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REPORT ON GOLD AT PORT CYGNET AND
WHEATLEY'S BAY, HUON RIVER.

Government Geologist's Office,
Launceston, 22nd June, 1907.

SIR,

PURSUANT to instructions received, I proceeded to the Huon River on the 5th April, to examine some ground taken up for gold-dredging at Wheatley's Bay and Lymington and gold-quartz mining works at Lovett.

Alluvial gold-seeking in this district was carried on thirty years ago, and about nine years ago some lode mining was started round Lovett. Whether visible gold had ever been detected in the stone has always been a debatable question, but the late Mr. J. Harcourt Smith claimed to have noticed fine specks in the stone at Mt. Mary, near Lovett, and his samples of the red ferruginous lode material at that mine when assayed by the Government Analyst confirmed his determination by returning 4 dwts. 2 grs. gold per ton. On my present visit to the same mine I saw similar specks in the same reddish contact rock, and a piece which came from this trench and showed numerous minute specks of what resembled gold scattered all over a joint face of the specimen, on being assayed by the Government Analyst, yielded 3 ozs. 4 dwts. gold per ton, and 2 dwts. 12 grs. silver per ton.

This gives a rather important clue as to where one may expect to find gold-bearing stone in the district, for this reddish stone is rather a feature of most of the reported occurrences. There is a N.E.-S.W. belt of alkaline porphyries (1) which are intrusive in the Permo-Carboniferous strata at Lovett and Lymington, and at intervals along the contact line is found a development of quartz, opaline silica and chalcedony, associated generally with an impregnation of the contact rock with pyrite which has decomposed to hematite, giving it a characteristic reddish colour. It is this reddish-coloured rock which shows visible gold.

(1) The term porphyry is here used in a field sense, and includes all the rock varieties of alkali and nepheline syenites, tinguaies, essexites, sölvbergites, nepheline porphyries, &c. which form the remarkable assemblage of alkaline rocks at Port Cygnet.

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Any veins of quartz that there are in the district seem confined to the rocks in the neighbourhood of the contact, but quartz veins are not abundant, and need hardly be expected to be strongly developed, as the eruptive porphyry is not sufficiently siliceous for much surplus silica to be available for the formation of reefs. However, a certain amount of lode action has taken place at and near the contacts, and it would seem as if these contact formations are responsible for the gold which has been found in the alluvium of the creeks and flats.

The auriferous porphyry belt strikes right through the country to Little Oyster Cove and Peppermint Bay on the Channel. Gold-bearing creek sand occurs near the former. In it are small crystals of sphene, garnet, and zircon, besides a little flaky, water-worn gold. This sand is evidently the detritus of the Port Cygnet porphyry series.

The lode formations possess a purely scientific interest in being the youngest gold matrix in the island.

The gold quartz reefs of the north and east are all prior to the Permo-Carboniferous, while these southern occurrences are intrusive into the Permo-Carboniferous, and consequently younger.

The whole produce of the district, all in the form of alluvial gold, has been close upon 3000 ounces. Several years ago I took great pains to collect information bearing upon this point, and though exact figures are out of the question, the above estimate is probably very near the mark.

PETCHEY'S BAY GOLD MINING SYNDICATE.

This syndicate has applied for two dredging claims, one in Wheatley's and Petchey's Bays, and the other at the mouth of Forster's Rivulet and in Copper Alley at Lymington.

Between Lymington and Wheatley's Bay is a high hill-range which slopes steeply down to the Lymington Valley on the north, and to the Huon River on the south. The Permo-Carboniferous mudstones at sea-level are intruded into by the massive porphyry on both sides of the hill. This porphyry apparently rises into the heart of the hill, to a height of 700 feet above the river-level, and the gold deposited in the stone at or near its contact line with the sedimentary strata has been shed on the one side into the Lymington basin and on the other into the creek deposits and shore flats of the Huon River. One might expect therefore that the shore sands of the Huon would contain accumulations of gold. Such is in fact the case.

The beach in the little bay below Jno. Wheatley's 98 acres and H. Riseley's 24 acres is a flat floor of Permo-Carboniferous mudstone shelving off very gradually into the river. Dish prospects from the sand of this bay yield some very coarse gold. When I was there preparations were being made to bore with plant brought over from New Zealand, and test the bay thoroughly before going to the expense of a dredge. I was informed that as far as 500 or 600 feet from the shore the depth would not exceed 40 feet. North-east from this bay a valley opens into it covered with an alluvial deposit resting upon soft clayey porphyry about 40 feet above the river. A good many holes were sunk in this alluvial by former workers, from 6 or 7 feet to 24 feet. The wash as a rule is from 6 inches to 3 feet. The present syndicate have put down a dozen holes altogether. Some of these yielded only a few colours, others $\frac{1}{2}$ -dwt. each. Riseley's Creek, which flows through this valley, has always been considered to return the most gold. Mr. Kube showed me 4 or 5 ounces of gold which mostly came from this creek. The gold is mostly honeycombed and heavy, and coarse, one flat piece weighing 1 dwt. 14 grs.

West of the above is another little bay, Kube's Bay, just below Mr. Kube's house, and this receives Kube's Creek, which has yielded gold all the way down from the hills, but not so much as Riseley's. However, it was thought that this bay would also give good results. The syndicate had bored 25 feet in the bay when I was there, but only got 5 colours from one bore. There would seem therefore to be little encouragement here. The shores here are also mudstone, and on the east side of the bay a vertical dyke of porphyry traverses the country N. 77° E., about 2 feet 9 inches wide.

A fair quantity of gold has probably at one time or another been shed into these bays, but it must be recollected that the Huon is a tidal river, and much of the metal is likely to have been carried off and distributed elsewhere. My visit left upon me the impression that there is hardly enough scope for a dredging enterprise. From what I know of this district, I shall be surprised if the boring tests disclose enough gold to cover the cost of a dredge, and even if they do, a dredge would make short work of the limited area within the bay.

There is evidently a junction of the porphyry with the mudstones just above the bank of Wheatley's Bay, and it is just possible that the flat was once covered with the

sedimentary rock, which has been removed together with the gold-bearing vein material at the contact. But the bulk of the gold has, I think, been derived from the contacts higher up the hill to the north-east.

I ascended this hill with Mr. P. Hardy. Gold can be traced up the valley, and just where the foot of the slope begins a hole has been sunk 20 feet in mixed porphyry and sandstone wash and clay, showing colours of gold. No quartz is visible in the wash, and the alluvium is not bottomed.

Close by is another deep hole sunk as far as water. A chain further is also a hole sunk over 20 feet, but not bottomed. The stuff thrown out contains reddish contact stone similar to that on the hillcrest. Ascending the hill about 300 feet above the river is fossiliferous sandstone. A saddle here is 700 feet above the river, and there is apparently a contact of the porphyry and shale. Going north from this, the hill-range is composed of pebbly grit and conglomerate, with seams of chalcedony and contact stone, hornstone, &c.

It is from this hill slope that it is reasonable to suppose that most of the gold at the foot of the hill has been derived. But I think the main source has been lower down the hill, because the sandstones at the summit are pebbly, and there would have been more quartz associated with the gold at the base if both gold and quartz pebbles had been mainly derived from the hillcrest. There is reason, however, to believe that the quantity shed has been moderate, and unfortunately the slow accumulation of alluvial gold during the past ages does not necessarily mean that a payable outcrop will be found at the top of the hill. In the course of time a payable spot may be struck, but at present there is no indication to guide prospectors beyond the general trend of the north and south contact line, as shown by the reddish chalcedonised stone.

This syndicate is also preparing to bore at the mouth of and along Forster's Rivulet, north of the Lymington jetty, as well as on the shores of Copper Alley, the bay south of the jetty. I have not been able to learn exactly how this bay derived its name, but heard locally that the prisoners in the old days found signs of copper. It is possible that green iron stains on the mudstone surfaces, such as are seen at Sturges Bay, Cradoc Hill, Peppermint Bay, and many other places in this area, have been mistaken for copper. This green-stained rock has been tested

in the Government laboratories, and the colour found due to ferrous oxide.

The old company at Lymington took out a considerable quantity of gold from the shallow alluvial on Mr. Coad's ground during operations extending over a couple of years. This Lymington Valley has been carved out right across the line of porphyry from west to east, and naturally carries the concentrations from the waste of the rocks which have disappeared. In 1884 or 1885 Mr. Lane sank in the bed of Forster's Rivulet above the bridge, and is said to have got half a grain of gold to the dish. The position of the mouth of this rivulet is highly favourable, assuming a fair quantity of gold to have been brought down by the creek, but from what I hear the gold in the valley and on the surrounding slopes is extremely patchy. While the creek and the bay are suitable localities for search, I am inclined to think success doubtful, at any rate, on a scale that would warrant placing a dredge in position. However, the tests that are to be made will soon settle the question. If this bay and the one on the Huon River can be shown to yield sufficiently to be payable, the united claims would then justify further expense. Just south of the jetty a dyke or exposure of porphyry crops out in blue shale, and is seen again on the north side of the jetty. North of the rivulet and along the shore of the Arm to nearly half-way to Lovett the rocks are mudstone shale and mudstone conglomerate, traversed by dykes of porphyry. Opposite Green Point porphyry comes in, and continues thence all the way to Lovett.

LYMINGTON MINE.

In company with the Rev. Father O'Flynn and Mr. Davis, I visited the hill-saddle in the south-east corner of J. Dieren's 22 acres, about a mile west of the Lymington township boundary, where on one side the hill descends steeply to the Huon, and on the other to the Lymington-road.

Here there is a cut into chalcedonised contact stone, but as this is on private property, a Lovett syndicate has gone a little south-east and put in a short adit, 60 feet, and also about 60 feet below the crown of the hill, which so far has only passed through softened and altered country rock of no value. A formation which is ahead of the adit face has been uncovered a little further east, but an inspection of this showed that it consists merely of

fossiliferous country carrying hydrated oxide of iron, and is not worth driving for.

In a westerly direction along the range towards Black Jack mudstones, shales, and quartzites continue to form the country rock, occasionally fossiliferous. At one spot the hardened mudstones are impregnated with iron pyrites. Still further west an excavation has been made in mudstone with a seam of limonite. The gossanous capping is rather inviting in appearance, but degenerates into a seam of limonite, which has the disadvantage of carrying no associated quartz nor pyrites.

All around is pebbly sandstone and conglomerate, the waste of which would give rise to a decided quartz wash. But quartz gold-bearing wash is rather exceptional here, and bearing this in mind, it is probable that the gold at the base has come from some part of the contact with shales and mudstones lower down the hill than these high workings. This view gains support from the general opinion in the district, that the best prospects are always found not on the top of this hill, but some distance down its sides.

The porphyry no doubt passes right under it, and there are lower points of contact from which most of the gold may have come.

MOUNT MARY MINE.

This is situate just south of the south boundary of the township of Lovett, in the north-east corner of W. Dance's 15-acre block. The country rock is pebbly mudstone and shale near its contact with alkali and nepheline syenite porphyry, which crosses the mountain and the Lovett valley to the Livingstone Hill in a north-easterly direction. At the contact itself a good deal of brecciated rock is seen, very likely due to the crushing force of the intrusion; and the familiar reddish contact stone carrying visible gold on the faces occurs at the outcrop.

Work was begun here in 1898, but after some time was abandoned, and only resumed at the beginning of last year, when a new shaft was started. In all, four shafts have been sunk. The first was only 14 feet in depth. At this time specimens of stone are reported to have given 4 dwts. and as much as 11 dwts gold per ton. The second shaft was sunk 60 feet, and the lode-channel intersected by a crosscut in 16 feet of driving to the north-west. Stone from this is reported as having assayed 2 dwts. 7 grs. gold per ton, but a sample from the whole width of

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the lode (4 feet) taken by the late Mr. J. Harcourt Smith returned only traces of gold.

A third shaft was sunk 20 to 25 feet, and then abandoned. The fourth and present shaft has been sunk 73 feet. From the bottom a short crosscut has been driven south through the lode, which is here 3 feet wide, and has been driven upon east for 6 feet. In the lode-channel are up to 6 inches of green lode-stuff and silicified matter. A sampling which I took from the face was assayed by Mr. W. F. Ward, the Government Analyst, but only a trace of gold was detected. I was shown assay notes from Mr. Ward stating—2 dwts. 15 grs. gold per ton from green stuff; 8 grs. gold per ton from quartz; and 1 dwt. 7 grs. gold per ton from red stone. The 3-oz. red stone sent by me to Mr. Ward also came from the outcrop in a trench near by. As this trench has yielded several specimens showing visible gold, it might be as well to sink a little on the stone there. It is in fact the only formation in the district in which anything tangible in the way of gold is found, and I think a little money might be spent in proving it. From the manner, however, in which the gold occurs in this contact stone without any apparent channel, I am very much afraid that it will lead to the expenditure of money in search of something payable without resulting in anything really valuable. Still undoubtedly gold exists here, and there is an inducement to see how it goes down.

LIVINGSTONE MINE.

This is situate 2 miles north-east of Lovett on W. F. Rennahan's 173 acres, just north of the north boundary-line of John Thorp's 500 acres. A shaft has been sunk on the north-west fall of Livingstone Hill, which is a spur from Toby's Hill, at 600 feet above sea-level, on a quartz reef in nepheline syenite porphyry near the contact of the latter with fossiliferous Permo-Carboniferous strata. This shaft is not in a condition to enter at present, the collar having fallen in, but when I was here on a previous occasion it had been sunk upwards of 60 feet, following the parallel bands of quartz which, interlaminated with the porphyry, form the reef down to that depth on the underlay. This reef strikes a little north of east, apparently the same direction as the hill-spur, on the crest of which further east indications of the continuance of a line of quartz or reefing-stone are to be seen.

This shaft was sunk in 1898 on the strength of Victorian assays of specimens, which went 3 ozs. 23 grs. and

1 oz. 12 dwts. per ton. Subsequently an assay of 48 lbs. of stone gave 10 dwts. 13 grs. per ton. Later, a ton of stone was treated at Footscray, for 5 dwts. per ton. Then 6 tons of quartz were taken over, but no free gold was obtained, only 3 or 4 dwts. from the pyrites. Half a hundredweight which had remained over from the 1-ton lot was tried, and yielded only 13 grs. free gold per ton. These disappointing results led to the abandonment of work here. Some of the most likely-looking specimens taken by me from the tip were assayed by the Government Analyst, who could only detect a minute trace of gold.

The reef here is apparently a contact development, which may or may not be continuous. The likelihood is that the bands of quartz will be irregular along their course, though fairly constant enough in depth. Their behaviour in depth will most likely depend upon the accompanying line of the porphyry contact. The stone carries arsenopyrite, iron pyrites, copper pyrites, and a little blende and galena, an association of minerals which may be considered as a favourable indication for gold. It is in fact the most promising stone found in the entire district so far, and it is the only lode found entirely in porphyry. Evidently it has not carried much gold at the outcrop, or there would have been more of it found in the valley below. If it continues further east some more encouraging part may be found on its course. As matters stand at present, however, there is not much encouragement to go further with the work, in view of the poor results so far.

On the southern side of the ridge a tunnel was driven for about 400 feet, to intersect the reef at about 90 feet below the bottom of the shaft. The country through which it has been driven is the Permo-Carboniferous mudstone or sandstone traversed by dykes of porphyry. In driving, the direction of the adit was changed, and it now heads for the shaft. The reef line has not yet been intersected, but it cannot be far off. To settle the question as to whether the reef is likely to be permanent it would not be very expensive to continue the tunnel far enough for the purpose, and if the results then warrant further outlay, a new position should be selected for a working-shaft a little lower down the hill on the northern fall. It must be confessed, however, that looking at the results obtained so far from the shaft, any further work here would be quite speculative.

THE PORT CYGNET PORPHYRIES.

These combine to make a rock group so unique in Tasmania, and not altogether matched anywhere else in the world, that a few general remarks thereon are called for.

Increasing attention is being paid to the Port Cygnet eruptive rocks in Europe. They have been under the notice of the most distinguished European petrologists, Professors Rosenbusch and Brögger, and an important treatise (in German) on some of them by Dr. F. P. Paul, of Sydney, has recently appeared under the title of "Some Foyaitic-Theralitic Rocks from Tasmania." (1)

As is now well known, the rocks belong to the alkaline division of eruptives. They contain an excess of the alkalis, soda and potash, and consequently sodic minerals are plentifully developed in them, e.g., soda orthoclase, sodic augite and amphibole, nepheline, sodalite, häuyne, &c. It will therefore be readily understood how potent the waste from such rocks must be in forming a soil in the highest degree favourable for the fruit-culture for which the district is famous.

The petrographical classification of the rocks, as far as at present studied, may be stated as follows:—

1. *Family of the Alkali Syenites*—

(a) Plutonic representatives.

- (1) Quartz augite syenite, or akerite, according to Prof. Brögger. This is the plutonic rock forming part of the promontory of Regatta Point and on the Back-road north-west of Lymington.

2. *Family of the Elaeolite Syenites*—

(a) Plutonic representatives.

- (1) Elaeolite syenite. Part of the promontory of Regatta Point, and on Mount Mary.
- (2) Jacupirangite. A dark facies development of the elaeolite syenite at Regatta Point.

(b) Complementary and dyke representatives.

- (1) Nepheline syenite porphyry.

(a) The biscuit felspar rock on Mt. Livingstone and Mt. Mary.

(1) Beiträge zur petrographischen Kenntniss einiger foyaitisch-theralitischen Gesteine aus Tasmanien, Dr. F. P. Paul. Wien, 1900.

- (b) The häuyne-bearing rock on Mt. Livingstone closely related to the preceding.
- (2) Sölvbergite porphyry. A greenish dyke south of Regatta Point.
- (3) Mica-sölvbergite. A dyke south of the preceding.
- (4) Tinguaitite. The dense green rock above Mt. Mary Mine.
- (5) Tinguaitite porphyry. The rock on the summit of Mt. Mary, with porphyritic crystals of sanidine felspar and garnet.

3. Family of the *Essexites*—

(a) Plutonic representatives.

- (1) *Essexite*. Dark rock on the north side of Regatta Point.

4. Family of the *Theralites*—

(a) Plutonic representatives.

- (1) *Monchiquitic shonkinite*. A dark rock forming part of Regatta Point. Described formerly as mica-nephelinite, with the habit of a monchiquite. Called monchiquitic nephelinite by Dr. Paul, who also refers to its shonkinitic affinities.

The above list is far from exhausting the rock varieties found at Port Cygnet, but at any rate it presents the principal types.

Pyrite is met with sparsely distributed in the igneous rock, quite apart from any vein formation, but no gold in the rock has ever been seen in the hundreds of specimens that have been examined. This metal would appear to be confined to marginal parts of the porphyry and the adjacent sedimentary strata, where silica and metallic sulphides have been introduced.

As regards the age of the porphyries, all that can be said at present is that they are intrusive in the Permo-Carboniferous beds. How much younger they are than these has not yet been demonstrated. They are found on the shores of D'Entrecasteaux Channel, and Mr. F. J. Ernst, in 1902, in making a traverse across the range, found that an outcrop of Mesozoic diabase exists between the channel and the Lovett occurrences, presumably cutting through the belt of porphyry. Of course, if this is a real

intersection, a step further is taken in the determination of its age, and the alkaline rocks must be referred to the interval between the Lower Permo-Carboniferous and the Upper Mesozoic. On this visit I made my way over the range east of Lovett, *via* Nicholls' Creek, and descended to Woodbridge on the shores of the channel, for the express purpose of studying the junctions throughout the traverse with reference to the age question. On the north side of the road along Nicholls' Creek, ¼-mile from the Arm and 80 feet above sea-level, a fine contact occurs in a little quarry showing nepheline syenite porphyry underlying the mudstone strata which are fairly horizontal. The latter are hardened near the contact, but I did not notice any occurrence of mineral or vein formation. About a mile further along the road diabase is exposed, and beyond this is mudstone. The actual contacts unfortunately are not shown, and it is not certain whether it is the porphyry or the mudstone which is cut through by the diabase. On the eastern side of the range diabase is seen near the summit, and is succeeded lower down by the Permo-Carboniferous strata into which it has penetrated, and quite at sea-level the intrusions of porphyry in the mudstones on the north point of Peppermint Bay are met with. At present, therefore, what we know is that the Permo-Carboniferous beds are pierced both by diabase and porphyry, but the evidence available as to the relative ages of the respective intrusions is not absolutely convincing, though there is a high probability in favour of the pre-diabasic age of the porphyry. On the other hand, all the other occurrences of alkaline rocks in Tasmania are of Tertiary age.

CONCLUSION.

The general conclusions which I draw from this examination of the Port Cygnet district are very much the same as those embodied in my former report on this field. These are, briefly, that gold will not be found disseminated promiscuously through the porphyry, but is confined to the silicified and brecciated stone at the junction of the eruptive and sedimentary rock, sometimes in one, sometimes in the other, or in quartz veins connected with these contacts. The deposition of gold and mineral sulphides along these lines has not been great, and is irregular and patchy, and though prospecting has been carried on at several points, nothing payable has been struck so

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far. The gold won from the creeks and valley flats has been derived from the slow waste of the contact lines, and it is only along these lines that prospecting has any chance. Unfortunately, however, there is not much encouragement for spending money on the lode formations in the hope of payable results. On the whole I do not think that enough gold exists in the bay sands to warrant the construction and installation of dredging-plant. Nevertheless, the Port Cygnet goldfield is so unique that I am not without hope that some day or other, by prospecting or by accident, some part of the lode-line of sufficiently high grade to work may be met with.

I have the honour to be,
Sir,
Your obedient Servant,

W. H. TWELVETREES,
Government Geologist.

W. H. WALLACE, Esq.,
Secretary for Mines, Hobart.
