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REPORT ON THE SILVER-BEARING LODES OF THE SCAMANDER RIVER DISTRICT.

Geological Surveyor's Office, Launceston, June 22nd, 1893.

SIR,

I HAVE the honor to forward to you a few observations upon the silver lodes of the Scamander River district, a locality to which I made a short visit in October last. Owing to pressure of other work I have not been able to forward a report sooner.

Lodes carrying silver have been found in the district in two principal localities, near the mouth of the Scamander River, and on the watershed between it and Constable's Creek, which is a small stream running into George's Bay. There is a strong similarity between the two places, the lodes being found in each instance close to the contact between slates and metamorphic sandstones of Silurian or pre-Silurian age and intrusive porphyritic granite, and further resembling one another in their mineral composition, containing quartz and arsenical pyrites, with also more or less blende, galena, and magnetic pyrites: silver and a little gold are also contained. The old slates and sandstones probably belong to the same formation as those of the Mathinna and Mount Victoria goldfields, and the granite is part of the great mass which forms Mount Cameron and the Blue Tier. In both places where the silver lodes are found a tongue of granite extends southwards into the sedimentary formation from a larger mass of granite, these main masses being seen in the Golden Fleece Rivulet and George's River, and along the road between the Scamander Bridge and St. Helen's. The veins are sometimes in the granite and sometimes in the slate, but never, so far as my observation went, very far from the contact of the two sorts of country.

Very little mining has yet been done in the district, the workings of the old Scamander River Silver Mining Company being the most extensive. This mine is situated on the south bank of the Scamander River, about 30 chains up the stream from the bridge, on the main road from St. Mary's to George's Bay: it is on freehold property. (Lot 126, A. F. Kemp, pur. 640 ac.) In April, 1886, it was reported on by Mr. G. Thureau, F.G.S., whose report and maps of the locality give much information, and have been printed for public use, and should be referred to as well as the present one by those interested in the district. In one matter I differ, however, from Mr. Thureau entirely: he regards the matrix of the lodes as a quartz porphyry dyke of more recent age than the main granite mass and intrusive through it, but it seems to me that there is no evidence of such a later intrusion, and that the so-called quartz-porphry is simply a somewhat fine-grained variety of the main granite, the fineness of the crystals being doubtless due to the narrowness of the dyke on the south side of the river, and consequent more rapid cooling of the intruded igneous matter than at places where there was a large body of it. The rock thrown up from the shafts shows plainly that the dyke is substantially identical in mineral constitution with the common country granite, though the weathered superficial portions often closely resemble quartz-porphry. On the north side of the river, the granite is coarse-grained, and with large porphyritic crystals of felspar exactly similar to the common rock of the Blue Tier, and I did not come across anything that could be taken for quartz-porphry.

I have not been able to get authentic information as to the underground workings of the Scamander River mine, and as the shafts are full of water it is now impossible to see anything but the outcrop of the lode, its appearance in a small adit that has been driven, and the heaps of stuff that have been raised and piled on the surface. The main shaft is said to have been 132 feet deep, and an underlay shaft 123 feet: the mouth of the main shaft is, however, considerably higher on the slope of the hill than that of the latter, and both are said to have gone down to about the same level in the lode. The mine being situated close to the edge of the estuary of the Scamander, and the lodes running under the river bed, there was naturally a great deal of water to contend with, and I believe this had much to do with the abandonment of the enterprise. The outcrop is a good deal broken, and one cannot well estimate the width of the lode from it: it consists of quartz, stained with oxide and arseniate of iron mostly. The adit has been driven from a small gully N. 70° W. about 90 feet, then S. 60° W. some 33 feet: the granite at this level is much weathered, and contains numerous small veins of quartz, so that we cannot tell exactly where the main lode begins and where it ends. A wall which looks like the footwall is met with about 63 feet from the entrance, running N. 70° E. and dipping N.W. about 45°, and on this we find about 9 feet of quartzose lode stuff, much broken. This has been followed about 14 feet to the south-west, and a winze has been sunk which is said to communicate with the workings from the underlay shaft. Before coming to the footwall the granite country contained several quartz veins dipping towards the lode. On the hanging wall a "horse" of slate is found about 9 feet in thickness, and after passing through this, decomposed granite with occasional quartz veins is met with up to the end of the drive, where black slate is encountered, evidently the western wall of the granite dyke. One of the small quartz veins in this latter part of the adit is said to have assayed 122oz. of silver per ton, my informant being Mr. Robert French, who held the mine at the time of my visit, and had been for some months assaying the ore and experimenting with processes of extracting the silver from it by lixiviation. He also got very good returns of silver from several other veins, and from the ore at grass from the lower levels. The latter is of two sorts, quartz with but little of mineral sulphides, and assaying, according to Mr. French, from 80 to 122oz. of silver, and a dense heavy mixture of arsenical pyrites, pyrrhotite, copper pyrites, iron pyrites, blende, and galena, with but little quartz, and said to assay not less than 35 ounces of silver per ton. I took a handful of pieces of the sulphide ore in small fragments from all over the heap, and knocked off a large number of chips from the blocks of quartzose ore, so as to get a rough average sample of both sorts, and sent these to Hobart to be assayed by the Government Analyst. His returns from the quartz ore, however, fall very far short of those obtained by Mr. French, and probably give a much more correct valuation of the stuff. To make a really satisfactory test it

would be necessary to sample the heaps by cutting right through them in several places, and taking a parcel for assay in the regular ore-buyers' fashion, which I had neither time nor authority to do. Mr. Ward's assays gave:—

Quartz.	Gold.	Minute trace.
	Silver.	3oz. 18dwt. 10gr. per ton.
	Lead.	None.
Sulphide.	Gold.	Distinct traces.
	Silver.	4oz. 13dwt. 18gr. per ton.
	Lead.	6 per cent.

It is worthy of note that the sulphide ore carries a good percentage of silver, though quite poor in lead, which agrees with what Mr. French told me, namely that the galena did not appear to carry much more silver than the other sulphides. According to Mr. Thureau's report assays made from the stuff near the surface ranged from 20 ounces of silver, and 8dwt. 9gr. of gold to 198oz. of silver and 9dwt. of gold per ton. In Martin Sholl's Handbook of Tasmanian Mines it is stated that "Three tests of ores from the mine, tested in Tasmania and Adelaide, gave an average of 33 ounces to the ton, 50 tons having been treated," and the following extract from the first half-yearly report of the company is given:—"From some 10 feet from the surface to its present depth, this shaft has carried down with it a silver bearing formation over 3 feet in depth" (*sic*, with no doubt is meant), "from which metal assaying from 89oz. to 281oz. of silver per ton has been obtained. It is calculated that the main shaft will strike the No. 1 lode at a depth of 160 feet; it is also expected to cut some of the other lodes which were exposed in the adit previous to the company's formation. In order to be in a position to be able to treat the metal soon after the main shaft is down the required distance, your directors have found it necessary to erect suitable machinery. After making thorough inquiries, they found the best course to adopt is to erect a reverberatory furnace, which will reduce the metal into mattes, which mattes will be sent away and sold, thus saving the cost of refining the silver." In this extract the shaft first mentioned is evidently the underlay shaft: it is also easily seen that where "metal" is spoken of the mixed sulphide ore is referred to.

I do not know what were the reasons for ceasing work: one was, I believe, the large quantity of water to be pumped out, and another the great difficulty in getting a sale for the highly refractory ore from this mine, but whether there was any falling off in the size or value of the lode I am unable to say. The ore seen at surface is decidedly a difficult one for metallurgical treatment, being on the average both highly silicious and containing much arsenic. It is too silicious (as far as can be judged by mere inspection) for direct smelting for matte in reverberatory furnaces, unless only the sulphide portion were so treated, and on the other hand the quartzose portion contains compounds of silver which cannot well be saved by concentration. A combination of processes would probably be required as follows:—The ore having been freed from lumps of fairly pure sulphide by hand-picking, should be crushed and concentrated, the tailings freed as much as possible from sulphides, being then treated by pan amalgamation. The concentrates and picked sulphide ore should then be roasted and smelted for matte. The arsenic present would be troublesome, and so also might be the zinc blende and galena, but so far as I saw the ore does not contain enough of these latter minerals to greatly affect the treatment. Should this method of dealing with the stuff not succeed it would probably be necessary to grind up all the ore; roast it first without salt, and later on with a large addition of this so as to chloridise all silver compounds, and then treat by pan amalgamation or by lixiviation, the latter for choice. Before any process should be decided on, the ore should be tried on a working scale by several different methods, parcels of not less than 10 tons being sent for treatment to various works where these methods were in use.

Without knowing the state of the lode in the lower levels of the mine, I cannot express any opinion as to the likelihood of its becoming a paying concern, but if it could be proved that the value has not fallen off, and that difficulties of drainage and of treating the ore were the only obstacles to success, I should think that the mine would deserve another trial, as these troubles are by no means insuperable. It is evident that there is good silver ore in the lode, and this seems to be a fairly strong one, so there is considerable encouragement to give it a working trial. It appears to me that a good deal could be learned by driving on the course of the lode from close to the water's edge, so as to prove its strike and to see if it goes any distance into the slate country. This could be done without great expense, and as the surface rises pretty rapidly to the southward, it might turn out that considerable quantities of free milling ore could be stoped from above the water-level. While another trial of this mine cannot be recommended as a promising venture, it is by no means one to be altogether condemned, and it is quite probable that it might be successful.

On the north side of the Scamander several sections have been taken up on Crown Land on Mineral Leases during the last two years, but most of these have lately been forfeited. The most important discovery was made on section 1582-91M (formerly 803-91M), near the middle of which a small lode has been found which has yielded assays of from 100 to 900 ounces of silver to the ton, chloride of silver being occasionally seen in it. The vein is from 2 to 7 inches wide, of ferruginous quartz, and runs from N. 15° E. to N. 20° E., underlaying to the eastward about 7 feet in 6. A shaft has been sunk 40 feet on this, and a short drive some 36 feet or a little more, driven northward along its course. The vein has also been cut on surface in some more small shafts and trenches, but is in all cases quite small. The country traversed is soft weathered granite, which will no doubt get quite hard below the water-level. About 3 chains west of this lode, the slate and sandstone country is met with, and close to the contact another vein 2 to 3 inches wide, parallel to the first and like it dipping eastward has been found: this is said to have given an assay of 136 ounces of silver to the ton. Neither of these veins is large enough to work on a large scale, but a working party could probably make a living from them in the soft ground above the water-level, and in working might come upon larger bodies of ore. As a prospecting measure it would be well to costean across the line of these lodes for some distance, as there may be also larger parallel ones. The rich ore found in the known lodes makes it probable that if larger bodies occur they will be payable, and therefore offer inducement for further prospecting.

On section 1583-91M (formerly 870-91M) in the stratified country, a lode 4 to 5 feet wide of quartz, angular fragments of country rock, and oxide of iron, running N. 15° E. has been found about the centre of the block, and slightly cut into by one or two shallow trenches: I did not hear of any silver having been found in this.

On section 948-91M (now forfeited) two shafts some 60 and 30 feet deep were sunk some years ago in granite country, apparently on a small vein of quartz and oxide of iron. In the stuff thrown out from these shafts hard boulders of undecomposed granite are seen, showing that they were getting down through the weathered portion of the rock, and would soon have come upon the hard solid granite.

On section 3293-87M (now forfeited) in the slate country on the east side of the granite dyke a lode of quartz carrying much arsenical pyrites has been found, striking N. 30° W. In a cutting close to a small creek it is seen to be from 6 to 10 inches wide, but in an old shaft it is said to have been 3 feet wide. Mr. G. Worker, who has been a long time in the district and knows the mines well, told me that he had seen gold in this quartz at times. The course of the vein would bring it near the Scamander mine workings if it continued so far. It seems worth doing some more work upon.

The Upper Scamander silver discoveries are at the head of a large branch of the river, but not the main stream, about 6½ miles N.W. from the above sections, and several of them are on the north side of the water shed on the head waters of Constable's Creek. They are near the southern extremity of a long tongue of granite, protruding southward into the slate country from the main mass seen in the tin workings on the Golden Fleece Rivulet. Very little work has yet been done, though the lodes seem to be pretty numerous and strong. I noticed one which ran nearly north and south, but all the others which I saw ran approximately east and west.

Three sections, 1024-91M, 1025-91M, and 1026-91M, are held by the Ironbark Prospecting Association, so-called from the large numbers of fine ironbark trees growing on the property: these would be most useful mining timber if extensive work should be undertaken. Near the S.W. angle of section 1025-91M, are some workings made by the old Nevada P.A. on a quartz reef 4 feet wide, running N. 75° E. and underlaying 1 in 7 to the north-west. The country is soft granite. The quartz contains much arsenical pyrites and green arseniate of iron; I do not know whether gold or silver has been found in it. The reef looks a strong and permanent one, and may yet prove to be valuable. Towards the north-east angle of section 1026-91M, a shaft about 15 feet deep has been sunk on a lode 3 to 4 feet wide, running N. 70° W., and some few chains higher up the hill (eastward) another small shaft has been sunk on it. The reef is composed of quartz, containing arsenical pyrites, a little copper pyrites, and occasional specks of blende and galena; in parts the sulphides predominate in quantity, but usually the quartz is by far the largest constituent of the lode-stuff. One assay from this lode is reported to have yielded 18 ounces of silver to the ton. About 100 feet north of this reef there is a smaller one about 18 inches wide, showing much oxide of manganese and a good deal of arsenical pyrites. These lodes run into a high hill, and a tunnel driven on the course of the larger one, would open up probably quite 150 feet of "backs." The country is granite, but the slate comes in on the east boundary of the section, and if the lode continues eastward it would run into the slate. In section 1052-91M, another east and west lode of quartz is seen, but has not been opened up. In section 1093-91M (Lake and Smith's), a lode has been traced from near the north-east corner to the centre of the section by several trenches; it is from 2 feet to 4 feet in width, and runs N. 70° E. and consists of quartz with much arsenical pyrites, also some copper and iron pyrites, galena, and blende. The outcrop shows a good deal of brown oxide and green arseniate of iron. No one was at work, and I did not learn if any metal of value had been obtained, but the lode looks very promising and deserves a trial; it looks best near the centre of the section close to a creek which runs to the Scamander River.

Besides the above lodes, I have been told of others in the district, carrying the same minerals, and generally near the contact of the slate and the granite country. The constant presence of arsenical pyrites seems to me a good feature, as it is very frequently associated with gold elsewhere. The slate country belongs to the auriferous formation, and it is likely that if the lodes are traced into it they may be richer than in the granite. Nothing appears to have been done except the most desultory sort of prospecting, and more thorough work will have to be done before it is known whether the lodes are valuable or worthless. I would recommend the belt of country along the contact of the granite and the Silurian rocks to the attention of prospectors as it is a very likely place for mineral discoveries. The Scamander finds have proved that rich silver ore exists in these rocks, and it is probable that some day a really payable lode, or several, will be discovered. It may be recalled to mind that the Waterhouse reefs, which were proved to carry arsenical pyrites rich in gold, are situated in a patch of the same Silurian formation, lying between two areas of similar granite, which again gives hope that the common presence of arsenical pyrites in the Scamander district indicates the probability of gold being in the vicinity.

I have the honor to be

Sir,

Your obedient servant,

A. MONTGOMERY, M.A.,

Geological Surveyor.

The Secretary of Mines, Hobart.