

REPORT ON THE PENGUIN AND DIAL RANGE MINERAL FIELDS.

Government Geologist's Office,
Launceston, 20th October, 1898.

SIR,

I HAVE the honour to submit the following Report of a brief examination of the above fields.

The general geology of the district was fully described by the late Government Geologist, Mr. A. Montgomery, M.A., in a Report dated 29th July, 1895, the conglomerates, breccias, and tuffs of the Dial Range formation being provisionally referred to the Devonian System, and very little additional light has since been thrown on the subject. North of the Dial Creek, near the River Leven, a belt of syenite was noticed. I could not ascertain whether this is intrusive or not, but it may represent the root of the volcanoes from which the tuffs were ejected.

I only visited places where work was actually going on, or where something has been done since Mr. Montgomery's visit.

PENGUIN DISTRICT.

Section 2385-93M, formerly 155-87M.—The shaft of the old Penguin Mine is situated on this section just above high water-mark, close to the township of Penguin. It is said to have been sunk nearly 30 years ago, but no work has been done for many years until quite recently, when the shaft was unwatered and the old drives cleaned out by a Melbourne syndicate, on account of the high assays which are reported to have been obtained. The shaft is 6 feet by 8 feet in the clear, timbered with 10-inch by 10-inch frame-sets, and, except near the surface, the timber is still quite sound. Including the well, it is about 70 feet deep, and at 60 feet from the surface a considerable amount of driving has been done both N. and S. of the shaft. The country rock passed through in the drives is chiefly a hard siliceous dolomite more or less impregnated with pyrites. There have evidently been considerable differential movements within the mass, and numerous smooth "heads" have been developed, which are generally faced with calcite and iron pyrites; the latter also occasionally occurs in bunches with a little copper pyrites and tetrahedrite, but, as far as I could see, there is nothing like a regular lode, and the drives appear to have followed the heads in the country.

On the north side of the shaft there is a very roomy chamber from which the drive starts in a north north-westerly direction towards the sea, but gradually bears round to nearly east. About 8 feet from the end is a winze 12 feet deep, which was full of water at the time of my visit; this has since been baled out, and I have been shown samples from the bottom containing a good deal of copper pyrites and tetrahedrite with dolomite. The ore is said to be about 4 feet wide, but it is probably only a bunch. About 40 feet from the end a cross-cut has been driven 50 feet to the east without disclosing anything of value. South of the shaft about 150 feet of driving has been done in various directions, and a winze sunk 20 feet (now full of water), but I could see nothing to encourage further work being done. Although the north drive is all under the sea at high water, there is comparatively little water making, and the workings are kept dry by baling one shift with a whip.

About a chain east of the shaft, a prospecting shaft has been sunk about 20 feet. This is now full of water, but the stuff at the surface shows a good deal of iron pyrites, with a little galena, blende, copper pyrites, &c. in strings through the country, which consists largely of steatite, with bright green chlorite, magnesite, and calcite. At 8 feet down there is said to be about 3 feet of ore, which dipped out of the shaft to the east, but the manager informed me that a sample which he took from there returned only 15 grs. gold, 1 oz. 18 dwts. silver per ton, $\frac{1}{2}$ per cent. copper, and $\frac{1}{2}$ per cent. lead. I took a rough sample from some of the stone lying about the shaft, and sent it to Mr. Ward, the Government Analyst, but it did not contain appreciable quantities of any valuable metal.

Several small holes have been sunk on the beach below high-water mark, and for some distance on either side of the main shaft numerous small veins are seen, carrying oxide of iron and sulphides of iron, copper, lead, and zinc; but none of them, so far as could be seen, are rich enough or large enough to work, and there is no regularity in strike or dip. There is a possibility that at a greater depth they may come together and form a good lode, but at present the prospects do not seem to me to warrant the expense of proving this.

Hematite Deposits.—On the east side of Penguin Creek, between two and three miles from its mouth, some work has been done by a Sydney syndicate, known as the Tasmanian Iron Company, on Mr. Hudson's property, where two quarries have been opened on the hematite-

deposit mentioned in Mr. Montgomery's Report. No work was going on at the time of my visit, and I have been unable to obtain particulars as to the quantity and quality of the ore obtained, but several hundred tons were sold as flux to one of the New South Wales Smelting Companies, and I was informed that it averaged over 90 per cent. peroxide of iron. In the face there is from 15 to 20 feet of ore, a large proportion of which is very pure, dense, red hematite, but some parts are rather earthy and impure. Very little stripping is necessary, and, if systematically developed, large quantities of good ore could be very cheaply mined, but at present the costs of transit are too high to allow of much profit. From the quarries a wooden tramway about a mile long has been made down the valley of the Penguin Creek, which stream is crossed five or six times, and from the end of the tram the ore had to be carted over a rough road to Penguin wharf, whence it was taken in lighters to Devonport. The natural outlet is right down the Penguin Creek to its mouth, but the proprietors have been unable to come to terms with the owners of the properties through which the line would pass. The tram is now being extended to meet the Iron Cliffs Road, but the ore will still have to be handled twice, and carted a distance of nearly a mile to the wharf. When the Ulverstone-Burnie Railway is constructed the ore will doubtless be sent to the latter port, and it should be possible to put it on board ship there for about five shillings per ton.

Going south the hematite is seen outcropping in several places, and on Mr. Good's property a small quarry has been opened in which there is about 10 ft. of good ore. This is about 150 ft. higher than the Tasmanian Iron Company's workings, and is probably a separate deposit. The Iron Cliffs Road runs close to the quarry, the distance to Penguin being about $3\frac{1}{2}$ miles, and several small lots of ore were sent away, but, owing to the steep grades on the road, the cost of carting was too high to allow of profitable working. A good grade could be obtained for a tramway down the valley of the Penguin Creek, and, should iron smelting works be established on the mainland, these deposits would be well worth further attention.

Iron Cliffs.—South of Mr. Good's farm, two mineral sections, Nos. 1785-93M, 78 acres, and 1661-93M, 79 acres, have been taken up, through which runs the immense outcrop of brown hematite known as the Iron Cliffs. This is described in Mr. Montgomery's report before alluded to, but, at the time of his visit, no work had been done on it. Shortly afterwards a crosscut tunnel was started, about 25 ft. above M'Bride's Creek, and driven 260 ft., bearing S. 70° E. The country passed through is soft slate and sandstone, much stained with oxide of iron, and, about 40 ft. from the end, a gossan formation was cut striking nearly N. and S. and underlaying to the east. This is about 20 ft. wide, and is succeeded by about 8 ft. of country, after which gossan again appears and continues to the end of the tunnel, the eastern wall not having been reached when work was suspended. It would have proved the lode much better had the tunnel been driven north along its course from where it is cut through by the creek a few chains to the south-east. The gossan is similar to that seen on the surface, consisting largely of compact limonite in botryoidal and stalactitic forms; but there is a good deal of friable porous gossan of rather kindly appearance, and, in places, veins of quartz. I took a sample across the whole width of about 30 ft. exposed in the tunnel, but it contained no appreciable quantity of copper, silver, or gold. Above the tunnel the outcrop of the lode forms a ridge between M'Bride's Creek on the west and a deep blind gully on the east, and the configuration of the country is naturally favourable to the thorough oxidation and leaching of the metallic contents of the lode. Under these circumstances the absence of copper is not surprising, and it frequently happens in copper-bearing lodes that the copper contents have been leached out of the upper parts of the lode and redeposited in a concentrated form at a lower level. The absence, however, of silver and gold in the gossan is distinctly unfavourable, as these metals are generally concentrated in the oxidised portions of the lode; but it is quite possible that richer chutes would be met with in driving along its course.

Further north the lode is cut across by another deep gully, the highest point of the outcrop to the north being over 300 ft. above the bottom of the gully. The outcrop is here very wide, and the ground falls rapidly towards M'Bride's Creek, but further north and to the east basalt comes in, the ground being fairly flat, and it is probable that the lode-matter will not be so thoroughly oxidised as it is further south. From the compact nature of the gossan it seems probable that the greater part of the lode-filling was originally iron pyrites; but the lode is well worth a further trial, and since my visit a company called the Lady Braddon Mining Company has been formed to test it. To prove the value of the lode it is absolutely essential to get below the water-level, and I should advise driving a low-level adit underneath the big outcrop and then sinking a winze as deep as the water will allow.

A road could be easily made to connect with the Iron Cliffs Road in less than a quarter of a mile, so that the property is very easily accessible.

About 10 chains a little south of east from the tunnel is an old prospecting tunnel about 300 feet long, which was driven some years ago, and is now partly fallen in. The country passed through is chiefly soft slate and sandstone, striking nearly north and south, and dipping at high angles to the east. There is a good deal of pyrites through it, the water coming from the tunnel being heavily charged with oxide of iron, and in places the sides of the drive are stained with copper salts, but I could see no sign of any lode. Further north is another small tunnel about 50 feet long through brecciated conglomerate. The sides in places show the characteristic green

copper stainings, and near the entrance is a small vein of rubbly quartz from which fair prospects of native copper can be obtained by panning, but this is too small and ill-defined to be of much value.

DIAL RANGE FIELD.

This field lies between six and seven miles almost due south of Penguin, and occupies a narrow strip between the Dial Range and the River Leven. The ground was originally taken up for silver seven or eight years ago, but very little work was done, and all the sections were soon forfeited. Recently most of the ground has been taken up again with different boundary lines for copper, but the only sections on which any work to speak of has so far been done are those of the Keddie Copper Mining Company and the Dial Range Prospecting Association.

Access.—From Penguin there is a fair road to the agricultural holdings at the foot of Mt. Montgomery. The land passed through is very patchy, rich, chocolate-coloured soil, due to the decomposition of basalt, alternating with barren healthy patches. From the end of the road there is only a rough bridle-track, which has been partly formed in places. Numerous small creeks are crossed, but a good track could be constructed with no great expense.

The field can also be approached from Ulverstone by going up the Leven in a boat to what is known as Hay's Landing, about six miles from Ulverstone, and thence following the river to the Dial Creek, a distance of about three miles. The river is in places very shallow, and a good deal of expense would have to be incurred in dredging and snagging to make it navigable for small steamers.

Keddie Copper Mining Co.—This company holds Section 2638-93M, 80 acres, which includes parts of the old leases 2605-87M, 3469-87M, and 3472-87M. The Dial Creek runs through the centre of the property, and on the south side of this a tunnel is being driven, bearing S. 35° W., to intersect a lode which is seen outcropping near the top of the hill about 160 feet above the tunnel level. The country rock passed through is chiefly breccia, varying a good deal in texture and composition, but consisting principally of angular fragments of slate and sandstone, mixed with volcanic ash. Some parts are extremely soft and porous, while in other parts the rock is much silicified, and it frequently contains iron and copper pyrites, carbonate of iron, &c., irregularly disseminated through it. At 70 feet from the entrance an intensely hard formation was struck, consisting of an intimate mixture of fine-grained iron pyrites and quartz. Near the bottom it is six or seven feet wide, but does not rise to the back of the drive. This may be the continuation of the lode seen in the creek where the track crosses it N.W. from the tunnel, but it has not a very promising appearance. I visited this property twice, and at the time of my second visit on October 18th the tunnel was in 113 feet, the end being in hard breccia, letting out a good deal of water. It is probable that a change will soon come in, as the older Cambro-Silurian strata are seen outcropping a short distance higher up the hill.

About 75 feet above the tunnel is an old shaft 16 feet deep, and the tip shows a little iron and copper pyrites. Just below this, a few shots have been put into an outcrop of quartzite and hornstone, showing specks of copper pyrites and malachite. It resembles more a band of silicified country than a lode; but the tunnel will soon prove if it is of any value.

Two or three chains further south, and 85 feet higher up, is another old shaft said to be 20 feet deep, sunk in gossan of rather kindly appearance. This is the outcrop of the lode for which the tunnel is being driven: its strike is apparently about N. 20° W., and its underlay to the E.N.E. It is probable that the tunnel will strike it well below the zone of oxidation, and will therefore have a good chance of proving its value.

At the top of the spur, close to the southern boundary, is another rather promising-looking gossan outcrop, running apparently N.E. and S.W. A little work was done on it some years ago, but not sufficient to prove its value. Several other outcrops of gossan are seen on this section and on the adjoining section to the west; but they all require to be sunk or driven upon before any opinion can be expressed as to their value.

South-east from the tunnel, on the east side of a small creek running into the Dial Creek, a few shots have been put into a formation consisting of quartz and iron pyrites intimately associated, which, as far as can be seen, is about 10 feet wide, striking N.W. and S.E. To the S.E. the hill rises very rapidly, and the outcrop can be traced for a considerable distance, the pyrites gradually giving place to gossan. I took a sample by chipping from the pyrites exposed, but this yielded, on assay, only 1 dwt. 15 grs. gold per ton, no silver and no copper. It might be worth while driving on the course of this in the hope of meeting richer chutes, and, in the event of good ore being found, a short cross-cut could be driven from Dial Creek, into which the above-mentioned tributary falls, with a drop of about 40 feet, but present appearances are not very favourable.

Dial Range Prospecting Association, Sections 3188-93M, 3189-93M, 3190-93M, and 3191-93M, 80 acres each.—On Section 3191, close to the S.E. angle, which is the centre of the property, a pyrites lode about 7 feet wide, striking nearly N. and S., and underlaying E., is seen in the bed of a small creek. The ore is very free from gangue, consisting principally of crystalline iron pyrites, with bunches of very pure copper pyrites, frequently much tarnished and coated with

black oxide of copper. The bed of the creek has been lowered, and a tunnel bearing N. 20° W. has been driven a distance of about 70 feet. The country-rock is very soft tufaceous breccia, requiring close timbering, and it is difficult to see exactly what has been passed through, but the drive appears to have gone diagonally across the lode. The end is in breccia, with a little pyrites through it, and I should advise cross-cutting E. to try and pick up the lode. It is quite possible, however, that it has dipped under foot to the north, the fissure not extending to the surface in the soft breccia. I took a fair average sample of the lode across a width of about 6 feet near the entrance of the tunnel, which Mr. Ward found to contain 3.2% copper, traces only of silver and gold; but much better assays are reported to have been obtained.

In several places the sides are stained green from the copper salts leaching out, and the trunk of a tree fern which had been lying for some time at the foot of the seconds tip has become saturated with copper sulphate in solution, so that when any bright piece of iron or steel is thrust into it it is immediately coated with metallic copper.

Much of the ore is very friable, and it is probable that a good deal of the contents has been dissolved out and reprecipitated at a lower level. Unfortunately, going north from the mouth of the tunnel the ground is comparatively flat for a considerable distance, and it is impossible to put in a lower adit. Even as it is, there is a descent of several feet into the tunnel, and the stuff has to be wheeled up an incline and taken some distance for a suitable dump.

The best way to properly test the lode would be to sink on it, and there is a good probability of the copper contents increasing with depth, but water is likely to prove heavy, and, with the present means of access, it would be impossible to bring in any heavy machinery.

About 100 feet south of the tunnel is another small branch creek, in the bed of which some pyrites is showing, but its full width is not seen. South of the creek a second tunnel is being driven bearing S. 10° E., and at the time of my visit this was in about 120 feet. The country rock passed through consists of felsitic tuff and breccia: near the entrance it is much stained with oxide of iron, and for the last 40 feet there has been a good deal of iron pyrites and quartz with vughs containing black oxide of copper, but there is no defined lode. Near the top of the hill, 120 feet above the tunnel, is a strong outcrop of hematite with veins of quartz, probably the capping of a pyrites lode, and the tunnel is now being turned to come under this.

A short distance up the creek, S.W. from the tunnel, the Cambro-Silurian strata are seen, consisting of alternate bands of slate and sandstone, striking about N.W. and S.E., and standing almost vertical. The tuffs and breccias appear to have been laid down on a very uneven bottom, unless, as is probable, they have been brought into their present position by a fault. This is a point of some importance, as the lodes are likely to be better defined and more productive in the older rocks.

As before mentioned, practically no work has been done outside the properties already described, but the indications are sufficient to warrant more thorough prospecting.

I have the honour to be,

Sir,

Your obedient Servant,

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