

Inspector of Mines Office, Launceston, April, 1886.

REPORT on the Scamander Silver and Gold Deposits.

THE existence of some metalliferous deposits in this vicinity has been known for some years, but, as they occurred on land alienated from the Crown, some difficulty was experienced in obtaining permission for their exploitation. A few months ago, however, Mr. J. R. Chaffey obtained a lease of over 600 acres for mining purposes from Mr. M. Steel, and no time has been lost in testing in a practical manner this promising locality.

The locality where the silver-gold deposits have since been found to occur is highly interesting from a mining geologist's point of view, both on account of their established value and of their similarity to other older and well-known silver-gold vein deposits in California, Nevada, and in the Colony of Victoria, which, like these here, chiefly occur in dykes of porphyry and in metamorphic schists.

The dyke of porphyry (quartz) in which these silver-gold bearing veins are enclosed, observes an average bearing of N. 24° W., and its width appears as contingent on the country rocks, through which it protrudes in its course on both the north and south side of the river, being from one to five chains in width, the greater width being observable in the schists and not in the granite (see geological sketch plan). South of the river this dyke is, at a distance of about one mile, overlaid by the marine tertiaries, and in the north, across the river, I have traced it for over three miles without reaching the end, where it crosses the most southern foot hills of the Scamander Ranges. There is, therefore, ample scope for prospectors in this direction, as very little private land intervenes from those ranges to the George's River and farther. Indications of another and parallel dyke west of this one were observed, and other ore deposits may occur, as this region has not been much prospected, though gold has been found in a thin vein north of the river and west of the township of Yarmouth. This dyke of porphyry being of a more recent origin than the granite and the schists, —the latter on both sides of same,—dip anticlinally from that plutonic rock, which thus forms the axis or "centre of division."

The mining operations which have been carried on under the direction of Mr. Chaffey upon Mr. Steel's land are located and extend almost from the southern edge of the Scamander River for over six chains to the south; beyond that principal deposit other promising indications have been found on or near the surface. Several surface cuttings along the "cap" of the various veins have been made, and a tunnel had been driven at nearly right angles with the course of the dyke for a distance of over 80 feet, intersecting thereby not only the irregular veins met with in the surface cuttings, but likewise others not so exposed to view.

The character of these silver-gold veins is very characteristic, as they differ very materially from those, for instance, recently opened at Silvertown, Broken Hills, and Sunny Corners, N.S.W., where chiefly pure chlorides and sulphides of silver and also galenites are found to occur in purely mineral-bearing veins of chiefly a ferruginous (*gossan*) character or description. The Scamander veins consist, however, principally of quartzose vein matter, in the joints, cavities, and cracks of which their silver ores occur in botryoidal cluster-like forms, and in small concretions coating the quartz crystals, and as thoroughly associated with iron and arsenical pyrites. The silver ores proper exhibit a splendid lustre, when approaching crystallisation, in yellow to amber and greenish to grass-green or olive colours, which latter do not fade on exposure to the atmosphere. Comparing these ores with the chloro-bromides (*embolites*) of silver of St. Arnaud, Victoria, and with those of other renowned silver deposits in South America and Arizona, there appears to be a marked difference which, together with my tests, would place them as "bromides" of silver or "bromite," which occurs in nearly all of those places mentioned as associated with chlorides of silver and also of "cerussites" (carbonates of lead), the last of which I discovered in very fine needle-like crystals. All these kinds of ores carry, generally, a very high percentage of silver, which, at Scamander, is much enhanced in value by the occurrence in these veins of free gold.

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With regard to the width and extent of these veins, it may be stated that in the adit referred to they range from about six inches (the first vein carries a good percentage of visible native silver) to over four feet thick; and it appears from their bearings (of four of the veins) as if they would intersect each other at various points, thus forming an extensive vein formation in the porphyritic dyke, which circumstance should in the future greatly facilitate the mining operations on a larger scale.

The assays, as made from time to time, and from various veins, by Mr. Jenkins, of the Mount Bischoff T.M. Smelting Works, have ranged from 20 ozs. of silver and 8 dwts. 9 grs. of gold to 198 ozs. of silver and 9 dwts. of gold to the ton of raw ore, which undoubtedly should leave a very profitable percentage over all working and other expenses when working or manipulating the ores in the manner described below. It should be borne in mind that, as this ore occurs exclusively in quartz, thus representing a very high percentage of silica, it will be quite impossible to smelt this ore with any degree of success in the modern "water-jacket furnace" (La Monté's), owing to the absence of the necessary and cheap materials for liquefaction so as to produce in such furnaces a good flux in order to separate and concentrate the metalliferous from the earthy ingredients in the ores. Quite recently such a furnace, of 20 tons capacity, was purchased by the New Zealand Smelting Company at Auckland, for the purpose of treating the vein-matters of the Thames reefs, which, to a certain extent, correspond with our Scamander ores as to their relative percentage of silica; but they are richer in free gold of a low value owing to the large percentage of silver contained. Mr. La Monte asserted, and the company accepted his statements as correct, that by means of his furnace 90 per cent. of the assay value of gold and silver per ton would be saved; that the cost of treatment would be at the rate of £2 per ton, and that the capacity of his furnace was at the rate of 20 tons per diem; and the results of a thirty days' run were as follows:—The estimated yield of 90 per cent. was reduced to one-fourth; the treatment cost £6 15s. per ton; only six tons were treated per diem instead of 20 tons, and the 30 days' run cost the company £1227 5s. It appears that La Monté based his original estimate too high, and he did not anticipate the very serious difficulty that had to be met with in the *excessive proportion of silica* in the Thames ores. The amount of flux required was, of course, very great, thus reducing the quantity of ore treated to about one-fourth of the original estimate. Where no silica (or quartz) occurs, of course, very much better results are obtainable with proper fluxes in these or similar furnaces, but, as shown above, they are not at all suitable to Scamander ores as occurring at, above, and, in all probability, for some distance below the present adit level.

The Scamander ores resemble very considerably those I have examined in the mines of the States of Nevada and California, and also those from Arizona and Mexico, where they are now manipulated to such a degree of success as to give up from 65 per cent. of their metallic components, which is considered by their experts to be as near as possible the real value of the ore obtainable; and this is added to by the annual results after other manipulations and further treatment of the tailings resulting from the processes employed.

The following is a concise synopsis of what treatment should be employed with the very considerable quantity of ores now in sight; viz.—

- 1st. Calcination; that in proper furnaces preferable.
- 2nd. Crushing with rollers, discs, or disintegrators to produce less slimes than with stampers. These to discharge into
- 3rd. Collecting sand-pits. Sands to be fed into
- 4th. Grinding pans (horns), to reduce the ore fine enough to admit of its being treated in the larger
- 5th. "Separating pan," revolving at a lower speed, and which can be hermetically closed, but by means of valves can be made to admit of superheated steam near its base, through an annular steam chest to heat the pulp, and jets of quicksilver from the top of this concentrator.

The resulting tailings are to be intercepted and left to decompose in the open air for further treatment.

In the States referred to, the *pan process* entails a cost per ton of from £2 6s. to £2 18s., which amount would be materially reduced on account of the lower wages prevailing in this Colony. The employment of pans and separators, as the character of the ore does not admit of any better system of concentration, appears at first sight to be, in connection with the use of quicksilver, somewhat inexplicable, as mercury will only associate and amalgamate with pure metals. The Scamander ores, however, contain but free gold, and the silver occurs either as a bromide or sulphide (stephanite), but it has been proved, and the manufacture of these sets of pans,—viz. two grinding and one separating in each set,—has received in those States a great impulse from the fact that no better results could be obtained by any other means or process, and that their ores were peculiarly well adapted to working in such vessels; and the chemical composition of the Nevadian, Californian, Arizona, Mexican, and Scamander ores is such that the iron of the pans to a sensible degree assists their decomposition. Under proper treatment, *i.e.*, including additions of solutions of sulphates of

iron and copper periodically, these ores will be readily, with the aid of the particles of iron worn off during the grinding processes, made to give up their silver contents in a metallic form for proper amalgamation. The "separator" or "pan," which is much larger than the two grinding-pans, but all of which are occasionally fed with mercury, revolves at a lower rate of speed, and in it the "pulp" is from time to time considerably diluted with water, causing the quicksilver and amalgam to fall to the bottom, whence it is removed for retorting in a furnace, which is furnished with a number of shelves (iron) carrying each a number of iron forms for the ingots of "bullion," i.e., silver and gold obtained from the amalgam thus retorted.

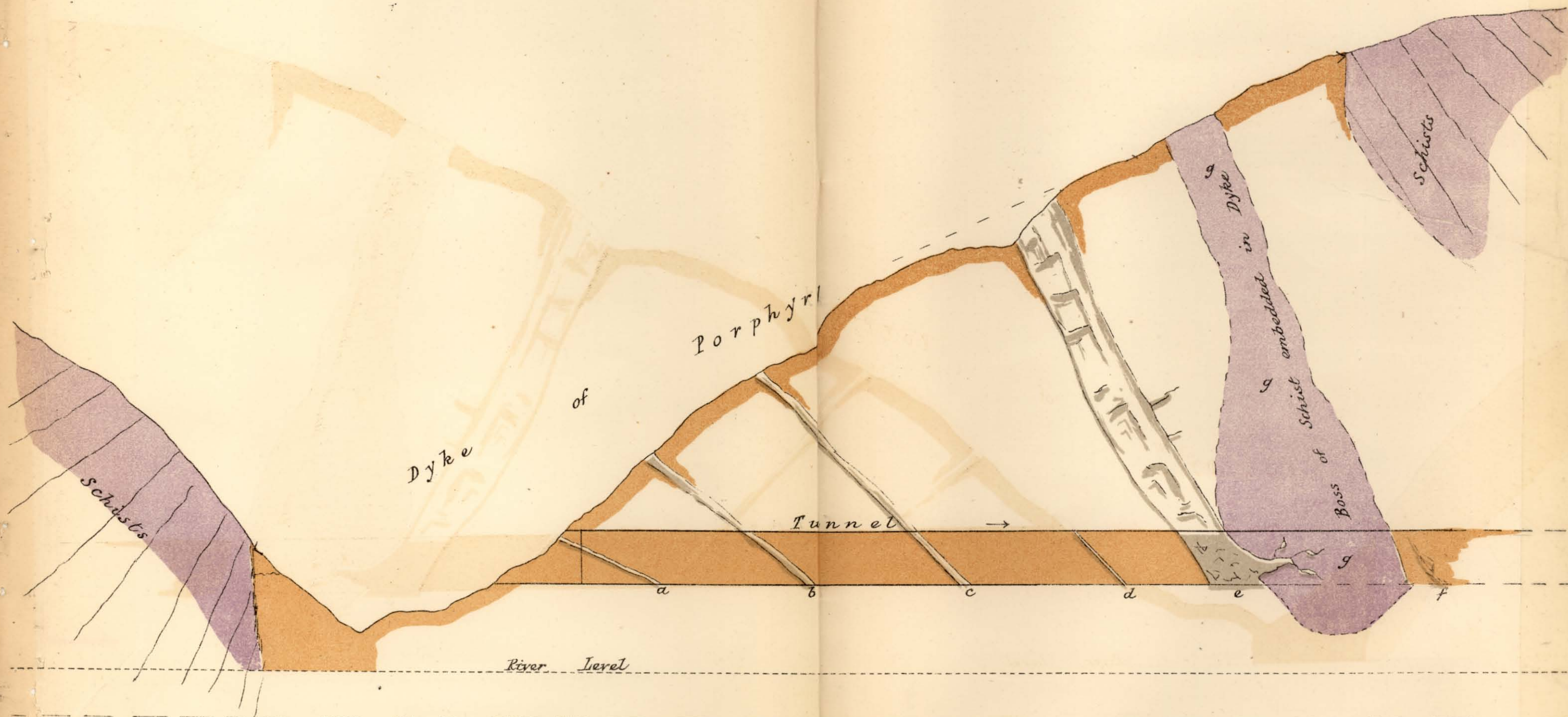
As regards the permanency and extent of these silver-gold deposits, the former is, in my opinion, substantially proved from the general character of the veins and the laminated structure of same with the ores contained therein, with this satisfactory addition—that indications exist of these bromides of silver passing into, at lower levels, sulphides and sulphurets. As to the extent of these ore deposits, confined as they are to the dyke of feldspathic porphyry, it should be borne in mind that scarcely any indications whatever were existent at the surface of so valuable ore deposits beneath the same, and that more pronounced indications have been found both north and south of the river, where they are exposed at the lowest point near the river's edge. Quartz veins charged with sulphurets of lead, zinc, iron, arsenic, oxide of manganese, and a little silver have been found both north and south in the dyke for a length of over four miles at various places; and patient search, skilful exploration, and sinking to greater depths, where the country does not admit of that much more preferable mode of prospecting,—viz., tunnelling,—is only needed to prove their subterranean value by such methodical system of development.

A thin quartz vein (four inches) has been discovered by Mr. Chaffey north of the river, and west of Yarmouth. Assays showed 1 oz. 18 dwts. of gold and a considerable percentage of silver per ton.

G. THUREAU, F.G.S.

F. BELSTEAD, Esq., Secretary for Mines, Hobart.

PLAN N°1



Reference: Cross-Section:-
a b c d e f. Quartzose Silver-Gold veins.

Scale 10 feet to one inch

Levi J. Thureau F.G.S.

OFFICE OF MINES




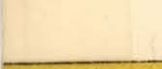


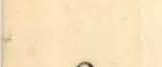

5 cm

GEOLOGICAL SKETCH PLAN
SCAMANDER SILVER GOLD DEPOSITS

Scale. 4 Chains to an inch

fact. G. Thurau F.F.S.
- April 1886.

REFERENCE

-  Granite
-  Porphyry inclosing Silver-Gold Deposits
-  Metamorphic Schists
-  Tertiaries (Marine)
-  Alluvial (Pleistocene)
-  Present scene of Mining operations on outcrop of Quartzose Silver-Gold deposits } a-b line of Tunnel
-  Survey Stations
-  Auriferous Quartz Vein

5 cm

