

REPORT ON THE MOUNT FARRELL
DISTRICT.

*Government Geologist's Office,
Launceston, 20th December, 1900.*

SIR,

IN accordance with your instructions, I left Zeehan on the 7th June to examine the mineral country which is being opened up on the flanks of Mount Farrell, and now have the honour to report to you the results of my inspection.

The route which I took from the Pieman bridge, on the Emu Bay railway line, was the pack track which runs along the south side of the Pieman for five miles, and crosses the Murchison River by a suspension bridge half a mile above its junction with the Mackintosh. The township of Farrell, consisting of a good hotel, two or three stores, and a dozen cottages, is situate on the button-grass plain at the edge of the timbered west slope of Mount Farrell, about half a mile east of the Murchison River bridge. The population of the township and the surrounding district is about 100. A progress committee has been formed to press upon the Government the claims of the township and mines for tracks and improvements generally. Snow lies on the ground in winter, but the aspect is open, and the climate more genial than many West Coast districts, in every way favourable for the cultivation of grass and vegetables. The button-grass, no doubt, covers worthless soil, but the good fern soil of the mountain slopes, when cleared and tilled, ought to yield abundant crops. In this respect there are few mining fields on the West Coast more favoured than Mount Farrell.

Fine weather prevailed during the week I spent here, consequently, I did not see the Pieman track at its worst. I saw, however, that it would get into an impassable state after a little rain, and that it would not bear more traffic than was going over it, unless repaired

and improved in places. I understand this has since been done, but at the time of my visit the transport of ore from the North Farrell mine was being impeded by its condition, 80 tons having accumulated at the mine. The North Farrell Company was having a horse-tram line surveyed five and a half miles to the Emu Bay line, but has since commenced the survey of a steam tramway, which will connect with the railway at the 21-mile, north of the Pieman bridge. I believe this will be about eight miles in length, and its construction will relieve that company considerably, for ore was being bagged at the rate of two or three hundred bags per week, and not more than half this quantity could be packed out weekly. The cost of packing to the Pieman bridge, viz., £2 5s. per ton, is an item which can only be borne by high-grade ore. The other companies carrying on work in the district will also be confronted by the same difficulty directly they begin to produce. Even if they connect with the North Farrell tramway, it is not certain that they would be able to arrange satisfactorily with that company for the transport of their output. If an arrangement of that sort could be made, it would perhaps be the best for all parties. The alternatives are for the Government to construct a tramway for the service of both mines and township, or to widen the present pack track and convert it into a road for wheeled traffic. Storekeepers and others residing on the township favour a macadamised road, as answering their requirements better than a tramline. On the other hand, ore transport can be effected more speedily and economically by means of a tramway. The construction of a road would not secure a sufficiently cheap carriage to satisfy mines producing ore of low grade, and as I understand the Emu Bay Company contemplates removing its Pieman station further up the line on account of the gradient, some other route would have to be found for a high road. If matters improve at the Farrell mines, the town will become more important, and sooner or later a cart road will be requisite.

A pack track has recently been formed from Farrell to the Murchison River cage, three miles to the south-east, and this will serve the mines on the Central Farrell, Murchison, North Murchison, and Osborne sections,

and, if continued, would lead to mineral country still further east. This was only a footpath when I was there, but has been widened by the Government since to enable miners to get their supplies to the ground.

Innes's track goes north from the township along the western base of the mountain, supplying the North Farrell, Farrell-Mackintosh, Mackintosh, Metropolitan, and other sections. This track was being corduroyed at the time of my visit, as between the township and North Farrell Mine it was in a shocking state.

Mount Farrell is a north and south ridge, one of the summits of the West Coast range, rising to a height of about 1500 feet above sea-level, and 1000 feet above the plain at its western base. It occupies the angle formed by the Sophia and Mackintosh rivers, and was named by Mr. A. Montgomery after Mr. Farrell, the pioneer prospector of this district.

The Mackintosh and Murchison rivers west of the town are running between rocky walls of a metamorphosed grit, the kind of ancient sediment generally called greywacke. In some cases, in the bluffs overhanging the river west of the Mackintosh sections, carbonate of lime has been dissolved out of the rock, and re-precipitated in the form of stalactites and stalagmite. A few hundred feet further east the greywacke is succeeded by talcose slate or schist, which in its turn gives way to a belt of dark slate 200 feet and upwards in width, bounded on the east by schists, which are uncomformably overlaid by horizontally bedded conglomerate, forming the cap of the mountain. This conglomerate is the same as that which almost invariably caps the other summits of the West Coast range, and is of Devonian or Lower Carboniferous age. The slates and schists are presumably Silurian, and possibly Lower Silurian, for Mr. Montgomery noted blue limestone in the bed of the Mackintosh, a short distance above its junction with the Sophia River, charged with fossils of the Gordon River series. This limestone strikes N. 5° E., and dips E., which would make the mountain an anticlinal, as the normal dip of the strata on the west side of Mount Farrell is to the west. This anticline, however, is not what might be expected. The general strike of the slates and schists is a few degrees east of

north, though locally, here and there, it may vary to west of north. At the south-eastern end of the mountain, following the Murchison River, the familiar quartz-felsite (quartz-porphry) of Red Hills, Jukes, and Darwin, comes in, containing similar deposits of copper pyrites. The felsite here looks fresher, and is rather coarser, than on Darwin. Possibly its occurrences in this district may help better to the elucidation of its relations to the surrounding rocks than the exposures further south.

The zone of slate on the western slope is kindly promising country for silver-lead ore. This belt, interrupted occasionally by bands of greywacke, runs through the South Murchison, Murchison, North Murchison, Central Farrell, Mount Farrell, North Farrell, Mackintosh-Farrell, and Mackintosh sections. The galena lodes are, as a rule, veins and sheets of quartz in the partings of the slates, but now and then they do really cross these in the underlay. Thus their bearing is generally east of north. Pyrites and carbonate of iron are associates of the galena, and, at the southern end of the field, zinc blende and copper pyrites. During the last few days stannite has been detected by Mr. F. W. Petterd in the galena of the Central Farrell. This is a further demonstration of the connection of the ores on the West Coast with underlying granite. The Mount Farrell is the second district in the Colony from which this interesting mineral has been recorded. Some fabl ore has been isolated from galena in the North Farrell Mine, assaying 41ozs. silver per ton.

As may be expected from the way in which the ore makes in the partings of the slate, thinning out, disappearing and again thickening irregularly, the field is not traversed throughout its length by one or more master lodes filling defined and continuous fissures. The lode on the North Farrell section is the nearest approach to it. The lodes, as a rule, are *en echelon*, on parallel meridians, so that they cannot always be traced from one section into another. Moreover, there are walls beyond walls, parallel laminations of the slate enclosing ore outside the lode driven upon. This irregularity has caused disappointment in one or two of the mines, but the ore may make anywhere in the slate, and it is highly

probable, in fact, almost certain, that each and all of the slate country sections possess galena deposits which would be disclosed by exploratory work.

North Mount Farrell Mine.

Sections 3262-93M, 76 acres, and 4116-93M, 68 acres, Josiah Innes, Manager. The workings are on the 76-acre section, half a mile north of the township, and the mine is at present the only one on the field which is shipping ore regularly.

The lode passes through the section with a mean bearing of N. 20° E., and its enclosing rock is slate. By trenching, the lode-channel has been shown to continue over a thousand feet through the property. For the most part the lode seems to be parallel with the slates, but in one instance, at least, I noticed that it crossed them at an angle of 10°. As a rule, I believe it to run with the bedding planes of the country, but whether it does so or not, does not matter so long as it is metalliferous. I found three levels driven on the lode.

No. 0 is an upper drive 70 feet on its course, going south. Just inside the entrance on the east side a 9-inch vein of galena goes off into the country. On the footwall is a good two-inch vein of metal, and good ore, also, on the hanging-wall, goes underfoot. The end of drive carries two feet of lode material with 4 inches of clean ore. The lode-channel here is filled with curly slate, and the footwall is better defined than the hanging-wall. The drive is certainly following the ore, but it may very well be leaving some behind on the hanging-wall side. Further back in the level the hanging-wall is much more to the west, and carries ore. When the drive is a little more advanced, a crosscut west ought to be put in to prove the width of the ore-channel. The end is now only 20 feet from surface, but where the lode has been trenced 430 feet south of this, 150 feet of backs can be obtained.

No. 1 is the tunnel below the preceding, and, at 70 feet in, cut the western wall of the lode formation. At this point there is a 7-inch seam of carbonate of iron and galena: on the footwall side is a dig of 4-inch pug, assaying 5 per cent. lead, 19½ ozs. silver, 10 dwts. gold.

The tunnel was continued through slate 40 feet further in. Behind the end is a vein of galena crossing the country, and this part of the tunnel is seamed and patched with carbonate of iron and silver-lead ore. Eighteen feet east of the footwall is another dig, the intervening country being lode-slate, with some galena and carbonate of iron, not reported as lode, although mineralised. I noticed that the slate all through the tunnel is traversed by small leaders of galena. North and south drives have been put in from the tunnel: the principal level is the south one. It had been driven 116 feet on a good lode. At 35 feet a rise was put up 51 feet, and the ground thus opened up has been stoped, yielding good ore. In the end of the level are ten inches of solid galena; the width of the lode here is 3 ft. 6 in. The country-rock east of the drive also shows good ore. Below the rise a winze connects with the level underneath. At 76 feet from the flat sheet a branch vein goes off a little south-east, carrying good galena seams, and forming passable concentrating stuff. This branch is really part and parcel of the lode, which may be described as 11 feet wide, containing small veins in all directions, after the manner of a stockwork. Since my visit, Mr. W. B. Cocker, the legal manager, tells me that at 119 feet in this level a crosscut has been driven 106 feet, intersecting first at 24 feet, a vein of galena, assaying 80 per cent. lead, and 110 ozs. silver, proving the lode formation to be 39 feet wide; and at 100 feet, intersecting No. 3 lode, which sampled 73 per cent. lead, 51 ozs. silver, and 70 per cent. lead, and 144 ozs. silver. At 135 feet in the level, a second rise has been put up recently (42 feet) to level No. 0, and passed through a good body of high-grade galena. A winze 34 feet south of flat sheet also passed through good ore 2 ft. 6 in. wide.

The north drive from this tunnel carried only a little ore for half a chain in length. The lode dies away or rather deteriorates towards the north end, where it is represented by seams of carbonate of iron and the dig. The drive had better be continued further north to come over where the lower tunnel intersects the lode.

In going up from this level to No. 0, some seams of galena are seen in the side of the track, which have not been cut in any of the tunnels. They pass down outside

the entrance to where the concentrating stuff is being put.

A hundred feet below the preceding is the No. 2 tunnel, which has been driven east across slates dipping west. In the slates are laminae and bunches of quartz. Before intersecting the lode at 238 feet, a few stringers of ore were cut in the last 30 feet. The underlay of the lode is about 1 in 6 to the W., and where it was cut the ore-vein was 7 inches wide. After cutting it, the tunnel was continued about 14 feet further through slate much seamed with quartz, and a little splashed with galena. These seams, in the end, are perhaps a couple of feet wide in the aggregate. The north drive on lode is 35 feet long. In this direction the lode thins out to two inches on the footwall. The lode-channel, however, is five feet wide with a dig on the hanging-wall, and is filled with lode-slate and flat veins of quartz, carrying fine pyrites. Water is flowing down footwall. Where the lode was cut, no wall was showing. The south drive was 130 feet in length, and some nice fine-grained galena showed under-foot, at its entrance. At first the lode runs with the country, and then seems to cross it. At 81 feet in this drive is a rise to No. 1 level, and Mr. Cocker informs me stopes are now opened out from the rise, both north and south. Along the drive there is a good deal of quartz on the footwall side, and the walls are not at all well defined. In the end the channel is six feet wide, and the dig still continues on the hanging-wall. No foot-wall noticeable. Four to six inches of solid fine-grained ore, and veins of ore 2 to 3 inches wide through the rest of the slate, with the usual seams of carbonate of iron. This end is improving rapidly. I am told that the ore has since widened out to 2 feet of firsts, and 3 feet of seconds. Behind the end I observed a vein of copper ore going out east as a spur, also spurs of galena running into the country. I think a crosscut is needed here to prove the country on the east side of the lode.

A 320-foot tunnel is to be started directly. I am indebted to Mr. Cocker for the following figures, which cover a period of ten months to the 31st October last.

The output has been 400 tons of galena (firsts) = 8113 bags, of which 5113 bags have been sold, realising £3271 14s. 8d. net at Pieman Bridge station, and

650 tons concentrating ore. The average price realised at Pieman station has been between £12 and £13 per ton.

The mining manager estimates that the ground between No. 2 level and surface is worth 2300 tons first-class ore, which, at £12 per ton, would be worth £28,000; and he further calculates that 10,000 tons of dressed ore (also worth £12 per ton) ought to be obtained from concentrating material contained in the same block of lode. The estimate may come out all right, as it has no doubt been made as carefully as possible, but it is more useful as giving some general idea than as a precise calculation of fixed quantities, which I consider cannot be made yet.

The company will have, in the near future, to consider the question of concentration. The present system of shipping firsts only, a necessity, perhaps, in the early stages of most mines, cannot be continued indefinitely without prejudicing the prospects of the mine, and eventually imperilling its existence. The prospects of this mine are so encouraging, and its success of such importance to the district as a whole, that it is to be hoped wise counsels will prevail. By the time the tramway is nearly ready, the drives will have been extended further, and the ground between the levels blocked out by rises and winzes, and then the construction of a small dressing mill must be taken into careful consideration.

The sale assays of North Farrell ore are given herewith:—

1899.		Weight.				Assay.		Prices.				Net Realisation at Pieman.				
						Silver.	Lead.	Lead.	Silver.							
		Tons.	cwt.	qrs.	lbs.	ozs. dwts.	Per cent.	£	s.	d.	s.	d.	£	s.	d.	
Oct. 16.....	60 Bags	3	5	0	3	55	1	54·4	15	15	0	2	2 $\frac{3}{16}$	24	18	11
Dec. 25.....	430 "	20	19	0	14	70	10	63·4	17	1	3	2	3 $\frac{3}{16}$	225	19	3
1900.																
Jan. 6.....	249 "	12	7	3	3	65	0	66	16	10	0	2	3	178	10	7
26.....	69 "	3	5	0	0	60	0	63	16	0	0	2	3	40	13	2
Mar. 7.....	795 "	39	12	2	25	71	0	62	16	10	0	2	3 $\frac{7}{16}$	505	2	6
May 11.....	292 "	14	10	0	23	74	0	64	16	15	0	2	3 $\frac{9}{16}$	196	18	5
June 27.....	790 "	38	4	3	16	54	0	51	17	7	6	2	4	359	1	3
Aug. 11.....	629 "	33	1	0	9	64	0	62	} 17	12	6	2	4 $\frac{1}{16}$	} 151	12	10
	222 "	11	11	3	1	59	0	69								
Sept. 27.....	360 "	19	1	3	6	73	0	73	} 17	15	0	2	4 $\frac{1}{2}$	} 307	5	7
	458 "	24	1	3	21	67	0	62								
Nov. 8.....	84 "	4	4	0	0	64	0	56	} 17	10	0	2	5 $\frac{1}{4}$	} 51	5	6
	116 "	5	14	2	24	66	0	67								
	559 "	29	6	1	0	65	0	61								

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From this it will be seen that the average ratio of silver to lead is 1 oz. to 1 per cent. The ratio of 1 or $1\frac{1}{2}$ oz. may be taken as the average for the field, notwithstanding special assays of some of the ore from Mount Farrell and Central Farrell mines have given a higher figure.

Mount Farrell Mine.

This property comprises three sections, 2410, 2409-93M, 80 acres each, and 3261-93M, 75 acres, Josiah Innes, manager. The sections are just above the township, and in a good position for adit driving. The mine was started last year on the discovery of a lode cut in some surface trenches, where small quantities of galena were found in oxidised slate.

A tunnel has been driven below this outcrop, and the first metal was cut at 105 feet in. Splashes of galena occurred all through the rock for 15 feet, running horizontally with a 3-inch seam of carbonate of iron. This seam looks as if it might be a continuation of the lode on the North Farrell. I shall return to this question later.

The first drive on the lode is 53 feet north and 13 feet south. The north drive follows a splendid footwall, the best seen in the district, carrying a pug lode with it, and about 12 inches good galena at one place. This ought to be risen upon. After driving through this bunch, the lode contracts and the metal dies out. In the end of the drive there is pug on both walls, carrying a little disseminated galena. A south drive has been put in for 15 feet in slate along the footwall. The pug in the end carries a few specks of ore. The strike of the lode at the beginning of the drive north appears to be different from that of the slate, but afterwards becomes parallel. In the tunnel, 7 feet behind the intersection, there is a soft dig, but no metal, though there is a little galena in the slate all through.

At 182 feet a little ore was struck in the sole of the tunnel, and close to here a small boxful of ore was taken from a seam. This showed some fahl ore. At the time this was thought to be the hanging-wall of the lode, and for 15 feet eastwards the slate is more or less mineralised. At 197 feet a drive N. was put in 101 feet, and another

one S. 15 feet. Good ore was met with in a bunch in the sole of the north drive. The quality left nothing to be desired. Samples assayed by Mr. Latta returned—

Lead, 51.6 per cent.; silver, 208 ozs. 3 dwt. per ton.
" 71.2 " " 98 ozs. 4 dwt. " "

and by Mr. Allom—

Lead, 73.8 per cent.; silver, 165 ozs. 9 dwts.; gold, a trace.

Unfortunately the drive went through it, and a 7-foot hole sunk on it proved it to be only a bunch. The end of the drive is in tight curly slate, showing a good deal of quartz, and a little way back some mineral is visible in the roof. At surface, 80 feet above the ore-bunch, I saw a soft dig in the trench corresponding with the lode-wall below. I should certainly say that the drive is on the track of the lode, in spite of the absence of vein-stuff. The clean wall which is carried through on the east side of drive continues without a break. At the surface this lode has been trenched to the north boundary, where it was 8 feet wide, with a little galena and some bands of carbonate of iron. The trenches seem to establish the continuity of the line as far as the north boundary, and some trenches on the North Farrell section show a prolongation of the same country, and it may be that the two lodes are identical, as they are claimed to be, though, on the ground, it looked to me as if the Farrell were east of the North Farrell lode. In this belt, where the deposition of ore has largely followed the lines of bedding, I do not attach much importance to the identification of one lode with another in adjoining sections. The channels will not be continuous, but will give out and re-appear on different parallels, and this necessitates a good deal of cross-cutting and driving in the way of exploration. The Mount Farrell Company has been unfortunate in not coming across a good run of ore, but need not despair, as such runs may be met with in any part of the section, and at any depth.

A lower tunnel was being started to intersect the lode 180 feet below the surface trench. This has since been driven for 92 feet, but a bed of hard quartzite or grey-wacke being encountered at 59 feet, and continuing, the

adit was stopped, and another one begun 70 feet below the upper tunnel. It has now been driven 160 feet, and has passed through beds of talcose and graphitic slate, with carbonate of iron, galena, copper, and iron pyrites. It is expected to cut the lode in 330 feet, and then a drive of 80 feet north will bring it below No. 1 adit.

Ten chains from the S.W. corner of the same section (2409) is a large white quartz reef about 40 feet wide, which projects boldly some 30 feet from the surface. It carries a little iron pyrites, and the country should be cut into on each side to see whether any mineral is associated with the quartz. The metals most likely to occur in it are galena and copper. This reef might be intersected in depth by continuing the present tunnel between two and three hundred feet further; but there is hardly sufficient inducement for this in view of the reef being barren at surface. A shorter adit could be put into it at a much shallower depth, about 40 feet. The Farrell Company deserves credit for sticking to its mine after the initial disappointment might well have led to a despairing policy.

Mr. J. L. Foley, the legal manager, has kindly supplied me with the following list of assays of ore from this mine. The normal silver ratio is $1\frac{1}{4}$ — $1\frac{1}{2}$ oz. to the unit of lead. The higher rates of silver are exceptional, and only show that some variability exists.

Date.	By Whom Made.	Description.	Silver.		Lead.	Copper.	Sample No.
			oz.	dwt.	Per cent.	Per cent.	
1899.							
May 18	Mr. G. J. Latta	Fahl ore and galena	41	3	44.7	2.8	...
"	"	Fine-grained galena	98	4	71.2
"	"	Coarse-grained galena ...	208	2	51.6
"	"	Pug	37	9	23.7
" 30	"	Galena	88	18	42
June 20	Mr. A. Allom	"	165	9	73.8	Gold. Trace	1
" 27	Dapto Smelting Works...	"	158	0	71	1½ dwt.	1
Sept. 20	Mr. G. J. Latta	Fine-grained galena	99	12	63.4
"	"	Coarse-grained galena ...	78	15	67.8
"	"	Pug	69	12	37.2	...	2

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Eleven bags of ore were picked from the material obtained in the course of sinking shaft to a depth of 62 feet about 1000 feet north of No. 1 adit, and about 500 feet from northern boundary. A drive N., was opened out from this shaft. At times this drive contained as much as from two to four feet of concentrated ore mixed with bunches of firsts. Short crosscuts were put in E. and W. from the drive through slate and schist country, with veinlets of galena and some pug. The Government Analyst's assay of the ore is 82 per cent. lead, 70 ozs. 11 dwts. 4 grs. silver.

Farrell Mackintosh.

This is west of the North Farrell, Section 3262, and comprises 80 acres, 2935-93M, in the name of J. T. Smith. No work was going on here at the time of my visit, and I believe nothing has been observed beyond disseminations of galena, but if the galena lode of the adjoining Mackintosh property continues, it will come into this block from the north. Prospecting is necessary here.

Central Farrell Mine.

Section 4817-93M, 80 acres, north of and adjoining the North Murchison. T. A. Petrie, Manager.

The slate country is well developed in this section, and the lode, where trenched at surface, is of a highly encouraging nature. The lode channel in the trench is a band of broken slate, 5 feet wide, twisted with quartz and carbonate of iron, and carrying a vein of bright medium to fine-grained galena, 2 to 3 inches wide, lying on a good slate footwall. Lode and country slate dip W., and have an identical strike. Wherever lenticles and nests of quartz occur, I notice that the slates become twisted, evidently a local mechanical deformation. This lode has been supposed to be the same as the North Farrell lode, but this is manifestly impossible, it lying very much further east than that lode. The North Farrell lode is very violently treated, if it is twisted to correspond with all the lodes, which, on this field, are claimed to be its continuation.

Since my visit, Mr. E. Gaunt, the Legal Manager, informs me that the tunnel is now 220 feet in, and at 144

feet a lode (No. 1) has been cut, and driven north upon for 148 feet. The main lode is supposed to be still ahead. According to information received from the company, the metal in the No. 1 lode assayed 407 ozs. silver, 64½ per cent. lead. When first cut, the lode was 20 inches wide, but is now broken up into milling ore. There are 100 feet of backs over this tunnel, which will give additional 80 feet in another 100 feet of driving; and over 500 feet could be obtained, if necessary. The silver contents of the lode are very irregular. A small vein of galena, which was cut at 100 feet, and which seems to belong to the same lode, or is a parallel shoot, assayed 60 per cent. lead, and 90 ozs. silver. The samples reported from the surface outcrop above alluded to, assayed 339 ozs. silver, 79 per cent. lead; 266 ozs. silver, 67 per cent. lead. A piece taken by Mr. Jas. Harrison, Inspector of Mines, was assayed in Zeehan, and yielded 100 ozs. silver, 70 per cent. lead; and a sample selected by myself, and assayed by the Government Analyst, returned 184 ozs. 11 dwts. 8 grs. silver, and 70 per cent. lead. These contents are highly encouraging. The width of the lode may be expected to vary from time to time, as there seems to be a tendency for the ore to make in parallel bands, but a few bands of high-grade ore would make a payable lode. The Farrell mountain offers excellent facilities for tunnelling, and this sort of exploration, on an extensive scale, is commendable, for crosscut tunnels must cut the tracks of the numerous parallel lodes known to exist. They may also intersect lodes which remain unsuspected, concealed below a heavy overburden of soil and conglomerate detritus. The rounded pebbles in the detritus might lead to the idea that the superficial covering is a wash, but the stones are, in reality, those released from the conglomerate which caps the mountain.

North Murchison Mine.

Section 3390-93M, 79 acres, south of the Central Farrell, in the name of W. S. Southwell. Mr. Thornton, Manager.

Four men were employed here driving a tunnel east, across grit (greywacke) to intersect a galena lode at a depth of 70 to 80 feet. These backs will increase as

the lode is driven upon N. and S. The tunnel was 55 feet in, and expected to cut the lode in another 80 feet. Eighty feet higher on the hillside the lode formation has been exposed, measuring 6 feet wide, and carrying pug on both walls, between which is lode-slate, seamed with carbonate of iron, and charged with disseminated galena and iron pyrites. I saw a 2-inch vein of galena in this slate. The lode-channel underlies W. with the country. The same lode is exposed in the creek a little further south. East of the slate is a 9-foot band of grit, which is succeeded further E. by slate again. The long trench, extended up the hill, traverses slate all along its course, and has not intersected any fresh lodes. This trench was intended to pick up the main lode of the Murchison River, M.A., but has not been driven quite far enough for that purpose. The North Murchison lode, lower down, is evidently a parallel one. Some 400 feet further north, at contact of slate with greywacke, trenching shows country-rock impregnated with pyrite and a little galena.

Murchison River Mine.

Section 3263-93M, 60 acres, Maurice Callaghan, Manager.

This is about a mile from the township, south of and adjoining the North Murchison. A north and south lode runs through the centre of the section, bearing N. 5° E. In parts of its dip it is a contact lode, situate between slate on the east, and greywacke on the west. Where it has been cut into at surface, it is about 9 feet wide, with a good quartz outcrop, containing pyrite, arsenopyrite, galena, and blende, and forming a very kindly-looking gossan cap. At surface, a trench up the hill discloses the succession of strata, as follows from W. to E.:—(1) coarse hard quartz grit in the western part of the property, and up to the western wall of the lode; (2) lode; (3) green quartz schist (containing grains of quartz) for 60 feet; this carries a little galena; (4) slate for 100 feet; (5) schist up to the east boundary. This is green with chlorite, carrying disintegrated grains of quartz, pressed and elongated in the direction of the laminae of the schist.

An upper adit has been driven for 294 feet, a little south of east, cutting the lode at 76 feet in, with 56 feet

of backs; and a bottom adit for 270 feet, a hundred feet lower down. The backs increase going north. The top tunnel first goes 40 feet through decomposed, but somewhat hard, gossanous material, then into mottled quartz grit. At 76 feet from entrance, the hanging-wall of the lode was met with, dipping W., with the country strata at an angle of 70° . The first 16 feet of the lode consists of reef quartz, with galena and pyrites in veins, strings, and pockets. For another 6 feet the lode carries galena, and widens out to 9 feet in the sole. No footwall is noticeable; the lode formation fades away into the slate. Levels have been driven on the lode N. and S. The south drive is only 12 feet in; and the lode carries fair galena the full width of the drive, with a good deal of pyrites, and much carbonate of iron. The galena in the sole is very clean. It is a good strong lode, but the drive has not much backs, and consequently was stopped. The intention is to drive the lower level. The north drive is in 107 feet, with at first a mixed galena, blende, and pyrites lode, the full width of the level. There is some very solid cubical galena here. The slate wall is well seen on the east side of drive, veined with iron pyrites. After going north, however, for 70 feet, the country bends round a little, and we get slate on both sides of the level. The lode track is visible in the roof for a little distance, but is then lost. The slate in the end is clean, nice looking, with splashes of galena, and charged with iron pyrites. Pug and broken slate, about a foot wide, hug the footwall on the east. At 90 feet in this level a crosscut has been driven W. for 20 feet through slate, up to the contact with the quartz grit (greywacke), and full into the latter for about 3 feet. No galena, or sign of a lode, is seen at the contact. This crosscut has been a judicious piece of work. Opposite to it is a crosscut E. 20 feet through country slate, a good deal mineralised, charged with iron pyrites, carbonate of iron, and a little galena here and there. The lode is evidently not in this crosscut. Both of them are of great use, as they enable us to affirm with some confidence that the main drive is still on the track of the lode. At the surface, too, 160 feet north of this, there is a blow of gossan.

At 117 feet from entrance in the main tunnel, which still traverses slate, a lode slate formation 18 inches wide (at top) was cut, consisting of puggy, broken slate, with slugs of cubical galena, and copper pyrites. A drive south was put in on this for 25 feet, but the galena died out, and the end is now in clean slate, with a solitary slug of galena on the hanging wall.

At 225 feet from entrance the tunnel cut a one-inch vein of galena, and they drove 24 feet south on it. A quartz-veined lode slate formation, 16 inches wide, with disseminated galena, was carried by the drive, and some solid bunches were reported. This is in the slate country, but the end of the tunnel, 6 feet further, is in grey schist.

A lower tunnel has been driven 140 feet further N. than the upper tunnel, and 100 feet lower down. It begins in slate, which lies W. of the grit. At 96 feet a lode slate formation 8 or 9 feet wide was cut and driven upon N. for 10 feet, with a one-inch vein of carbonate of iron and galena on the hanging wall. On the footwall is puggy slate; the centre consists of slate, carrying iron pyrites. Twenty feet further, in the main adit, the slate country is succeeded by quartzite for 15 feet, and then the rock becomes slate again. This gives way to about 70 feet of quartz grit, replaced to the E. by slate. At 238 feet from the mouth a drive north has gone in upon a calculated line of lode expected to come under the end of the south drive in the level above where the good galena is showing. The drive follows a small seam of lime in the slate. At 280 feet the adit cuts through a small pug formation, with splashes of galena and seams of baryta in slate. The slate is twisted. The pug forms the footwall of a metamorphic slate formation 7 feet wide, containing large splashes of galena and blende. This might be worth while proving.

A few hundred tons of ore are stacked at surface. The firsts are good looking; the seconds contain a good deal of zinc blende. Copper pyrites, too, is an ingredient.

Twenty men have been employed at this mine, but at the time of my visit the number had been reduced to three, engaged in sampling ore. All driving had been stopped till a bulk shipment of 20 tons had been made, and the results shown to justify re-starting on a larger scale. The assays are 60 and 70 oz. silver to 70 per cent.

lead. A sample which I took from the upper level was assayed by Mr. W. F. Ward, the Government Analyst, and returned 105 oz. 10 dwt. 6 grs. silver per ton, and 85 per cent. lead. The track to the township is excessively soft and muddy, much cut up by horses. It has had some patching in extra bad places, but will need a good deal more before it is fit for traffic. In its present state it will take over 45s. per ton to pack the ore out to the Pieman, but since my visit I understand it has been repaired by the Government.

The mixture of metals in this mine forms a drawback, but the drives show that a good deal of these can be got clean and separately, and it is probable that in depth one or the other will predominate. The mine will be subject to the usual conditions of deposits on this field, but it is well worth serious prospecting. The ore deposit in the upper level requires proving in depth. The sooner work is resumed on this encouraging property the better.

South Murchison.

Section 4950-93M, 73 acres, in the name of H. Kelly, adjoins the Murchison River property on the south, and is in a good position for prospecting. Just before I left the district, they started to trench on a north and south lode near the northern boundary. The lodes from the north will, no doubt, traverse the section.

Mackintosh Mine.

Sections 3222-93M (79 acres), 3223, 3221-93M (80 acres each), north of and adjoining the North Farrell and Mackintosh-Farrell, Wm. Tresize, Manager. These three sections are in a north and south line on the rising ground between Innes' track and the mountain. On the southern section a main adit is being driven across black and grey twisted slates, with a view of cutting the North Farrell lode in about 300 feet of driving. It was in 34 feet when I was there. About six feet of overburden rests on the slates above the tunnel capping at entrance. Some canary copper ore was cut in a bunch at the approach. The level is estimated to have 90 feet backs when the lode is intersected, and these will increase going north and south. A surface trench, higher up the hill, ahead of the adit,

discloses a little galena, with quartz, in the laminations of the slates, much broken here. This point will be reached after driving about 90 feet. The ore is disseminated rather than clean. A galena lode has been costeamed further up the slope, showing a black lode formation, 10 feet wide, of slate, pug, and quartz, with a little galena and copper. It carries a good deal of bunchy quartz. It is here a couple of hundred feet from the south boundary-line, and has been traced 32 chains north. This goes into the centre section, but has not yet been picked up in the northern block. As concentrating ore, it has been cut in a trench further north on the centre section, and some of the clean galena assayed 64 per cent. lead, and 72 ozs. silver per ton. A couple of feet of what may be described as poor concentrating ore are exposed in a cutting south of the trench, with an equal width of slate, impregnated with some galena. A little pile of nice dressing-ore is stacked outside. There are veins of mineral all up the creek. A tunnel would cut this lode in 200 feet of driving, with 65 feet backs, but work has been stopped here, and transferred to the southern section. There is some uncertainty as to the lode being the continuation of the North Farrell, but the opinion on the ground is that the two are identical. I had no time to verify this.

About 60 feet W. of this line is a copper lode, in a belt of grey talcose schist, which is about 200 feet wide, and bounded E. and W. by slate. This schist is the channel for the copper ore. The copper has not been traced beyond the centre section. This lode is about 30 chains W. of the Metropolitan line. The schist is said to go N., right through to Pearce's. It carries copper pyrites and sulphate, associated with quartz. Its bearing is about N. 5° E., and its dip W. A shaft has been sunk on the lode. At bottom of same the ground is poor, charged with carbonate of iron and splashes of copper ore. This shaft is on the footwall of the lode, which underlies 8 feet to the W. in the 40 feet sunk. A few fathoms further W., another quartz outcrop occurs in the creek, also with copper pyrites and sulphate. The same is cut further north, where it has been uncovered to a width of 14 feet, and consists of fissile quartz, showing a little copper pyrites. Further west is another band of quartz and iron

pyrites, but with no copper visible. A specimen of the copper pyrites, assayed by the Government Analyst, returned 15.5 per cent. copper, with traces of gold and silver; and a sample from the galena lode assayed 65 per cent. lead, 39 ozs. 17 dwts. silver per ton.

The proper course would be to drive a long tunnel to the shaft, intersecting the different lodes outcropping in this belt of schist. The tunnel would, however, have to be over 400 feet in length, and such a task is probably beyond the resources of the present owners. The nature of the ore is attractive—very clean copper pyrites, associated with quartz, and hardly any iron pyrites. The property needs development, and has fair chances of improving into something valuable. At present, it is being prospected by two men and the manager. Without the infusion of a little more vigour and capital, the undertaking is bound to remain stationary. The property occupies an important position in the northern part of this field, and deserves more serious attention than it has hitherto received.

Metropolitan.

Section 4860-93m, 80 acres, in the name of C. P. Smith. Work has been abandoned here. I found a tunnel driven E. 16° S., near the northern boundary, for about 30 feet, in a light-coloured talcose schist, right under the precipitous western face of the N. end of Mt. Farrell. Just behind the end the tunnel enters conglomerate. The conglomerate is silurian, and has no connection with the younger conglomerate capping of the mountain, of which huge boulders lie over the tunnel higher up the hill. The schist is sometimes silicified with white quartz, and contains a few splashes of copper and iron pyrites. I could see no sign of a lode. A few specks of galena have been found. This tunnel is on the east side of the Barn Bluff track. Westwards from the track, the usual kindly black slates begin, and run down, right across the river, for a width of 20 or 30 chains. These slates require prospecting. There is not much inducement to continue the tunnel. Better results would probably be attained by costeaning across the belt of slate, with a view of locating some of the lodes, which, in all likelihood, are enclosed in it. The slates here run N. 35° E.

Osborne Copper Blocks.

Sections on the Murchison River, 3 miles south-east from Farrell township, 4440-1-2-3-4, 80 acres each. The Melbourne syndicate, represented by Mr. J. P. Madden, is prospecting here. Geo. Harris, the prospector who discovered copper on the blocks in 1898, was at work at one of the shows near the cage over the Murchison, in Section 4442. The river here flows in a gorge between the Farrell and Murchison mountains. On the Farrell side of the river, north of the cage, there is a cupriferous formation of greenish slaty schists, which cross the river-bed, and contain splashes of copper and iron pyrites. On the Mount Murchison side, 100 feet above the river-bed, a short tunnel is being driven into the same country, besprinkled with copper and iron pyrites, under an outcrop of hematite and magnetite showing the same minerals. A sample of fair-looking copper ore, which I took from here, was assayed by the Government Analyst, and returned 1.8 per cent. copper, 1 oz. 9 dwts. 9 grs. silver per ton, 8 dwts. 4 grs. gold per ton; this result is distinctly promising. Work should be persevered with, and systematic sampling adhered to. 50 feet further up the hill to the W., a trench has been cut, disclosing dark chloritic schist, mineralised and associated with reddish quartz-porphry, similar to that of the Red Hills. This is not the only place here where iron ore is exposed. I was told that outcrops of hematite are to be seen further north on the east slope of Farrell, and further south also, on the east side of Mount Murchison. I was shown some copper ore in chloritic quartz-porphry from Section 3340-93M (James Spencer), about two miles to the S.W., from which it would appear that the zone is of at least that width. At the Murchison cage is a bluff of coarse reddish quartz-porphry, descending to the river on its eastern side. Further south, nearly half a mile up the river, on Section 4441, is a galena lode running N.W., rather badly exposed at the water edge. It is in the red quartz-porphry country, and, as no work had been done on it, and it was partly concealed by the river, I could not ascertain its width, but it seemed a foot or two wide. Arsenical pyrites and a little cubical galena were the minerals observed. The veinstone is quartz, and of an appearance which suggests that it may be gold-bearing.

This lode should be opened upon higher up the Farrell slope.

On the southern lease, No. 4440, is Harris's copper show, on the eastern side of the Murchison river, in massive chloritic quartz-felsite of green and reddish colour, impregnated with iron and copper pyrites. This belt is the same as that in which the hematite occurs near the cage further north. Very little work has been done in the way of exploration yet; but the country-rock and the associated minerals are those of the great copper-bearing belt extending southwards through Jukes and Darwin, and the possibilities are those of a large copper field. It is a couple of miles east of the Red Hill line, but the intervening country is of the same description, which makes this belt one of great width. There is only a footpath leading to Harris' show, and prospecting work is consequently attended with difficulties. The sections require systematic exploration, and will absorb any amount of outlay of that kind, as the copper ore is scattered over wide areas of the country-rock, and the localities where it is more or less concentrated have yet to be hunted up and opened out. As a copper field it is the counterpart of those which I have described further south on the same range. From the evidences presented to me at different times during my visit to the West Coast, and in spite of indications which at first sight are not altogether favourable, I have gradually formed the opinion that this copper zone is destined to be of the highest importance to the Colony; but time, capital, and careful attention to the geological relations of the rocks and ore deposits will be found necessary factors of successful work.

From the above, it will be seen that the mineral district of Mount Farrell is roughly susceptible of two divisions, a galena and a copper ore field. The galena deposits give it its immediate value, the copper a prospective one. The slates in which the galena lodes run are of a most favourable character, and the configuration of the ground is well adapted to easy and economical working. The width of the slate belt, as far as proved, is only two or three hundred feet, but there is reason to believe that bands of slate occur again a little further west, under the button-grass. The slate crosses the Murchison in a

southerly direction, and its northern extension ought to be prospected. A good extension in either direction would greatly enhance the possibilities of the field. In the nature of things, the field being thus limited, it cannot attain the magnitude of Zeehan as a silver-lead producer, but the fact of a good lead district existing midway between Zeehan and Burnie is in itself important, and every new mineral centre is of distinct advantage to the Colony as a whole. Only one mine of any importance, so far, has been opened up; but I believe exploratory work on the other sections will probably result in equally good discoveries. The country is of a highly promising nature. The lodes do not appear to be in the form of a few main fissures, but occur rather as numerous fractures and infiltrations between the slates, and this fact makes it in the highest degree unlikely that the deposition of galena is confined to one spot.

As regards the copper ore in the quartz-porphry area, it will take time to prospect the field and develop the exposures. Every reported success at Red Hills, Jukes, and Darwin, will re-act on this field, and stimulate work. If the mining on those mountains attains success, as it promises to do, the copper mining here will receive an impetus.

Kershaw's Blocks.

I left Mt. Farrell on the 13th June, and proceeded to the Pieman, crossing along the track north of the river. Greywacke and quartz-keratophyre are the rocks cut through by this track. I passed by the old Langdon P.A. Mine, the tunnel entrance of which was padlocked. The mine seems to be in keratophyre. Further W. is the Cutty Sark. There is no lode in this mine (C. Sark), but the iron and copper pyrites are disseminated through a dark-green, massive quartz-chloritic rock. The useful mineral is not abundant enough to be payable where the rock has been worked. Though the mine has been abandoned, it may yet be taken up again some day, if payable spots are discovered in it. I could not satisfy myself whether this rock had any connection with the quartz-keratophyre, or not: it is certainly in juxta-position. At the Pieman crossing the same rock is seen under the bridge; also on the north side of the river, where Mr.

Hodge has found some good copper pyrites. Immediately to the west of this exposure is quartz-keratophyre, well seen in the railway cutting south of the bridge. This appears to be on the strike of the soda-felsite, which occurs on Mt. Read.

A little north of the Pieman bridge I climbed up to Kershaw's blocks, four sections, 50 acres each, 3199, 3200, 3201, 3202, which occupy the top of a lofty hill, west of the railway, about 1400 feet above sea-level. The centre peg of the four sections is fairly on the top of the hill. About 150 feet below the crown of the hill a trench has been cut in somewhat calcareous schistose rock, impregnated with iron pyrites. Higher up a 7-foot cut shows this pyrite quite solid, and on the hill-crest a hole has disclosed the same dense pyrites in the same grey schist. On the S.W. section the same formation extends on the southern peak. The outcrop of this ore-body forms a crust of iron oxide. Fifty feet below the trench, a tunnel is being driven N.W. in the schist, which has been strongly mineralised the last 25 feet. The schist planes bear N. 20° W., and the dip is to the N.E. The ore-body may be described as a broad mass of calcareous schist and pyrite, with quartz and a little copper pyrite; it also contains a little galena. The present end of tunnel has about 60 feet backs, which would increase to 200 feet when under the crown of the hill, to be reached after driving further 200 feet.

It is an exceptionally solid body of pyritic ore, but I do not think the present works are anything like deep enough to settle the question whether copper pyrites makes in depth. At the same time, the present owners are not in a position to incur the outlay requisite for a conclusive test. The deposit is of a magnitude which cannot fail to command attention, but its economic value has to be proved. It has, doubtless, been formed metasomatically, and is, apparently, in the zone of the pyritic deposits of Mt. Read. There is no reason for not indulging in the hope that at some point or other the iron may give place to copper pyrites.

On this journey I was accompanied by Mr. James Harrison, Inspector of Mines for the Western Division, and I am also indebted to the mine managers on Mt. Farrell, Messrs. Innes, Maurice Callaghan, Tresize,

Petrie, Thornton, etc., for assistance and information. Mr. Con. Madden, of *Mount Farrell Hotel*, and Mr. Hodge, of the *Pieman Hotel*, also took much trouble in guiding me to difficult spots. To all of these I wish to return my thanks.

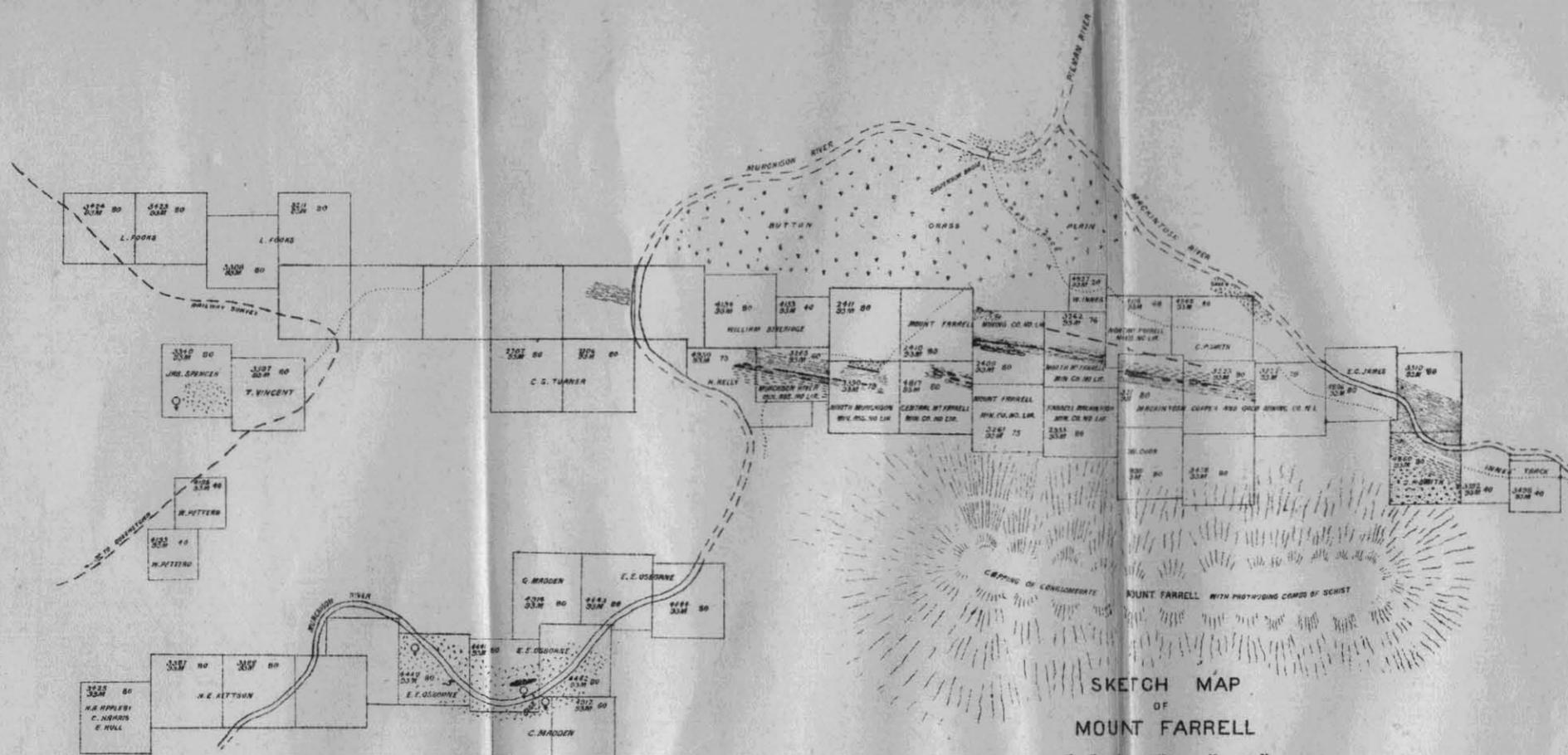
I have the honour to be,

Sir,

Your obedient Servant,

W. H. TWELVETREES,
Government Geologist.

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



SKETCH MAP
OF
MOUNT FARRELL

Scale 0 10 20 30 40 50 Chains

W. H. Trevelock
Geol. Geologist
Dec. 1900

- | | | | |
|--------------|--|----------------|--|
| GREYWACK | | SLATE | |
| CONGLOMERATE | | SCHIST | |
| GRIT | | QUARTZ OUTCROP | |
| MINERALITE | | QUARTZ FELSITE | |
| GALENA | | COPPER | |

