Silica, the base of quartz, pure or impure, is the most universally distributed mineral; it enters into fully two-thirds of the earthy minerals known.

Gold can be extracted by the expert chemist, tending to show that in very minute proportions it is as universally present as iron or the commoner metals—the analysis has been carried to such an extent, that it is alleged to have been found in a flower!

So that in nearly every metamorphic fusion which has taken place, silica and gold must have participated.

Where the subsequent crystalline arrangement on cooling has resulted in the formation of paying lodes, veins or seams of any metal useful in the arts, it is natural to conclude the pre-existence of the metal contained in unusual local proportions.

Notwithstanding the obvious simplicity of this theory, which really more resembles a natural postulate than a hypothesis, the Barrel lode at Laidlaw's is valuable evidence confirmatory of a once controverted question which it is eminently calculated to set at rest, so much so, that it is hardly to be regretted if its bad yield has saved it from entire destruction.

It is evident that when in a true plastic state contortion took place, which could not have resulted had the quartz been in either a solid or a perfectly fluid state.

The lode is, or was, nearly horizontal, had very little dip, its contortions may have been partly attributable to the nature of the ground, but I don't think so; I believe the whole, killas and all, were in a state of fusion flowing against an obstacle at a lower level, the lower portion becoming stiffer from cooling, whilst the succeeding on-flow of a less viscid mass overlapped and cooled in its turn.

The contortions were very singular from their regularity; when the backs were bared they presented an appearance aptly described as resembling trunks of trees laid from two to four feet apart, parallel to one another; the undulations were so remarkable, that it is questionable whether any other mineral lode has ever been found of a similar character, and it is worth notice—perhaps record.

Irrespective of scientific value, a report on this lode may be of practical use, for in shafting to intercept a known lode, in a contorted "country," unless bends be observed, in mining on a large scale calculations may be a very great number of fathoms out on the wrong side of the estimate, causing serious additional expense and delay.

As according to Mr. Campbell's opinion, as I understand it in his first

report, the whole metamorphic series of the Province consists of a number of anticlinal axes, caused by the protrusion of granite, with more or less contorted killas, or slate and bluestone, with quartz lodes between the axes, the matter is not unworthy of attention in an economic point of view.

R. B. S.

Conversation ensued upon the subject matter, which was all the more interesting, that the formation alluded to had just come under the observation of gentlemen present. The thanks of the meeting were then voted to Colonel SINCLAIR for his excellent Paper.

The party soon afterward returned to Dartmouth, and crossed to the city, highly pleased with their excursion.

W. G.

LETTER from the Right Rev. THE BISHOP OF NEWFOUNDLAND, concerning the Mummy of the Great Auk, (*Alca impennis*), found on the Funk Islands.

“ST. JOHN’S, N. F., Aug. 10. 1864.

“*My Dear Sir,*—

“I am much pleased that the mummy arrived in a good state of preservation. How long it has been embalmed or entombed in the ice I cannot of course tell, but I understand the different specimens were found several feet (at least four) below the surface, and under ice which never melts. They were all found on the Funk Islands, but on which side I am not able now to discover, as the person who dug them up is not at present, I believe, in St. John’s. He was sent, or went there to gather the guano or bird manure on speculation, with strict injunctions to procure, if possible, the bones, or skeletons, of the extinct bird. In this he succeeded better than in his own business, and probably if he had known the value attached to these specimens by naturalists he might have turned them to better account than the guano. One specimen I sent to Mr. Newton, and you saw by his letter how highly it was prized. Another was sent to Agassiz, and the third I have been enabled through the kindness of our Governor to forward to you. And this is the most perfect of the three, or certainly more perfect than the one I sent to Mr. Newton,—the other I did not see.

“I think it very likely more specimens might be found, as no persons are living on the island, and it is only lately that any attempt has been made to discover and preserve the skeleton.

“Yours faithfully,

“ED. NEWFOUNDLAND.”