REPORT ON THE BELL MOUNT AND MIDDLESEX MINERAL FIELDS.

Government Geologist's Office,
Launceston, 6th September, 1898.

SIR,

IN accordance with your instructions I have lately made a second examination of the Shepherd and Murphy Mine, Bell Mount, and while in the neighbourhood visited one or two other sections where a little work was going on. From Bell Mount I went to the Devon Mine on the Dove River, and returned to Sheffield by the old Middlesex Road, crossing the River Forth at the Lorinna Bridge. On my way I visited the Glynn and Golden Hill Mines on the Five-mile Rise, and the old workings at Mount Claude, and have now the honour to present the following Report :—

Shepherd and Murphy Mine.—Since my previous visit to this mine on June 5th, 1897, a considerable amount of work has been done on the lines suggested in my Report, two adits having been driven in a southerly direction, and a total distance of over 1000 feet of driving and 170 feet of sinking done, with satisfactory results. No. 1 adit starts between the outcrops of Nos. 5 and 6 lodes, and the former was cut at about 170 feet from the entrance. 12 feet beyond this another quartz vein was cut, not seen on the surface, and this has been called No. 5A. Both of these lodes are very small, and no work has yet been done on them. No. 4 lode was cut at 267 feet, and has been driven on on either side of the cross-cut, a total distance of 115 feet. Its course is almost due E. and W., with little or no underlay, and its width is from 18 inches to 2 feet, the lode-matter being principally crystalline quartz, containing a good deal of cassiterite and wolfram with occasional bunches of bismuthinite (sulphide of bismuth). In the east drive the lode has been left standing for a length of about 40 feet to avoid double handling, the bin at the entrance to the adit being full of ore. Connection has been made with the surface by a shaft 66 feet deep, sunk on the lode, which increases in size from the surface downwards, and is said to carry good ore all the way down. The old tunnel on this lode from the eastern fall of the hill mentioned in my former Report is about 25 feet above this level, but no further work has been done there. No. 3 lode was cut 93 feet from No. 4, but is small and broken, and does not seem worth driving on at this level. 50 feet further in No. 2 lode was cut, and connected with the surface by a shaft 86 feet deep. Only about 25 feet have been driven on this lode, which averages about 15 inches wide, and contains some good bunches of clean sulphide of bismuth, besides a fair percentage of tin ore, associated with wolfram. The adit has been extended 120 feet beyond No. 2 lode, and if continued should soon intersect No. 1 lode, which at the surface is about 6 inches wide. The country rock passed through is chiefly sandstone with bands of slate, but in the end it is hard quartzite.

From the bottom of the ore-bin, at the mouth of the adit, the track has been cleared and partly graded for a self-acting tramway, about 17 chains long, to the dressing-sheds, nearly 300 feet below, passing by the mouth of No. 2 adit. In this adit, which is 140 feet vertically below No. 1, No. 6 lode was cut at about 50 feet from the entrance, and has been driven on 320 feet. In the east drive it is about 15 inches wide, and in the west 18 inches to 2 feet in two branches, the general strike being about the same as the other lodes, *i.e.* approximately E. and W. The lode carries very good tin ore, in large crystals, and a good deal of wolfram ; occasionally a little sulphideof bismuth occurs associated with iron and copper pyrites, but this lode is not so rich in bismuth as Nos. 2 and 4. A little molybdenite has also been obtained. The gangue is principally quartz, but in places there is a good deal of fluor spar and chlorite, and sometimes kaolinised felspar, which on exposure to the weather crumbles and releases the crystals of tin ore. Where the lode was cut it is only about 35 feet below the surface, and going west along its course the ground is fairly level for about 150 feet, after which it gradually falls, and a shaft about 10 feet from the end of the drive connects with it in about 18 feet. A good pile of crushing-dirt, estimated to contain about 250 tons, has been obtained from this drive, and should give a very good yield of black tin. The adit will have to be driven several hundred feet before cutting No. 5 lode, but it is probable that another lode will be cut between these two. The three lodes which have so far been driven on have increased in width from the surface downwards, but it cannot be expected that they will continue to increase much more, and, as they are still small, it will be very necessary, when crushing is started, to keep the development work well ahead. It is probable that the lodes will eventually enter the granite below,

but at a depth which will not be reached for many years, if ever, though it is likely that the country rock will gradually become harder.

On the tramway track below No. 2 adit, a heavy brownish crystalline rock is seen, consisting almost entirely either of garnet or vesuvianite (probably the latter) this is evidently a product of contact metamorphism due to the intrusion of the granite, with which the lodes are undoubtedly connected. It may have been originally a limestone, which rock Mr. Montgomery, in his report on the district in November 1893, mentions as occurring further east at the Iris crossing. I noticed several small veins of felspar running through it, and in places it contains a good deal of magnetite. One interesting feature about this rock is that it contains a little sulphide of bismuth disseminated through it, and though I do not think that this is present in payable quantities it would be worth while, when the battery is running, to open out a face and make a trial crushing of 20 or 30 tons. If a lower adit is put in it will pass through this rock, and it is quite possible that another lode will be cut, which would probably be rich in bismuth.

The building for the concentrating plant has been erected, and has been made large enough for 20 heads of stamps, with jigs, Frue vanners, and buddles, but it is intended to erect only 10 head at first. Much of the tin ore is in coarse crystals, and a good deal could probably be saved by a roughing-jig, the dirt being first crushed with a stone-breaker or coarse rolls and passed through a revolving trommel before going to the battery. It will not be possible to separate the three minerals cassiterite, bismuthinite, and wolfram mechanically, but as a much better price is obtained for the metallic contents of each ore by itself than when all mixed together, it will probably be found that hand-picking can be advantageously carried on to a considerable extent and, for the same reason it would be advisable to treat the ore from No. 6 lode as far as possible by itself. The stamps and the vanners are to be driven independently by two Pelton wheels, and a dam has been constructed over 500 feet above the machinery site, estimated to contain between two and three million gallons. In dry weather there is very little water running into this, but a water-right of 10 sluice-heads has been taken up on the Weaning Paddock Creek, and it is proposed to bring this in, but the survey for the race has not yet been made.

From the dressing-sheds a sledge track about half a mile long has been made, connecting with the pack-track from Bell Mount. The first part of this is very steep, and a better grade could probably be obtained by a sidling track to junction with Hall's Track close to the five-mile peg. At present it is quite impossible to bring in any heavy machinery. On the Sheffield side, from the end of the formed road, the track has been cleared 20 feet wide to the foot of Bell Mount, a distance of about 3 miles. This is nearly all through good agricultural land, densely wooded, and would soon cut up with heavy traffic, unless corded or metalled. Round Bell Mount there is a hard bottom, and a good grade can be obtained, but a good deal of cutting will be necessary on account of the steep slope of the hill. Some two miles further on basalt country is again met with, and the present pack-track is in a very bad state. All underground work has been temporarily suspended pending the completion of the road and the subsequent erection of the machinery, but 8 men were employed at the time of my visit ground-sluicing the alluvial to the east of the Western Creek alluded to in my previous Report. The "wash," consisting chiefly of angular and sub-angular fragments of quartzite and sandstone mixed with decomposed basalt, is about 10 feet deep, and contains a little tin ore, wolfram, and carbonate and sulphide of bismuth all through it, the average yield at present being a little more than a bag of mixed ore per man per week, which more than covers working expenses. The ground was very heavily timbered, and work is a good deal hampered by the stumps and logs. In the wash occasional boulders carrying tin ore occur, the source of which is as yet quite uncertain. These boulders, some of which have to be broken up with dynamite, consist of glassy quartz crystals (often broken) and fragments of sandstone and quartzite (occasionally waterworn) cemented together with a siliceous paste. They have apparently come from an older cemented drift, but the crystals of cassiterite which are irregularly distributed through them are, as far as can be seen, quite sharp, and the boulders themselves are very little waterworn. To the south and west the country is covered with basalt, and there is good reason to hope that other lodes exist below this, and probably a deep lead, but these are questions which can well be left to a future time when the mine is better opened up.

A little ground-sluicing has also been done on Section 1963-93M, 80 acres, which is now held by the Shepherd and Murphy Company. The wash in the face is about 4 feet deep, consisting of angular fragments of sandstone, and gives very fair prospects of ruby and black tin. With a good supply of water this would probably pay to work, but owing to its elevation this would be difficult to secure. A small race has been brought in through a gap in the divide from the head of the Narrawa Creek, which is on the other watershed running into the Forth, but there is very little water, except in very wet weather. Water could probably be brought in from the Company's dam, but this is not justified at present, as the extent of the wash is unknown, and it is hard to prospect on account of the thick horizontal scrub.

Since my last visit several small lots of hand-picked bismuth ore and concentrates have been shipped to England and sold, and I am indebted to the kindness of the Manager, Mr. Sheargold, for copies of the account sales.

One lot of hand-picked ore, weighing 6 cwt., assayed 63·6 per cent. bismuth, the metal being paid for at the rate of 4*s.* per pound. A second lot, weighing 5 cwt. 2 qrs. 6 lbs., assayed 70 per cent. bismuth, which was paid for at the rate of 3*s.* 10*d.* per pound. The gross value of the two lots was £168 16*s.* 10*d.*, and the net proceeds received by the Company, £152 15*s.* 3*d.*, equal to £264 8*s.* 10*d.* per ton.

The following are copies of the account sales of the concentrates:—

103 bags (sold in Germany) weighing 5 tons net; assay value, 11·5 per cent. bismuth, 39·6 per cent. tin.

	£	s.	d.
Bismuth contents, 11½ cwts. at £19 18*s.* per cwt.	228	17	0
Tin contents, 1·98 tons, at £32 per ton	63	7	2
	292	4	2

Charges.

	£	s.	d.			
Smelting, at £6 10*s.* per ton	32	10	0			
Assaying, grinding, sampling, &c.	11	2	0			
Brokerage, commission, &c.	13	10	0			
Freight to Hamburg, dock charges, &c.	14	2	11	71	4	11
Net value received				£220	19	3

13 bags, weighing 13 cwts. 0 qrs. 26 lbs. net; assay value, 14·25 per cent. bismuth, 47·2 per cent. tin.

51 bags, weighing 2 tons 10 cwts. 3 qrs. 5 lbs.; assay value, 15·59 per cent. bismuth, 46·21 per cent. tin.

	£	s.	d.
Bismuth contents (2 lots), 9 cwts. 3 qrs. 6 lbs., at £19 18*s.* per cwt.	195	1	10
Tin contents (2 lots), 1 ton 9 cwts. 2 qrs. 23 lbs., at £38 5*s.* per ton	56	16	2
	251	18	0

Charges.

	£	s.	d.			
Smelting, at £7 10*s.* per ton	24	0	2			
Assays	3	3	0			
Brokerage and commission	11	18	0			
Dock charges, rent, &c.	2	2	4	41	3	6
Net value received				£210	14	6

No mention is made of the tungsten contents, but the price paid for the tin is probably regulated by the percentage of wolfram in the ore. The Manager is now hand-picking more closely, and dividing the concentrates into two classes, coarse and fine. I took samples from the concentrates on hand, which Mr. Ward, Government Analyst, has assayed with the following results :— No. 1. Coarse Concentrates—20 per cent. tin, 33 per cent. bismuth, 9·6 per cent. tungstic acid. No. 2. Fine Concentrates—34 per cent. tin, 6 per cent. bismuth, 14·2 per cent. tungstic acid.

The principal producers of bismuth in England are the firm of Johnson, Matthey and Co., of London, who treat most of the Australian and Bolivian ores, but their process is a secret. The usual method of separating the bismuth from the tin is to carefully roast the finely-crushed ore, so as to convert the sulphide of bismuth into oxide, and then digest the roasted ore with dilute hydrochloric acid. The oxide of bismuth dissolves, and the solution is then drawn off and diluted with large quantities of water, which precipitates the bismuth as oxychloride. Owing to the presence of iron and other impurities, it is generally necessary to dissolve and reprecipitate this once or twice, and it is then reduced to metal by smelting in graphite or iron pots with lime and charcoal. The wolfram remains undissolved in the original residue, together with the tin ore, silica, &c.: on smelting, part of it goes into the tin and makes it hard and less fusible; the rest goes into the slag, making it less liquid, and causing greater loss in tin, through the inclusion of prills. To separate it, the ore is subjected to a preliminary smelting in special reverberatory furnaces, with soda, salt or sulphate of soda, and the tungstate of soda which is formed is leached out with water. Considerable loss of tin is caused by the formation of sodium stannate; and it is said that this loss is not covered by the value of the tungstate obtained, so it does not seem likely that the hopes of being paid for the wolfram will be realised. Probably, however, when regular shipments of concentrates are made, the charges for smelting, assaying, &c., and other incidental expenses will be considerably reduced.

The company has now spent a considerable sum of money, and done a large amount of work, in opening up the mine, clearing, cutting tracks, &c. As before mentioned, the lodes are small; but, in my opinion, the developments are quite sufficient to warrant the erection of concentrating machinery, and I should advise the road being made as soon as the dry weather sets in.

Section 1815-93M, 78 acres.—The Shepherd and Murphy, No. 4 lode, has been traced into this section; and near the north-western corner a deep trench has been cut along its course, and the lode exposed for a length of about 150 feet. It is a well-defined lode, 15 to 18 inches wide, striking E. and W.,—the enclosing country rock being sandstone, striking about E.N.E. The lode-filling is chiefly quartz, affording fine specimens of smoky quartz crystals. It carries a good

deal of wolfram, and in places a little tin ore and native bismuth. So far as proved, it is nothing like payable, and no work is going on here at present, but it is worth further prospecting.

About three-quarters of a mile N.E. of this several sections have been taken up for gold, and a lot of trenching has been done, and several small shafts sunk, which are now all full of water, on a belt of gold-bearing sandstone, running about W.N.W.

On Section 970-93G, known as Packett's Reward, one man was at work dollying the surface-stone, which shows a little fine gold for a width of about 10 feet. There is little to distinguish the gold-bearing stone from the ordinary country rock, which is a friable sandstone containing small stringers of quartz; and in one trench a small quartz vein is seen carrying wolfram. A sample which I took from the bottom of the trench, across a width of about 6 feet, yielded 6 dwts. 12 grs. gold per ton. The stone is very soft, and this would probably pay to crush, if there were any large extent of it; but the experience obtained in a shaft sunk on the "formation" is against the probability of this. This shaft was sunk 30 feet, when water proved too heavy to cope with without machinery, and sinking had to be discontinued. Mr. Hemmings, one of the holders of the section, informed me that, at a depth of about 14 feet in the shaft, pyrites began to come in in the form of wedge, and at the bottom there was pyrites for the full width of the shaft. I took a sample by chipping from the most solid-looking pieces at the mouth of the shaft, but this assayed only 1 dwt. 15 grs. gold per ton. Doubtless the gold has been concentrated near the surface, owing to the decomposition of the pyrites and it does not seem very likely that free gold will be found below the water-level. Owing to the porous nature of the country, water is likely to be heavy, and the present prospects do not warrant the erection of pumping machinery. Towards the Narrawa Creek, however, the ground falls rapidly, and the "formation" could be tested at a considerable depth without much expense,—the country being very easy for driving.

Narrawa P. A.—This company holds sections 35-93G, 36-93G, 37-93G, and 40-93G, a total of 60 acres, of which 35-93G, 36-93G, 20 acres, lying a short distance north of Packett's, are reward claims for gold. The principal work done is on section 35, on which a tunnel has been driven about 135 feet in a general westerly direction along the course of a formation consisting of sandstone and quartzite heavily impregnated with iron, arsenical and copper pyrites, with, in places, a good proportion of galena. At 80 feet from the entrance a cross-cut has been driven 20 feet to the S., showing more or less sulphide ore all through the country. Above the tunnel the hill rises very steeply, and offers excellent facilities for working by means of tunnels should payable ore be discovered. On the surface the iron-stained capping has been trenched across in several places up the hill, and is said to carry a little free gold for a width of 30 or 40 feet. As far as would be seen it consists of quartz grains cemented together with oxide of iron, probably due to the decomposition of the pyrites, which have released the gold, and I consider the formation to be an impregnation rather than a lode. A sample which I took from some of the ore at grass assayed 2 per cent. copper, 5 oz. 17 dwts. 12 grs. silver per ton. and traces of gold. In driving it is quite likely that good bunches of ore will be found, but frequent assays should be made to determine the value of the ore.

Bell Mount Gold Field.—This field has been practically abandoned, though one or two men still make a living on it. Several good sized nuggets up to 16 ozs. in weight were found some years ago, and altogether a large quantity of gold has been obtained, but the source which shed the gold has not yet been discovered. Much of the country is covered with basalt, and it is probable that auriferous leads lie buried beneath this. Prospecting is also much hindered by the thick scrub, but the fires of last summer have now cleared a good deal of this, and the field deserves further attention from prospectors.

Leaving this district, Hall's track was followed for about two miles in a southerly direction along the basaltic plateau forming the divide between the Forth and Iris Rivers. This track then bears round to the west following the high land, and junctions with the V.D.L. Co's. road not far from their Middlesex Plains block. Another track bears to the east and joins the Middlesex Road close to the old Caledonian Gold Mine. One fair-sized creek, locally known as the Bull Plains Creek, was crossed at an elevation of about 100 feet above the Shepherd and Murphy Camp, and might be available as a source of power for that mine, being nearer than the Weaning Paddock Creek, but it is on the Forth watershed and it seems doubtful if the water could be taken across the divide. The track here passes through some well grassed open country, but it lies too high to be of much value, and at the time of my visit was covered with three or four inches of snow.

The Caledonian Mine has been abandoned for some years, and the 15-head battery, which must have cost a great deal to bring to such a spot, has been removed to the Golden Hill Mine near Lorinna.

The Middlesex Road was followed to the top of the Five Mile Rise, which, according to my aneroid readings, is 2000 feet above the bridge over the Forth at Lorinna: we then branched off and followed a blazed line along the ridge overlooking the deep gorge of the Dove River, and finally struck the pack-track made by the Devon S. M. Co. from their mine. For some distance past the Caledonian Mine the country consists of sandstones and grits, which further on are overlain by basalt, and near the Devon track granite is seen, which continues down to the Dove River.

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DOVE RIVER DISTRICT.

Devon Mine.—The Devon Silver Mining Company, No Liability, holds Sections 1831-93M, 1938-93M, 1939-93M, and 1940-93M, a total of 160 acres, and this is the only property in the district upon which any work to speak of has been done, progress having been very much hampered by the difficulties of access. The Dove River runs in a southerly direction through the centre of Section 1831-93M, on which the present workings are, the banks on either side being very steep, and in places quite precipitous. The only means of crossing the river is by a rough bridge made of fallen trees; this is often covered with water, the river rising rapidly after heavy rain, and it was partly carried away while I was there.

The principal country rocks are granite and quartz porphyry, with metamorphic slates and sandstones. The normal granite, which is composed of reddish felspar, quartz, and black mica (biotite) is plainly intrusive through the sedimentary strata, which are probably of Upper Silurian age, but it is not at present quite clear whether the quartz porphyry forms a dyke (elvan course) in the granite, or whether it is merely a marginal portion of the granite mass, but I am inclined to think that it is a dyke.

The sedimentary rocks have undergone considerable metamorphism, but the line of contact with the igneous rocks is covered with a thick talus of angular detritus.

About four chains from the northern boundary, and nine chains from the western boundary of Section 1831-93M, a tunnel has been driven 85 feet in a westerly direction about 25 feet above the level of the river. At about 40 feet from the entrance a small vein of gossan carrying a little galena and cerussite was passed through, and at 50 feet a lode was cut carrying about 9 inches of clean galena, but the ore soon cut out when driven on N. and S. In the north drive, which is in 25 feet, the ore made again in about 5 feet, but proved to be only a bunch. In the end it is making again, and there is about 9 inches of good ore in the back of the drive, but in the bottom it is very small; the country rock is quartz porphyry on both walls. Going south the lode was barren for about 12 feet, but near the end, which at the time of my visit was 21 feet from the cross-cut, there is very good ore showing in the back of the drive, cubical and fine-grained galena with a little copper pyrites, the clean ore being in one place about 18 inches wide, but in the bottom of the drive there is only a thread of galena. In the end the vein is split into two branches, each carrying a few inches of clean galena, and for the whole width of the drive there is a little pyrites through the porphyry with small strings of galena. I took a sample of the clean ore from the back of the drive for a length of about 6 feet, which assayed 1 dwt. 15 grs. gold, 87 ozs. 10 dwts. 20 grs. silver per ton, and 73 per cent. lead. The pyrites is also reported to carry gold, and I therefore took a sample across a width of about 4 feet 6 inches which is being saved for seconds, but this only yielded 6 dwts. 12 grs. silver per ton and no gold. The tunnel has been continued 35 feet past the drive in quartz porphyry all the way. Above the tunnel the hill rises at an angle of about 45°, and some high grade galena was obtained from an open cut along the outcrop, the point where the first ore was found, being about 100 feet N. of where it was cut in the tunnel, and about 60 feet above it. A trial parcel of 5 tons 18 cwt. from this cut was sent to the Dapto Works, New South Wales. This parcel assayed 66·6 per cent. lead, 71 ozs. 19 dwts. 19 grs. silver, and 4 dwts. 4 grs. gold per ton, the gross value being £90 19*s.* 3*d.*, and the net value at the works, £64 12*s.*; but the charge for packing the ore to Sheffield was £6 per ton, and freight to Devonport and Sydney had to be paid in addition to this, so that very little profit remained. About 10 tons of first-class ore have been obtained from the tunnel level, which will not be sent away until there is a better track to the mine. The ore in the open cut occurs in the same bunchy way as in the drive. From the frequent "slickensides" that are seen it is evident that there has been a movement of the wall-rocks, and the lode occupies a fault fissure. The section of the original fissure appears to have been a series of short curves, and by the movement of the walls relatively to one another small open spaces were formed which are now filled with ore, while at the same time the wall-rock was more or less shattered. I am of opinion that the lode will be patchy throughout both in strike and dip, the ore occurring in bunches or pockets rather in regular shoots, but it is likely that the bunches will be fairly frequent. In stoping it will be necessary to take out the whole length, as the ore is likely to make a few feet above even where the lode is barren in the back of the drive.

The course of the lode is nearly N. and S. approximately parallel to the hill, so that the steep rise of the latter is not of much advantage unless other parallel lodes be discovered further up. Of this there is some likelihood; and to the S.W. of the tunnel, about 200 feet above it, a vein of manganese gossan about 18 inches wide is seen, striking apparently a little W. of N. and underlaying E., which is worth further attention. Surface prospecting is rendered difficult, owing to the thick accumulation of detritus from the disintegration of the rocks above. No work has been done on the northern sections, and I did not visit them.

Going west from the tunnel workings, the river is again met with in about three-quarters of a mile, having taken a sharp bend, and the intervening ridge is about 900 feet high. Several sections have been applied for on the other side; and I was shown samples containing galena, cerrusite, and zinc blende, said to have come from a formation 11 feet wide, on one of these sections; but unfortunately, owing to the river being flooded, I was unable to get across to see this. The country rocks on the ridge consist of slates, sandstones, and grits, much indurated and altered to hornstone and quartzite, which in places stand out in precipitous cliffs, owing to their superior hardness resisting the influence of weathering. The general strike appears to be nearly E. and W., and the

dip at high angles to the N. There is no direct evidence as to the age of these rocks, but they are certainly as old as Upper Silurian, and may be Lower Silurian.

South of the Devon Mine several sections have been taken up, but no work was going on at the time of my visit, and very little prospecting has yet been done.

From general considerations, it may be said that the district is a likely one for the occurrence of minerals, consisting as it does of the older sedimenatry strata, traversed by intrusive igneous rocks; and, although granite is not generally supposed to be favourable for lead ores, the high-grade ore obtained at the Devon Mine should encourage further prospecting. Probably at a depth the galena will give way to copper pyrites. An effort should be made to trace the lode into the sedimentary rocks, in which it is likely to be more productive. The great bar to prospecting at present is the expense and difficulty of getting supplies. The pack-track made by the Devon Company is far too steep, rising 1500 feet in the first mile and a-half. The level of the Devon Camp is about 300 feet above the Forth Bridge at Lorinna; and, though the country is a good deal furrowed with deep gullies, it is said by those who know the country well that a good track could be obtained from the bridge to the Devon in five or six miles by following the Dove down to its junction with the Forth. A good deal of this would be in rotten granite, which makes an excellent track; and I should advise a rough survey of this being made at once. The present track joins the Middlesex Road on the Five Mile Rise, 1400 feet above the Lorinna Bridge.

FIVE MILE RISE GOLD FIELD.

Glynn Mine, Sections 720-93M, 721-93M, 1010-93M, and 1011-93M, a total of 30 acres.—Until recently this mine was worked by tributors, who at considerable expense erected a small five-head battery and portable engine. The workings are situated on Section 1011 at an elevation of nearly 2000 feet above sea level, and the tributors got out several small crushings from an open cut about 85 feet long along the reef. The last 55 tons crushed, of which 35 tons were classed as seconds, yielded 19 ozs. of gold. The reef runs a little W. of N. with a slight underlay to the W., and the enclosing country rocks are slates and argillaceous sandstones dipping at very low angles to the north, and striking nearly E. and W. To the N.E. the country is covered with basalt, which in places has a vesicular structure, and contains abundant zeolites. From the end of the tributors' workings a winze was sunk 16 feet and connected with a shaft 35 feet deep sunk on the top of the ridge to the west of the line of lode, and the country in the cross-cut between the shaft and the winze is said to have carried a little fine gold throughout; but all these workings are now inaccessible. Above the open cut are several large isolated boulders of conglomerate said to contain a little gold, but I do not consider these of any importance, except as showing that the older rocks from which they were derived were gold-bearing. The company has now resumed work, having bought the tributors out, and a tunnel has been driven west about 25 feet below the old workings, the lowest point available to serve the battery at the present site. At 49 feet the reef was cut about 3 feet wide, and has been driven on N. about 26 feet, but it had pinched a good deal in the end when I saw it. The reef may be called a "mullocky" one, consisting chiefly of crushed country rock with rubbly iron-stained quartz. Very fair prospects of fine gold can be obtained with the dish, but the gold is said to be of very poor quality, being worth only about £2 10*s.* per ounce, owing to the large proportion of silver. Comparatively little stone is available above the present level, but quite sufficient to prove whether it can be treated at a profit, which there seems good reason to hope, as it can be cheaply mined and easily crushed, and a yield of ½ oz. per ton should pay all expenses; doubtless, too, better results will be obtained when the battery, which is now exposed to the weather, is covered in. I consider that the reef is likely to live down, but it is probable that below the water level there will be a considerable percentage of pyrites, and a winze should be sunk to ascertain this. Water for the boiler and for battery purposes is very scarce in summer. A small steam-pump has now been obtained, and it is intended to pump the water from the so-called Big Creek, which runs close to the battery, about 25 feet below it, but I believe there is very little water in this creek in very dry weather. Several chains lower down the creek a little work has been done on a quartz formation carrying a large proportion of iron pyrites which is said to contain silver, but the old prospecting drive was inaccessible, and no opinion could be formed as to the size and probable value of the formation.

Golden Hill Mine, Sections 348-93G, 349-93G, 350-93G, and 351-93G, 10 acres each.—These sections lie a short distance to the west of the River Forth, near the bottom of the Five Mile Rise; and, till recently, were worked privately. A good 15-head battery, which formerly stood at the New Caledonian Mine, has been erected close to the river; and this is connected with the mine by a wooden tramway about half a mile long, having a fall of about 200 feet. The country rocks are very similar to those at the Glynn Mine, consisting of fine-grained sandstones and slates, lying very flat, and striking about E. and W.; but I saw no sign of any fossils which would indicate their age.

The present company is working in a drive started by the former proprietor, who drove a tunnel a total distance of 317 feet, in a general south-westerly direction. At 287 feet a lode formation was cut, which has been driven on about 70 feet to the S.E.,—the strike being about S.E. and N.W., underlaying S.W. The ore consists of iron pyrites and zinc blende, in places very free from gangue, but generally disseminated through a hard siliceous matrix, and on the hanging-wall is a small oxidised vein carrying a little free gold. The lode-channel appears to be a true

fault-fissure, originally partly filled with crushed country rock, which has been silicified by percolating solutions, which at the same time deposited the sulphides. At 165 feet from the entrance a vein of oxidised lode-matter was passed through, which seems worth following; and, since my return, I have been informed that what is probably the continuation of this has been found on the surface, 60 feet above the tunnel. Where cut, it is said to show about 3 feet wide of gossan; and a trial crushing of 12 tons, taken from an open cut, yielded half an ounce of gold per ton. A small creek runs to the N.E. past the mouth of the tunnel; and a short distance up this, W.N.W. from the mouth of the tunnel, a seam of blende and pyrites about 2 feet wide is seen in the face of a cliff, cutting right across the bedding of the country. This is probably a continuation of the lode worked in the tunnel.

At the time of my visit, a trial crushing of 50 tons was being taken out from the tunnel-level, and the battery was crushing with eight heads. I have since heard that the 50 tons yielded 11½ ozs. of gold from the amalgam; but the stone contained a large percentage of pyrites and blende, and the sands have been stacked for future treatment. I took a sample from the launder at the bottom of the plates, which gave, on assay, 8 dwts. 4 grs. gold per ton. Below water-level it is probable that there will be little or no free gold; and the future success of the mine largely depends on the treatment of the sulphides. They could be easily concentrated on a vanner or rotating table; and a fair bulk sample should be taken from the accumulaled sands, and carefully washed and assayed, to ascertain if this would pay.

Alluvial Workings.—A good deal of alluvial gold has been obtained from the Five Mile Rise at various times; but the difficulty of obtaining a permanent supply of water has always been the great drawback.

To the east of the Glynn Mine, Mr. O'Rourke has an alluvial claim, on which he has done a large amount of work. He has a water-right of 2 sluice-heads on Big Creek, and this is brought in by a race about half a mile long into a small dam, from which a line of pipes conveys it to the face; but the pressure is not sufficient for effective hydraulicking, and the supply is very poor in summer. The "wash" consists of angular fragments of sandstone, and in the highest face is about 16 feet deep, with one or two hard bands of ironstone cement. The bottom consists of slate and sandstone, with a very flat dip. The gold is mostly coarse, and very little water-worn; and the appearance of the "wash" shows that it has not travelled far, but no reefs have yet been discovered which could have shed the gold.

A little gold is said to be obtainable nearly everywhere from the surface-gravel formed by the disintegration of the bottom "in situ," and it is probable that this is largely derived from small stringers in the country; but there is still a good chance of discovering a payable quartz reef.

MOUNT CLAUDE.

Very little work has been done here since Mr. Montgomery reported on the district in 1893, and all the ground was afterwards forfeited; but attention is again being directed to the locality, and several sections have been recently taken up again. The long tunnel started by the Mount Claude Silver Lead Mining Co., and continued in turn by the Southern Cross Proprietary Silver Mining Co. and the Kentish Proprietary Silver Mining Co., was extended to 850 feet, and again abandoned. The end is in hard crystalline limestone, and I could see no sign of any lode formation corresponding to the gossan outcrop on the surface. This section, formely 90-87M, is now numbered 2093-93M, having been recently taken up on the old lines in the name of W. D. Tune, and I believe a company has been formed in Sheffield to work this, the intention being to sink a shaft on the line of the gossan outcrop west of the line of the tunnel, but operations had not been started at the time of my visit. The old workings higher up the creek were inaccessible, owing to a flood in the creek. The strata are here seen to be very much crumpled and folded, and it is impossible to see what is the normal strike or dip. All the high peaks are capped with coarse conglomerate, the beds of which are, in places, seen to be also much curved and folded, but it is not quite clear whether they belong to the same age as the sandstones, slates, and limestone seen lower down, or whether they are younger than these, and rest unconformably upon them.

The only work that was going on at the time of my visit was on the north side of the Mount Claude Creek, about 10 chains from the end of the old tramway. A hole has been sunk close to the line, and for a width of seven or eight feet there are several small veins of galena up to 3 inches in in thickness, with a little iron and copper pyrites and zinc blende, and the country rock is all more or less mineralised. The apparent strike of the veins is about S.E. and N.W., with a slight underlay to the N.E. into the hill, but from the nature of the occurrence they are likely to be very irregular both in strike and dip. Below the tram to the S.W. the ground falls rapidly towards the Mount Claude Creek, and a tunnel had just been started which, in about 30 feet of driving, should intersect the veins seen above at a depth of about 25 feet; but it would be advisable to continue the tunnel until clean country is met. In the approach to this tunnel small strings of galena are seen, and there is also a good deal of galena finely disseminated through the country rock, which is a hard metamorphic sandstone or quartzite. Forty feet lower down several small veins of galena and copper pyrites are seen in the joints of the country at the foot of a perpendicular cliff. The country has evidently been shattered and permeated by mineral bearing solutions for a considerable width, and the formation partakes rather of the nature of a stockwork than a

lode, but it is quite possible that at a depth a clean fissure may have been formed, in which case the ore would probably be more concentrated. Several tons of good concentrating ore have been obtained from the cut near the tram, and picked samples are reported to have assayed from 60 to 71 per cent. lead and 42 to 58 ozs. silver per ton, with traces of gold. One sample, described as quartz only, without any visible ore, is said to have yielded 9 per cent. lead, 8 oz. 6 dwt. 4 grs. silver per ton, and 3 dwt. 6 grs. gold per ton.

Further S.E. at the foot of a cliff above the tram a rather promising looking vein of coarse and fine grained galena with a little copper pyrites is seen, and a sample which I took from here assayed 72·6 per cent. lead, 39 ozs. 4 dwts. silver, and 1 dwt. 15 grains gold per ton. A good deal of first-class ore could be picked from the small veins of galena, but no dependence can be placed on the continuance of any individual vein, and the proposition is at present mainly a concentrating one, but one which seems to offer very fair prospects of success. I do not know how much water the Claude Creek carries in summer, but it drains a good deal of country, and judging by the amount of water in it at present, it seems probable that a good supply could be obtained for concentrating purposes. There are good facilities for mining by means of adits, and the ore could be cheaply carted to Railton *viâ* Sheffield, a distance of about 23 miles. There is a good road from Sheffield to the agricultural holdings near the head of the valley of the Dasher River, and from here to the old Mount Claude tramway a good road could be made at small expense. The Lorinna road branches off about a mile and a half from the tramway, and passes over the top of Mount Claude and Oliver's Hill (a continuation of Gad's Hill.) The machinery for the New Caledonian and Glynn batteries was taken over this road, but at very great expense. Going over Mount Claude it is very steep, rising over 1100 feet in about two miles, and from the top of Oliver's Hill down to Lorinna there is a fall of nearly 1800 feet in under four miles. The road has only been formed in places, and the grades are so steep that the water soon wears deep channels, making it quite unfit for wheeled traffic. On the Forth side there is some good agricultural land, densely wooded, but I do not know what extent there is. The level of the Lorinna Bridge is only about 200 feet below that of Sheffield, and it is probable that a much better route for a road could be obtained by keeping as close as possible to the river, but, from the broken and rugged nature of the country, this is likely to be a very expensive undertaking, not justified by the present development of the mines.

I have the honour to be,

Sir,

Your obedient servant,

J. HARCOURT SMITH, B.A.,
Government Geologist.

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

WILLIAM GRAHAME,
GOVERNMENT PRINTER, TASMANIA.