REPORT ON MINERAL FIELDS BETWEEN WARATAH AND LONG PLAINS.

(With One Map.)

Government Geologist's Office,
Launceston, 28th September, 1903.

SIR,

I HAVE the honour to report that, pursuant to your instructions, I visited the Magnet, Heazlewood, Whyte River, and Long Plains Mineral Fields on the 24th March to 7th April last.

My previous visit to these districts was three years ago. On the present occasion I found fresh work being carried on at several places, and many signs of activity were observable. The good prices ruling for silver, lead, and tin are evidently directing attention to a part of the State which may be described as being pre-eminently a mineral-bearing area. On the Magnet Range, the Magnet Silver-mining Company has carried out extensive work in connection with its mine, which is a highly-productive property. Great activity prevails at the Badger, where several tin shows are being prospected. At the Whyte River a little alluvial tin ore is being won. The Confidence group is being worked for silver-lead with an encouraging outlook. The Victorian Magnet Company is pushing a long drive into the old Godkin workings. A tunnel is being driven into the hill on the Godkin Extended to intersect the lode at some depth; and a drive on the line of gossan is to be started from the tunnel on the Discoverer section further north. Messrs. W. R. Bell and L. Smith have done a good deal of exploratory work on the old Bell's Reward at the Heazlewood. The Wealth of Tasmania Copper Proprietary is testing Binks' copper show; and the Long Tunnel Syndicate is arranging for resumption of work at its silver-lead mine at Mount Stewart. Some nickel sections have been taken up again at the Heazlewood. At the Long Plains I found the Burnie Syndicate working on Cox's face; and some driving done in Lynch's tunnels. Prospecting was also in progress at Madman's Terrace.

Some of the more remote mines labour under the disadvantage of both distance and poor tracks. When the discoveries are situate at any distance from the main road, the drawbacks of costly transport make themselves felt.

A good road exists from Waratah to the 18-mile, at the end of the Bald Hill; but between that and the Corinna end of the road there is a gap of nearly 10 miles, supplied with a bridle-track—not at all a bad one for horses or foot travelling, but imposing a costly freightage on all who have to get stores that way. I was told that a sum had been earmarked to defray the cost of bridging this gap, but the work was not continued owing to the suspension of operations at the claims along the route. Any mining enterprise which is now started along here will be heavily handicapped by packing costs.

The general geology of the whole district was discussed in my report of the 30th June, 1900. In the present report geological considerations will be touched upon under the headings of the separate mines.

Long Plains.

These form the high tableland between the Whyte River on the east and the Savage River on the west, both of which have cut deep channels—sometimes stupendous gorges—in the country in their south-westerly flow to the River Pieman. The plateau is, on the whole, tolerably level, though in places gently undulating, and has a general height of from 1100 to 1200 feet above sea-level. The plain itself, where traversed by the track from Waratah to Corinna, is grassy and treeless, timber being found only where creeks seam the country; but east of the Whyte, the Meredith Range is closely timbered, and the country between the western edge of the plain and the Savage River is also wooded.

A superficial layer of detrital quartz, from 1 to 5 feet in thickness, rests upon the edges of the country-rock, which latter consists of laminated sandstones and quartz schists. In places these detrital stones cohere rather firmly, forming what is locally called cement. The formation is, however, strictly one of quartz, sand, and pebbles, and is not cemented by any secondary silicious deposit. The stones are angular, and water-worn pebbles are not common among them. This drift cannot be described as alluvial; the term detrital would describe it more appropriately. It has undeniably been derived from the weathering of the underlying schists, &c., which are profusely laminated with quartz. The latter

thus liberated and broken up forms the bulk of the drift. The rounded pebbles which have been found in it occasionally have been believed to be survivals from an alluvial covering supposed to have been subsequently carried away. It is more probable that the presence of these is due to former creeks or rivers. There is a body of wash at the head of Townsend's Creek or Madman's Hill, half a mile north of Gill's section, and about 1200 feet above sea-level. This suggests a wider covering of alluvial than is seen now, but it may be only the remnant of a former watercourse. If this country had been under a wide sheet of water in Tertiary times, the wash would have contained stones of granite from the Meredith Range, the same as happens on Brown's Plains, but these have not been observed here. That the country was at that time connected with the Meredith Range is shown by 2 or 3 feet of granite wash occurring on the track for two or three hundred yards at the Big Creek, in the timbered country between Long Plains and the Bald Hill. This wash contains some tin ore (in trivial quantities) and tourmaline, and was evidently deposited before the valley of the Whyte River, which now separates it from the Meredith Range, was excavated. This excavation has, of course, removed the bed of the former stream. But there is nothing in the nature of the drift on the Long Plains generally to necessitate a reference of its source to other than the underlying rock of which the plains consist.

At 24 miles from Waratah and 16 from Corinna is the Bullock's Head, the remnant of a bovine cranium on a stake, which has been a familiar landmark for the last twenty years. It marks the turn-off to Gill's gold sections, and formerly to the Specimen Reef. The Long Plain extends here eastward for half a mile over rolling country, and then connects by a saddle with the Golden Ridge (Gill's), a spur which extends for a mile in a direction bearing a few degrees east of north.

This is the ridge on which Weetman and Crockford made their gold discoveries twenty years ago. It runs through the gold sections for upwards of 50 chains, terminating north at Riley's Creek and south at Cox's Face. The rocks are thinly-bedded or cleaved quartz, micaceous, talcose, and graphitic schists, slates, and crystalline sandstone, striking a little east of north, and dipping at very high angles a little south of east. They are here also covered with a layer of angular stones of quartz, derived from the underlying bedrock.

The creeks on the west foot of the ridge are Gray's and Little Duffer Creeks; on the east side is Jarman's Creek.

The schists have the same strike and dip as those on the plain further east, but appear to be generally more talcose and graphitic than those. There is no evidence of unconformity between the two, and both probably belong to the same geological system, a marked difference, however, being that the Golden Ridge schists are proved to be auriferous. No fossils have been found in any of them, hence their age remains uncertain for the present.

The country changes at the Main Creek on the west, the Rocky and Savage Rivers belt of amphibole schists coming in there, with deposits of magnetite, pyrrhotite, and copper pyrites. This belt has a normal strike of west of north.

To the east the quartz schists of the Long Plains lie between the Golden Ridge and the granite of the Meredith.

The Golden Ridge belt, as defined by the creek channels on each side, is about a quarter of a mile wide. It may possibly extend 10 chains further west to Main Creek, in the latitude of the Reward sections, but I could not explore that part of the country in the time at my disposal. In any case, this zone is that which has furnished the gold for which the locality is famous.

Main Creek and all its affluents have carried gold. Smith's Creek was the richest on the field, though, according to Messrs. Weetman and Crockford, the heaviest gold was got in Gray's, namely, one nugget over 5 ozs. These gentlemen tell me that they always heard that Gray's Creek turned out about 500 ozs.; that Riley's was the poorest, being only payable in patches; that some payable patches were got in Duffer's; and that Main Creek was payable for a few claims below where Riley's empties into it. Mr. Batty told me that Jarman's and Hungry Jack and all the creeks round the Golden Ridge have returned gold. The bank returns show purchases of about 5000 ozs., the greater part of which would be received from Long Plains, the remainder coming from Brown's Plains, Savage, Pieman, and Castray Rivers. This, too, only represents a fraction of the gold won, as it is believed that most of it was taken to Victoria direct. The late Mr. J. Harcourt Smith obtained information to the effect that between 20,000 and 30,000 ozs. may be accepted as the total Long Plains produce.

The gold found in the creeks is, of course, water-worn, but that found in the angular quartz drift on the hillsides, as well as much of that occurring in softened zones of the schist, is ragged, spongy, and semi-crystalline, showing all the signs of precipitation from secondary solution. Some of the gold in the drift on the hill has been deposited by surface precipitation; some of it, no doubt, has been liberated from the

schists in its present form. The nuggets and patches met with underground may be ascribed to the circulation of waters carrying gold in solution into zones of rock favourable for its precipitation.

The absence of quartz reefs has always puzzled prospectors, and although a good deal of quartz occurs in the form of laminæ, veinlets, and irregular bunches, it does not appear to be the source of the gold. The occurrence of auriferous pyrites points to pyritic veins being the original carriers of the gold. It might be thought that these veins ought to be either very numerous or very rich to have furnished all the gold that has been won. It must be borne in mind, however, that the superficial drift represents ages of denudation, and has yielded the bulk of the gold hitherto. A comparatively small proportion has been won from underground. Messrs. Weetman and Crockford tell me that their experience was: (1) That all their veins had a strike approximately east and west, with a southerly underlie; (2) that these veins were gold-bearing only while passing through a greenish (chloritic) schist; (3) that the veins were always gossanous in this schist, but widened out, and carried a good deal of quartz when they entered the hungry-looking micaceous schist, which is the prevailing rock (in this rock they never carried a trace of gold); (4) that the veins were not persistent, but died out, and were replaced by others, and so on.

Messrs. Weetman and Crockford began work here in the winter of 1883, and found the first gold-bearing vein in the latter end of 1884. In 1885 they were granted two reward leases, afterwards held by the Weetman and Crockford Gold-mining company, and now in the name of H. H. Gill. Messrs. Weetman and Crockford have kindly given me an account of their operations, and I cannot do better than reproduce it in their own words:—

"Most of the creeks had been worked out when we got there, so we turned our attention to the sources of all the good gold we heard had been got. Starting in Gray's Gully, where we were told that the gold died out, we picked up a light trail going up the hill on the east side of the gully, and followed it until we came to a patch of 60 ozs. of heavy crystallised gold, about abreast of the mouth of No. 1 tunnel. Between there and the top of the ridge we found three gold-bearing veins, or sets of veins, for there were generally two or three together. The vein afterwards worked by the company was the only one from which we got payable gold. We always believed that it was the source of the patch which we got just below it, though the veins almost

on the ridge were the strongest, but never carrying other than fine gold. We drove on the first-mentioned vein, and won a few ounces of heavy gold in the first 2 or 3 feet, but continued driving 30 or 40 feet on it without obtaining a colour. We then left the district for several months, but returning, sank a winze right under where we got the gold. We followed the underlie of the vein, getting a few colours on the way down, until we reached 35 feet, when we opened out, and in a few feet of driving won 30 or 40 ozs. of gold. As it was very erratic, we put in a tunnel (the company's No. 1 tunnel), and after driving 100 feet, we cut very good gold (and heavier than any we had got before), about 15 feet below the winze. The veins here were stronger and more numerous, and the prospects extraordinarily good. It was at this stage that the property passed from us to the Weetman and Crockford Company. Had we brought our tunnel in 10 or 12 feet lower we should have struck a dead blank, for the company started to follow the veins on the underlie from our tunnel, and sank only a few feet when they lost the gold. They had a long blank, but came eventually on another small patch, from which they got 20 or 30 ozs. by puddling.

"We also found a small vein at the head of Jarman's Gully after working payable alluvial right to it from where the gold was lost in the creek. When we cut the vein we got over 3 ozs. in the first dish, but it gradually died out at about 6 feet down, and although we sank 40 feet further, we never saw a colour again. We found another vein in the same way on the track going down to Duffer's Creek, south of the Reward leases, but although we got 6 ozs. on the cap of it, and followed it down for 40 or 50 feet, getting colours all the time, we never got another patch. We may add that in the first 60-ozs. patch which we got on the hillside, there was one piece 6 ozs. 12 dwts., and another 5 ozs."

After Messrs. Weetman and Crockford's operations, several companies essayed mining in different parts of the belt. Two Frenchmen are said to have prospected towards the northern end of it for several years prior to 1889, and were a long time driving a tunnel, known now as the Frenchmen's Tunnel. The Weetman and Crockford Gold-mining Company, the South Weetman and Crockford Prospecting Association, the Weetman and Crockford South Extended, the No. 1 North Weetman and Crockford Gold-mining Company, the Go-ahead Gold-mining Company, the Long Plains Gold-mining Company, Limited, the Long Plains Extended, the Long Plains Mining Syndicate, are the titles of various associations which have had a more or less transitory exist-

ence, supported by the hope of discovering the source of the rich coarse gold.

The Weetman and Crockford Gold-mining Company was formed in December, 1888, with a nominal capital of £30,000, to work the two Reward claims. It continued work till 1889, puddling the auriferous dirt, when, having spent £2500, it was considered that other means of treating the stuff was necessary, and work was then abandoned.

The No. 1 North Weetman and Crockford Company drove into the spur at the northern end, intersecting iron and copper pyrites in Riley's Creek, which assayed, according to the report at the time (possibly exaggerated), up to 25 dwts. gold per ton. In July, 1889, it was decided to suspend, pending the Weetman and Crockford Company's clean-up, and I cannot learn that the North ever resumed operations.

It must be admitted that the isolated discoveries and surface yields all through the periods, both of Messrs. Weetman and Crockford, and of subsequent owners and workers, have been such as to stimulate search.

Thus Mr. H. H. Gill detached a nugget weighing 27 dwts. from a short drive (No. 6) on the western slope. The late Mr. J. Thureau in 1894 reported an assay by the Government Analyst of stone returning 50 ozs. per ton, though this must have been an altogether unsuitable sample, as well as two ordinary assays of 18 to 19 dwts., and a bulk assay of Gill's lodestuff made at Footscray, in Victoria, yielding 2 oz. 17 dwts. gold, 34 ozs. silver, and 10 per cent. copper. In January, 1896, Mr. Thureau again reported trials of a formation west of Riley's Creek, the friable matrix giving 7 ozs. 12 grs. gold for five loads washed. During his examination, half a pan was washed, with the result of a piece weighing 1 dwt. and some smaller pieces. Mr. David Jones in 1898 stated that, to his knowledge, 50 ozs. of gold were obtained from the Cox's face formation, besides smaller discoveries.

On the South Extended section Mr. George Bottriell broke out of a micaceous slate formation, with small quartz veins, 8 or 10 lbs. of dirt, and washed it, with the following results, reported at the time:—One nugget weighing 24 dwts., several smaller ones from 2 dwts. downwards; in all a little over 1½ ozs. gold.

I was shown a place on the section adjoining Weetman and Crockford's, where I was told that one dish gave 6 ozs. of gold, one of the nuggets weighing over 2 ozs.

The late F. Bennett, who was managing operations for the Burnie Company at Cox's face, showed me some rough, pointed gold specimens obtained from the batter of the face

a few days previously. Mr. F. Batty, the respected prospector who lives on the Reward claims, and has fossicked there for many years, showed me a spot below the house, where he got a 5-ozs. nugget, and told me that he had found two or three pieces of gold, weighing an ounce each. I was told that the largest nugget found in the neighbourhood was obtained by Gray's party in Gray's Creek, and weighed 8 ozs.

Mr. Gill tells me that the late Mr. Buddon, who managed for the Long Plains Syndicate, got 3 ozs. of gold from three dishes of stuff from the bottom of the underlay winze in the Big tunnel. From the same source I learned that Mr. Stafford picked out a 2 ozs. 7 dwts. nugget from a stope west of Riley's Creek; and that another 2¼-ozs. nugget was got by Illingworth on the way up to Jarman's.

On the edge of the aprpoach to Jarman's tunnel, and in the surface of the soft schist, Mr. Batty found a 3-ozs. nugget of crystallised gold. Jarman's Gully, which runs into Riley's Creek, was a very rich one. Mr. Batty states that he made as much as £16 in one morning's work there.

These instances show that gold has been distributed over this hill in very rich concentrations. It is no wonder that numerous attempts have been made to find some main run of the precious metal.

There seem to be four principal gold-bearing formations on this hill, approximately parallel to each other, and following the strike of the country-rocks.

The western belt is Weetman and Crockford's formation, immediately east of which is Cox's formation, which runs through the sections in a direction 10° to 15° east of north and west of south. This is a zone of slaty quartz and talcose schists, about 50 feet wide.

The new formation eastwards is Jarman's, and some distance further east is Gill's formation, 70 to 80 feet wide, consisting of graphitic and other schists, charged with iron pyrites, and carrying gold, silver, and copper.

The boundaries of these formations are not well-defined; they are essentially belts of country-rock in which gold has been met with, either in veins or distributed in the planes of foliation.

The various tunnels have been driven into the hill across these formations, but have not been successful in opening up any permanent run of gold-bearing material.

Thureau's tunnel (charted No. 3), or, as it is called locally, the Blacksmith's Shop tunnel, is on the west side of the hill, about 100 feet below the huts, and has been driven south-east for nearly 800 feet. I understand that the

Weetman and Crockford Company started it under the management of the late Mr. W. Budden. The Weetman and Crockford formation was struck about a chain in, and a short drive north put in on it below the surface show. This drive is in curly, green schist, interlaminated with quartz. A couple of narrow crosscuts were driven east without results; also a shallow shaft was sunk in stuff which gave colours only. In the main tunnel the same formation is seen for 12 feet in width, carrying leaders of quartz following the curves of the schist. Other flat leaders in this tunnel seem to have been gouged out for gold. Before coming to Tarry's drive north in this tunnel, Mr. Gill says he widened the adit at a place where there is a development of quartz seams, and got some gold out of the mullock. Tarry's drive north from this tunnel is in dark schist, associated with white clay. A crosscut west from it shows quartz seams conformable with the curves of the schist; the rock is ferruginous and stained green. The drive is heading north towards Jarman's, and a few yards further would bring it below where gold was got in Jarman's tunnel. Towards its end it was driven partly in a white clay, which has been recommended for paint, turning intensely white under heat. Tarry's drive is probably in Jarman's formation; but between Weetman and Crockford's and this, the main tunnel passed through a wide band of clayey matter, which appears to represent Cox's formation. Sluicing tests of it, however, do not seem to have yielded anything beyond colours.

The Long Plains Mining Syndicate (English) continued the tunnel beyond Tarry's drive, and in a few chains it entered a large body of graphite-quartz schist impregnated with pyrites. After emerging from this, soft white clayey schist is passed through for about 40 feet, succeeded by the ordinary contorted schist, which continues for 15 feet to the face. It is difficult to ascertain the width of the mineralised formation here, as the country-rock is softened, but it has been reported as being 75 feet, which includes the whole belt of altered rock. The more strongly mineralised part seemed to have a width of about 20 feet. I am uncertain whether this is identical with Gill's lode at Riley's Creek; the data are not quite sufficient for identifying it.

Big Tunnel.—Further down the slope of the hill is No. 4, the Big tunnel, 80 feet below No. 3. The syndicate drove this south-easterly to Weetman's formation, and then sank an underlay shaft in a south drive to a depth of 22 feet. A few fathoms above Thureau's tunnel, and at the entrance to Weetman and Crockford's short adit, a winze had been sunk to Thureau's tunnel, and thence down to the Big tunnel

opposite the south drive mentioned above. It was at the bottom of this winze that Mr. Buddon is said to have got 3 ozs. from three dishes. A couple of veins carried the gold in the winze, which is supposed to be in Weetman's formation. At the entrance to the tunnel Mr. Gill got over 2 ozs. in the dish, including a 25-dwts. nugget, all from schist, with no quartz attached. This tunnel has been driven about 300 feet, but not quite far enough to intercept Cox's formation.

Jarman's Tunnel (No. 8).—This is on the east side of the hill, with a long approach driven west, but the tunnel itself is driven south about 250 feet, in an opposite direction to Tarry's drive in Thureau's tunnel. These two drives are in a gold-bearing zone parallel to and between Cox's formation and Gill's lode. A little way in Jarman's tunnel 8 or 9 ozs. of gold were obtained from a small patch, and a winze was sunk. The formation is wavy schist, with lenticles of quartz. This was followed down in the winze, and coarse gold obtained in the ferruginous parts of the schist 26 or 27 feet from the surface. The Government Analyst's assay note of material from this in September, 1895, is:—Gold, 1 oz. 18 dwts.; silver, 18 dwts.

O'Brien's Tunnel.—This is further north, and is also in contorted schist rock, but was started just east of the line of Cox's formation, which it has thus missed. After being driven south-easterly for 150 feet, a short drive south was put in on about the strike of Jarman's formation, but with what result I do not know.

Crockford's Tunnel (No. 10).—This is some distance south of the huts, and on the west slope of the hill (on one of Bennett's sections). It was driven below where gold was got—6 ozs. to the dish—but the underground work was, I understand, fruitless.

Batty's Tunnel (No. 9).—This is driven opposite to the preceding, on the east side of the hill, but lower down, and passes below the extension of No. 10. It first goes through barren rock and reddish clay, and intersects the formation (Weetman's or Cox's), which, however, has not yielded anything beyond colours.

Davis and Foster's Tunnels.—These are situate 500 feet further south, and have been driven in opposite directions, over 100 feet each way, but appear to be outside the line of Cox's or Weetman's formation.

Cox's Face.—This is a few chains north of the preceding tunnels, and is on the south section of Bennett's. It is an open-cut for over a chain into the hill, between 30 and 40 feet high, exposing a face or section of contorted, silvery, micaceous and graphitic schist, interleaved with seams and

lenticles of quartz. These all dip at a high angle to the south-east. From first to last, I understand, about 80 ozs. of gold have been taken from this face by washing. Mr. Gill and the late Mr. Thureau turned less than half a sluice-head of water on, and washed the schist for a few hours, obtaining by sluicing 3½ dwts. coarse crystalline and some fine gold. A rather decomposed yellowish part of the formation exists on the west side of the face; it is locally called the lode, and the best gold is said to have been obtained from it, though the gold is not confined to this portion of the formation. Sluicing the face debris was going on at the time of my visit, with indifferent results. It is intended to drive into the face at 40 feet from the top, and crosscut through the formation. A shaft was being sunk with the idea of opening out and driving under the open-cut. A few colours of gold had been obtained from the shaft. A trial on a good scale will be made, and until then the value of the formation can hardly be defined. I was informed that the gold found in the face came from soft carbonate of iron seams. It seemed to me also that the rusty patches in the lenticles of quartz might represent auriferous pyrites.

This face is at the south end of the Golden Ridge, and the line of its strike all along the crest of the hill has been taken to be a line of lode, and has been the objective of all the tunnels referred to above. I am hardly prepared to say that this is a definite and independent lode-line. I am rather disposed to think that there are several discontinuous and parallel belts in the hill favourable in some parts of their course for the deposition of gold, and that transverse sections of the hill from west to east disclose now one and now another of these belts. Thus, sometimes the central line of schists is mineralised, and then called Cox's formation; sometimes the schists west of this have yielded gold, and bear the name of Weetman's formation. To the east of the central line another belt exists, Jarman's or Tarry's formation. Further east again is Gill's lode or formation.

Falls Tunnel, on Riley's Creek.—This is lower down, and east across Gill's lode towards Jarman's Creek. It has 19 feet of approach, and about 30 feet have been driven in the solid. At the entrance at creek-level there is a strong development of pyrites in graphitic schist, associated with veins and bunches of white quartz. The tunnel passes right through the formation, which is succeeded in the end by laminated quartz schist. At 20 feet in, a winze has been sunk 17 feet, and a crosscut driven across a wide lode. Inside the entrance of the tunnel is a short drive along the

lode, from which some ore, consisting of copper and iron sulphides, copper and lead carbonates, was assayed by Mr. W. Dixon, Footscray, returning 2 ozs. 17 dwts. 12 grs. gold, 34 ozs. 15 dwts. 20 grs. silver per ton, and 11·2 per cent. copper.

The iron pyrites contains a little gold, for a sample of it which I took was assayed by the Government Analyst, and yielded 2 dwts. gold per ton and a trace of silver.

The formation in this adit is more like a lode than I have seen elsewhere on these properties.

Falls Tunnel, on Riley's Creek.—This is lower down, and a couple of chains further north. It is also driven east and across a lode zone: the end is over 250 feet in, and in schist. At the entrance, the country is contorted graphitic schist, seamed with quartz. Some distance in, leaders of quartz cross the strata, and green copper stains indicate the presence of a lode or deposit. A small vein of copper pyrites was cut here. Further in, a zone of quartz and pyrites crosses the level, running with the schist, and has been opened upon north and south without any particular development. This would correspond in position with Gill's lode in Riley's tunnel, but whether it is the same as that cut towards the end of Thureau's tunnel is doubtful. I am almost inclined to think that if the latter formation is persistent, it is still ahead of the end of the Fall's tunnel. A sample which I took from the pyrites in this tunnel was assayed by Mr. W. F. Ward, Government Analyst, and yielded 4 dwts. gold per ton, and a trace of silver.

There is a larger development of quartz connected with the mineral at the northern end of the field, and though the quartz may not be auriferous, its associated minerals may be, and this indicates the desirability of more exploratory work. But this cannot be undertaken without a proper provision of capital. The machinery site has been chosen at the junction of Riley's and Gray's Creeks, and a tunnel driven from there to come under the Falls adit would be over 1000 feet in length. It would intersect Cox's formation in its course, but I fear the work would be of a magnitude out of proportion to present prospects. At the same time, choice must be made between long adits and deep-sinking, for the results of all the shallow trials already made support the view that if anything is to be found underground, it must be sought at a depth. The numerous discoveries which have been made make it pretty certain that there must be gold below the present workings, but how much or how little has to be proved. The distance existing between Cox's face and the central tunnels is considerable,

and suggests a similar distance underground along which gold-bearing veins may be found to extend. Whether the deep deposits are in narrow pyritic veins, or in larger bodies of quartz impregnated with pyrites, it is impossible to say. What can be said now is that these schists are gold-bearing, but not payable at the present depth of workings. My opinion is that not much change will be found until the rock below creek-level is reached.

More than one plan of working the properties has been put forward. My view is that adit-driving will leave matters pretty well where they are at present, and that to get to the source of all this precipitated gold, it will be necessary to resort to shaft-sinking. The ground above water-level is simply a zone of distribution: the primary deposits must be looked for in depth.

Pari passû with this work, an attempt might very well be made to ascertain whether it would not also be profitable to treat the hill-drift *en masse*. There are no doubt many places on the ridge and slopes where patches of auriferous dirt have escaped notice, and these would be brought to light under a system of systematic working. There would, however, have to be some scheme for water before launching out on a large scale. Meanwhile the hillside should be marked out in sections, and carefully sampled in bulk. This should place the owners in a position to see whether the hill-drift justifies a larger expenditure, and during the work something might be learned of the different runs of gold-bearing material.

Lynch's Tunnels.—These are a few chains north of Riley's Creek. Work had been suspended shortly before my visit, and I was at a disadvantage in forming an opinion.

The lower tunnel has been driven north-westerly at about 60 feet in, in a friable sandy and quartzose formation, and then following this on its course. The country-rock consists of micaceous and talcose schists, and the end of the drive is in friable ferruginous quartz sand, with some lumpy quartz in the roof. Half-way in the tunnel, I noticed a lump or lenticle of quartz 7 inches thick, and outside were several large blocks from 8 to 10 inches thick.

The upper tunnel is further up the creek, and has been driven in decomposed talcose schist, with irregular veins of quartz. Half-way in, a parallel tunnel has been driven on a seam of quartz in the same soft schist rock.

The indications for gold are promising, but the metal is more likely to be associated with the rusty country-rock than with the quartz. On the surface above the lower

tunnel loose gold has been picked up in the moss at the roots of trees.

Rio Tinto.

The Rio Tinto lodes, as seen on the Savage River, consist of lenses of magnetite, hematite, and pyrrhotite encased in hornblendic and serpentinous schist (miscalled diorite), which forms a belt of considerable width (over half a mile), striking a little west of north. It extends to 4 or 5 miles north of the Savage, and 10 miles south of it, to the Rocky River district. Owing to the deflection of the needle by the large masses of magnetic iron, the compass is of little use near the Rio Tinto Mine. Mr. David Jones has recorded a local attraction of as much as 180°*. At intervals all along this line deposits of magnetic iron ores and copper pyrites occur, accompanied by characteristic minerals (nickel, cobalt, talc, tremolite, asbestos, dolomite, &c.), which point to the action of identical mineralising agents throughout the belt.

The Rio Tinto lode was originally discovered by Surveyor-General Sprent. It was imagined at the time that the huge outcrop was, or might be, the exposure of a tin-ore deposit, and when this anticipation was not realised, the discovery was left severely alone for some time. However, a little prospecting was carried on subsequently, and the line of lode fell into the hands of two associations, one of which, the Orluzza Gold-mining Company, began work on the north side of the Savage River, and the other, the Savage River silver-prospecting Company, carried on operations on the south bank.

The Huzza Company, either wholly or in part, drove two tunnels at about 15 feet above the river on the course of an immense formation of hematite and magnetite, containing iron carbonate, iron pyrites, pyrrhotite, and a little copper pyrites, with variable proportions of silver and gold. These tunnels are nearly half a mile below the Savage River bridge. They were driven northerly, and they are within 30 feet of each other, consequently they are closely parallel adits. One (No. 2) follows the eastern side or wall of the formation for about 100 feet; the other, the western tunnel (No. 1), is driven 180 feet. From the former a crosscut has been driven 40 feet north-westerly towards the latter, passing through lode-matter all the way (magnetic iron ore, iron and copper pyrites, with a little asbestos).

* An Extensive Iron Formation, West Coast of Tasmania, D. Jones, Trans. Aust., Inst. M. E. Vol. V. 1898, p. 122.

Stains of copper sulphate and carbonate occur freely on the walls. Serpentine and tremolite are also associated minerals. The western tunnel is in lodestuff intermixed at first with dolomite, followed by solid iron ore and pyrites alternating with graphitic or talcose schists.

The whole lode, judging from its exposure in the north bank, appeared to be, together with intercalated schists, about 300 feet in width, and forms a bold ridge, over 700 feet in height, cleft by the Savage River. The country-rock on the west side of the lode is greatly decomposed, but appears to be hornblende schist of the Rocky River type.

The Savage River Company started work south of the river in the beginning of 1891, driving a crosscut to intersect the lode at a depth of 400 feet. Auriferous lodestuff was met with after about 50 feet of driving, and the company published assays of samples from the face, as follows:—

No. 1.—8 dwts. 20 grs. gold; 4 ozs. 4 dwts. silver; 22·25 per cent. copper.

No. 2.—Iron pyrites containing 1 oz. 19 dwts. gold; 5 ozs. silver.

Assays from the lode-capping were published, as follows:—1 oz. 16 dwts. gold; 5 ozs. silver; 1 oz. 18 dwts. gold; and one containing 5 per cent. lead and 9 ozs. silver.

From these and other assays (certainly not representative samples) the inference was drawn that a large body of payable lodestuff existed between the tunnel-level and the river. A deep tunnel near river-level was suggested, and a tramway was already spoken of to connect the mine with the Pieman down the valley of the Savage, an estimated distance of 11 miles.

I cannot find in the records of that time any mention of the above companies having discovered remunerative parts of this great deposit, and the next stage in the history of operations here was the formation of the Rio Tinto Company, No Liability, in 1895, with a nominal capital of £15,000 (£8000 paid up). It began work on January 1, 1896, and continued operations for a couple of years. The Chairman's report of 14th November, 1898, states that altogether 1550 feet had been driven, of which about 1400 feet had been on ore (this must be interpreted as meaning lode-matter). The conclusion arrived at was, that it was necessary to sink on the lode to test the value of the unleached portions of the various deposits. The existence of chalcopyrite in vein form in the magnetite at the bottom of the winze was considered as strongly encouraging deeper mining. By this time £13,390 had been expended, and it

was decided to close the mine down pending construction of the road and consideration of the class of machinery required, &c., as well as the introduction of necessary fresh capital. Since then there has been no further work on the property.

A No. 2, or eastern lode, is separated from the main lode by a quarter of a mile of dolomite and schist country. The adit on this was blocked near the entrance, and not in a condition to enter it. Ores of brown and red hematite, pyrite, and a little copper sulphide were stacked outside.

A huge lode formation like that of the Tinto will naturally vary in its metallic contents in its different parts. An average sampling of the whole formation would, of course, differ in results from the assays of selected specimens, and each would be misleading in its own way. What is necessary is average sampling of the portion intended to be worked. Hitherto no payable portions of any size have been discovered; but numerous samples from various points have been assayed, and serve to indicate the possibilities rather than to disclose the value of the lode worked.

The following assays are taken from the reports and certificates kindly placed at my disposal by F. G. Duff, Esq., the then chairman of directors of the Rio Tinto Mining Company:—

(1) No. 1 lode in No. 4 adit, a vein of chalcopyrite: gold, 2 dwts. 6 grs.; silver, a trace; copper, 29 per cent.

(2) No. 2 lode, gossan with pyrites, assayed every 3 feet: gold, from trace to 2 dwts. 12 grs.; silver, traces.

(3) No. 1 lode in No. 4 adit, 169 feet of lode-matter passed through, and assayed every 2 feet: gold, from traces to 1 dwt. 7 grs.; silver, from traces to 6 dwts. 12 grs.

Winze chamber in No. 4 adit, bunch of pyrites: gold, 2 dwts.; silver, trace; copper, 1½ per cent.; nickel, trace; cobalt, 2 per cent.

Lode in winze: gold, up to 1 oz.; silver, trace; nickel, trace; cobalt, trace.

Mr. A. J. Bolton made the following assays:—

No. 2 lode, melaconite in rise: gold, 3½ dwts.; silver, trace; copper, 21·11 per cent.

No. 1 lode, No. 1 adit, magnetite and pyrites: gold, 2 dwts. 4 grs.; silver, trace; copper, trace.

No. 1 lode, No. 2 adit crosscut, magnetite: gold, 4 dwts. 8 grs.; silver, trace; copper, trace.

No. 1 lode, No. 4 adit winze, magnetite: gold 1½ dwt.; silver, trace; copper, trace.

No. 2 lode. Samples from 1½ ton ore stacked outside adit, and broken 130 feet below surface: gold, 6 dwts. 13 grs.; silver, trace; copper, 1:5 per cent.

Various assays made on the mine at the time gave still higher figures.

I did not visit the No. 4 workings, which are some distance up the mountain.

There is reason to believe that gold is associated with some of the magnetite of this belt, in the form of nuggets of appreciable size, and it is not improbable that spots exist in the lode in which gold may be found in payable quantity. Copper, too, may be discovered in remunerative quantities, but the extent of lode-matter is so considerable that the work of proving it will take time. The sampling of it on a proper system will certainly be a work of some magnitude. The proving of this huge metalliferous body could be done better by the use of the diamond-drill than by tedious and expensive driving and sinking. Even then the work would be formidable. I estimate that the rate of boring in this formation would be about 150 feet per month, and it would take three or four months to bore into the lode from the outcrop on the top of the hill down to river-level. Near the river-bank, however, places could be selected on the somewhat steep slope, where bores could be put down easily to below water-level.

The leaching which has gone on for so long, and is still proceeding, is doubtless taking some of the copper down in the lode to a horizon of enrichment at or near the ground water-level, and to get at that zone, the work of proving must be taken down below the river. These large deposits have not yet been sufficiently studied to be able to determine how much of the iron oxide is the result of oxidation of pyrites, but I believe it is comparatively a small proportion. Sulphidic ores are associated with the oxide, intimately mixed with it, and veining its mass; but there is reason to believe that the latter is an independent precipitation. Consequently, the redeposition of metal at water-level may be expected to be on a limited, though perhaps remunerative, scale.

Corinna Track on Long Plains.

On the track where it passes through a creek gully, about a mile north of the Bullock's Head, is an exposure of a greenish schistose rock, which I noticed also on my former

visit as possibly being favourable for mineral. I examined it more particularly this time. It is evidently of sedimentary origin, in a chloritised condition, and I do not think it likely to prove ore-bearing.

HEAZLEWOOD.

This district, fronting on the main road between the 12 and 16 miles from Waratah, extends to, and abuts on, the Whyte River field at the Godkin and Confidence Mines. It is essentially an area favourable for mineral deposits. In the first place, the large exposure of serpentine carries nickel ores, as at the Lord Brassey, and Jupps' mines on Nickel Hill; shortly before my visit some sections had been pegged out, and ore-winning was to begin at once. No work has been done on the nickel mines since my previous visit. Previous work, at shallow levels, had not resulted in payable quantities of the ore, which also differs in constitution from the ores usually delivered to nickel-smelting works. If more regular concentrations could be discovered, nickel-mining might easily develop into a serious industry.

Great things were hoped at one time from the Nickel Hill, but, though a long tunnel and crosscut were driven, only thin nickeliferous veins were met with. These were followed for a long distance, without improvement, at from 80 to 100 feet from the surface. There is no necessary reason why the ore should be better at a greater depth, but there is a reason why it should prove to be more solid at the original margins of the serpentine rock; and further prospecting should have this in view.

Again, at a later period the granite of the Heazlewood was formed, intruding into the serpentine, limestones, sandstones, &c., of the country, and injecting its vapours and mineralised solutions great distances into these rocks. The result of this action, attended probably by the absorption of some of the invaded rock-material, was to produce the great variety of actinolitic and quartz-actinolite rocks now found there, and to deposit the mineral contents of the solutions in the lodes, &c., so numerous all along the granite contact-lines. These ores are silver-lead and copper pyrites; and the contact effects are widely spread. Wherever the great mountain mass of the Meredith Range impinges upon the neighbouring country, prospecting may reasonably be prosecuted all along the line.

Wealth of Tasmania Copper Proprietary.

This property comprises three sections, about a mile south of the main road at the 14 miles, and along the track

to Mount Stewart. Work has been started by this Melbourne company to test the deposit of copper pyrites known as "Binks' show." The outcrop is a blow of solid iron and copper pyrites, from which a sample taken by me assayed up to 39 per cent. of copper. This surface blow lies in decomposed magnesian rock, difficult of identification, and indeed the outcrop has such an isolated aspect that it is believed to have slipped to its present position from higher up the hill. I think, however, that it is *in situ*.

The former owner has driven a tunnel, a few yards below it, in soft decomposed rock with hard kernels. Drives north-east and south-west have been put in from the tunnel. The north drive is in greenish rock (actinolitic or serpentinous), with veins and splashes of copper pyrites, and soft digs containing copper oxide; lumps of bornite were seen outside on the tip. The south-west drive is for 30 feet in country-rock; no ore in end, but pug still a feature, containing on the footwall side a little native copper, bornite, and malachite. This drive is only a couple of fathoms from the surface, but is evidently not on the lode, though a little copper ore is visible at its entrance.

A few fathoms north-west of the outcrop, the present company has sunk a shaft 60 feet, and driven toward the ore with a view of intersecting it. When I was there the drive was in 60 feet, in enstatite rock (composed exclusively of the magnesian mineral enstatite, with serpentinous alteration), which for practical purposes may be called serpentine. Eight feet behind the end, was a 2-feet band of dolomite with a little zinc-blende, iron, and copper pyrites, the latter generally on the faces of the joint planes. The serpentine is occasionally indurated, and separates into little lumps of harder rock (dolomitised and resembling hornstone). In the tunnel, about 30 feet from the shaft, is a seam of red jaspery rock, which broke off into boulders in working. It is probable that a contact exists here between serpentine and granite, forming actinolite rock, in or near which, copper ores have been deposited. Since my visit, the tunnel has been driven 60 feet further in the same serpentinous and partly dolomitised rock, and ought now to be close on the lode.

Between this mine and the Heazlewood Mine, some jasperoid hornstone-looking rock has been worked in boulders; and some of these are stacked in the paddock for consignment to Melbourne. I am told some favourable gold assays were obtained from this stone, but some samples which I took were assayed by Mr. W. F. Ward, with the result of only traces of gold being found. About a

quarter of a mile south-west of the shaft are some bold cliffs of massive chloritic rock running north-west, plentifully but irregularly besprinkled with copper pyrites. In places quite good copper ore can be selected; and a fair-looking piece, which was assayed in the Government laboratories, gave 7 per cent. copper, 1 oz. silver, and traces of gold.

The rock is very tough, and care would have to be taken in the choice of working points, for the distribution of the ore is not constant, the mineral occurring in places in the massive rock. There is a face of this rock, some 20 feet high, in a ridge extending for 2 chains or more. A few hundred yards north-east, a bluff of actinolite rock forms the opposite hill, but there does not seem to be any copper in this. Jasperoid rock in the actinolite contact-country occurs here and there in the district. South-west of the Heazlewood Mine shaft, a small trench has been opened in this reddish rock by the Lyell people; a little copper pyrites is present in it.

On the track out to the Bell's Reward, a similar jaspery formation (apparently in syenite), with no metal in the outcrop, however, has attracted attention; and a shaft has been sunk some 30 feet deep, but is rather far away from the stone. On the hill to the west, a similar rock carries some iron pyrites, and has been worked a little.

Bell's Reward.

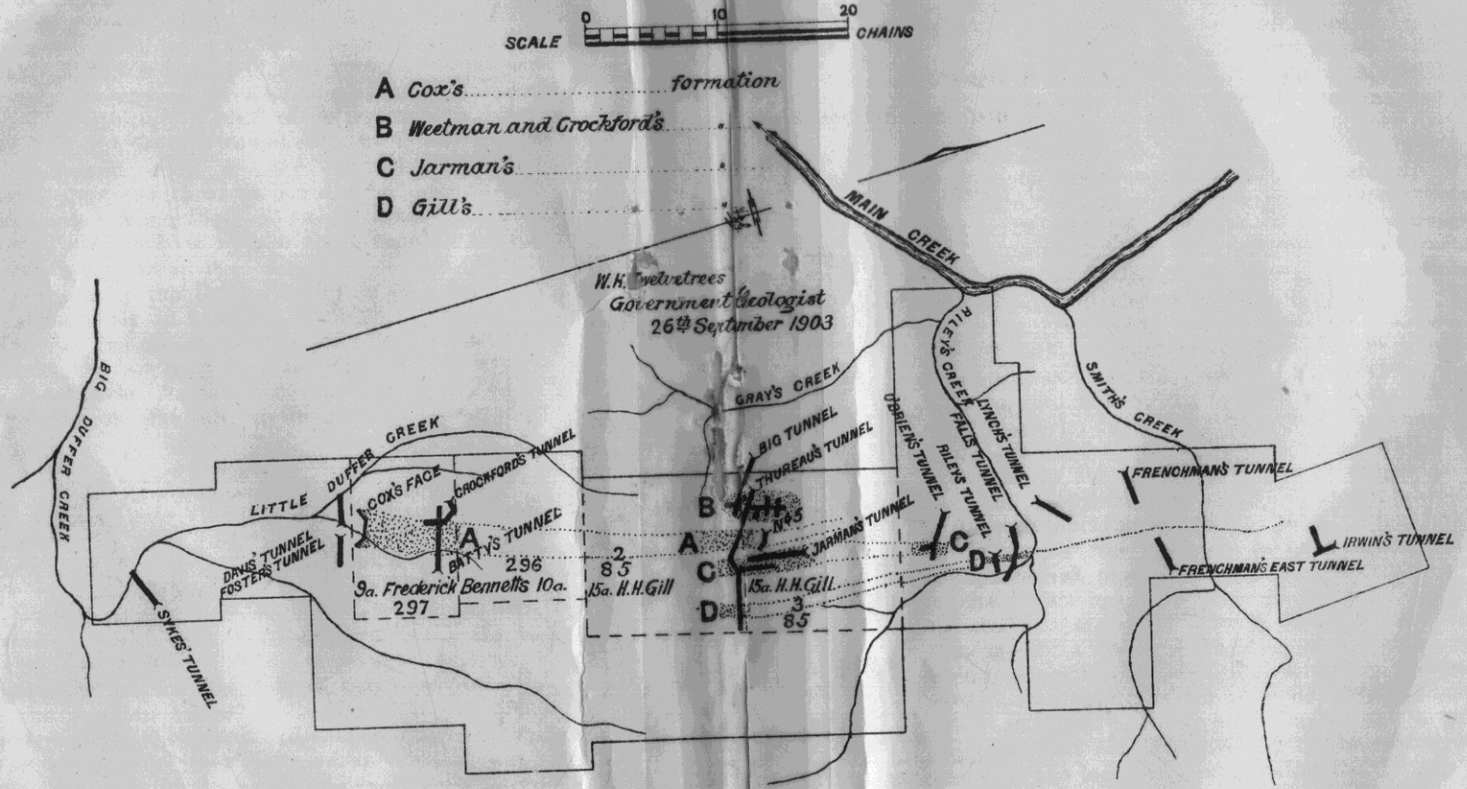
This old mine, situate about half a mile south of the main road at the 13 miles, has still retained the confidence of Mr. W. R. Bell and his colleagues; and a good deal of exploratory work has been done since my last visit. It, with the Discoverer and the Godkin Extended, is in a contact lode-belt, which runs south-easterly to the Godkin Mine at the Whyte River. The hornblende granite, or syenite country, is on the east side of the creek, and impinges on the Silurian sandstones, slates, and limestones on the west, or Bell's Reward, side. The result of this contact is seen in parallel lines of gossan, in veins of galena, zinc carbonate, and sulphide, and disseminations of silver and zinc and lead ores in the sedimentary rocks. All these are due to processes connected with the granite intrusion, and the strong bodies of gossan have nourished a belief that remunerative deposits exist at a depth; especially in view of the fact that the gossan itself is often seamed with veins of good sulphide ores, the possible survivals of primary ore, long ago decomposed, and now re-concentrated

(21).

21/35

Plan 43

PLAN OF
AREA FORMERLY HELD BY THE "LONG PLAINS MINING COMPANY"



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at ground water-level. This concisely expresses the reason for continued work on this belt.

Rich ores are known to exist in variable quantities at different points along the line; native silver and chloride of silver occurrences have raised high hopes. The reports of the Godkin Silver-mining Company in 1890 and 1891 published assays of 212, 218, 300, 600, 100, 110, 116, 200, 107, 158, and 85 ozs., also 41 ozs. (seconds), silver per ton of veinstuff; other, of gossan, 2½ to 12 ozs. per ton. Some of these assays between 100 and 150 ozs. represented bulk parcels. Some of the Bell's Reward gossan ore has contained as much as 104 and 105 ozs. of silver, with only 3 per cent. of lead. This time I was able to examine the main adit (Bottrill's) on Bell's Reward, which has been driven between 600 and 700 feet south-westerly into the hill, to intersect the line of lode from the Godkin Extended. It begins in soft slate, and then passes through barren limestone for about 130 feet. A few feet of rotten sedimentary rock were then met with, and afterwards soft material with traces of silver. Gossan was struck, but it does not seem to go down. A drive was started north, but the ground ran in, and a drive south was carried for a couple of sets in muddy stuff. Limestone succeeds to the gossan, and for about 15 feet along the limestone some native silver, galena, and zinc are said to have been met with. A short drive north has been put in on mineralised limestone, and a drive south for 50 feet, with a small winze half-way in. The limestone in the main tunnel forms a belt of about 130 feet, and is succeeded by about 200 feet of quartzite. About 170 feet behind the end of the tunnel, a few feet have been driven north and south on a hanging-wall of quartzite, with adherent puggy matter, and soft slate charged with galena. This has been believed to be a lode fracture, as the wall is remarkably smooth, but I am inclined to think it is merely a plane of bedding, along which mineral has been deposited. No water was struck in the tunnel until a little further in, where it is depositing oxide of iron. The tunnel end is in limestone, and bears south-west, but has been bent a little too much to the east to be at right angles to the lode-line. It is below the flat top of the hill, and should be driven further in to prove the ground ahead. Between 30 and 40 tons of ore were sold last year, but some of it did not realise expenses incurred, as this portion of the produce only contained from 25 to 30 ozs. of silver, and as much as 4 and 8 per cent. zinc.

The main shaft was sunk 154 feet, and at 140 feet a drive was opened out in each direction, but water was struck

suddenly, and the shaft was filled in a few minutes, the men escaping with difficulty. South of the tip, a zinc ore (carbonate) formation is exposed, near the contact of the granite with limestone; it has been cut through obliquely for about 13 feet. A sample assayed in the Government laboratories returned 1½ oz. silver per ton, and 25 per cent. zinc. This is a lower percentage than the calamine ores of Spain and Belgium, which run from 30 to 50 per cent. of zinc. The indications are that this will make into a zinc-blende deposit in depth. The deposit here seems to be on the strike of the large gossan formation passed through in the low tunnel of the Discoverer Mine further south, and it is quite possible that it may be a continuation of it. At all events, it occupies the same position geologically, being on the contact-line; and that is the important feature, for the line of gossan is not a straight one, and the mere agreement in strike consequently does not count for much. In the Discoverer tunnel gossan, however, there is neither lead nor zinc at present. The tunnel south of the Bell's Reward huts, now fallen in, was driven about 60 feet, but did not cut anything which could be called a lode. Beveridge's tunnel, the northern upper one, has been driven nearly 100 feet, passing through 20 feet of sandstone containing chloride of silver, and 24 feet of gossan. About 100 feet south of the main adit, but a little higher up the hill Mr. Bell has recently driven a cut into the hill for about 60 feet, with a view of intersecting the silver chloride-bearing sandstone. A black oxidised formation in sandstone, sprinkled with galena, was met with, but at 40 feet the drive fell in. We do not appear here to have a lode, but sandstone impregnated with mineral. Lower down, another tunnel 60 or 70 feet intersected the same black formation, containing bright galena and vughs of crystalline ore. This tunnel is in soft clay, and has also fallen in. The formation could be cut lower down, but at any depth accessible to adits it will probably be of the same character. The gossan on this mine seems to occur as irregular patches rather than persistent lodes; and I am disposed to think this is due partly to the irregular fracturing of the country-rock, and partly to the formation of cavities in a soluble rock such as limestone. The fractures have created channels through which solutions could circulate, and the porous shattered rock has been permeated with mineral. All this porous country, being well within the zone of surface waters, it would seem probable that a zone of enrichment exists at water-level. To reach this, shaft-sinking is necessary; any sound plan for developing the property must

include this feature. It may be that these gossan patches are not constant in depth; that they are in fact not lode cappings at all, but irregular concentrations. If they were heavily charged with mineral, they have parted with the most of it, and it cannot be recovered, except by going down after it. The main line of gossan, however, probably descends along the contact-line to the zone of the primary ores.

The Discoverer Mine.

Adjoining Bell's Reward, to the south-east, are the two Discoverer sections, 20 and 40 acres. Four tunnels have been driven into the hill. The low tunnel, driven south-westerly, first passed through 150 feet of clayey decomposed granite rock, and intersects a 100-feet band of ferro-manganese gossan, enclosing lumps of kaolin, but without any ore. On the west side of the gossan is clay, and then limestone. The same gossan and succeeding country is passed through also by a tunnel above this one. Vertically above the end of this, an upper tunnel has been driven. The entrance is in hill-drift and clay for about 50 feet, then a gossany patch is met with; after this clay again, then limestone dipping easterly. In the roof, large blocks of gossan occur, lying on the limestone, but this gossan does not pass under foot. About 250 feet above the lowest tunnel, and 90 feet below the crest of the hill, is the highest tunnel, driven about 170 feet. At its entrance, and above the roof gossan in the tunnel below, is gossan for about 45 feet, which is succeeded by limestone for 25 feet, replaced by clay for 70 feet, and then yellow fossiliferous sandstone to the face. The fossils are casts of the remains of brachiopods of Silurian age. Still 50 or 60 feet higher up the hill, is a shaft which has been sunk 50 feet in hill-drift and clay. The surface of the hill all the way down is strewn with lumps of gossan. If the gossan outcrops denote separate lodes, there must be several of these, but from the appearances generally, I believe they represent irregular channels or cavities in the either broken or soluble rock. Still there is no reason why they should not carry concentrations of valuable ore, and they all doubtless have some connection with the main lode-line, which will be found to follow the irregular contour of the granitic rock. The granitic-looking rock is to be seen most favourably at the Godkin Mine, on the Whyte River, and there it is found to be syenite (quartzless granite, the constituents of which are orthoclase, oligoclase, chloritic pseudomorphs after hornblende, and a little quartz). The limestone

appears to be the rock in which, or between which and the syenite, the strongest gossan bodies are developed. This is natural, as it is a soluble rock, and lime appears to have been a very general precipitant of minerals from solution.

Godkin Extended, and North Godkin.

Gossan is seen all along the track to the Godkin Extended section, and at the Godkin North shaft a large outcrop occurs, about 50 feet wide, consisting of iron oxide, with a good deal of black oxide of manganese, mixed with aluminous country-rock. In a trench, above the engine-house at this shaft, the gossan has been again exposed, and is associated with quartz. There is a slight curve here in the gossan line, which, going north, either branches, or bends somewhat to the west. Standing at the engine-house and looking easterly, the hill country is granite (syenite); westerly it is sandstone, more or less indurated or metamorphosed; between the two sets of rocks is the gossanous zone, consisting of oxidised iron and manganese, intermixed with country-rock (aluminous or siliceous according as the granite or sandstone material predominates). It is moreover very possible that the gossan occupies a space which was once a strip of limestone, but since dissolved away.

The Godkin North shaft was sunk to a depth of 150 or 180 feet, and a communication exists between it and No. 5 tunnel by a drive north from the latter, along the gossan line. Some shallow winzes were sunk from the drive, yielding payable ore (reported by the manager at 45 per cent. lead and 85 ozs. silver), and cross-cutting from the drive showed the limonite and manganiferous gossan, with quartz leaders, to be silver-bearing up to 12 ozs., and 20 to 50 feet wide.

The tunnel could not be entered at the time of my visit, but it has been driven north-easterly for a distance of about 800 feet. For nearly half the distance it passed through sandstones, and before intersecting the gossan line a bed of ore-bearing pebbly sandstone or conglomerate was met with. Boulders of banded ore are seen outside on the tip, showing the country to be, in places, loose and porous. The rocks have evidently been disturbed by intrusion, and water-channels have formed. Information is to the effect that these ore boulders were embedded in black puggy matter in the conglomerate. The tunnel-level is about 100 feet below the collar of the north shaft. The orestuff on the tip consists of conglomerate and carbonate of iron, with a little galena and zinc-blende, too poor, I consider, to be treated

as it is. The tunnel has been driven right across the gossan line, and, from its length, it must have passed into the granite country.

On the Godkin Extended, an upper adit, 80 or 90 feet below the gossan outcrop, has been driven a little east of north, in friable white sandstone, about 150 feet. A winze has been sunk 100 feet to the level below, which was a long one. In the latter level, loose boulders of rich banded ore were met with, as well as slugs of sulphide of silver. The sandstone contained secondary blende, and fossil casts of univalves (Silurian) were detected in it. The main gossan line is still some distance ahead of the end.

The Godkin Extended Amalgamated.

A new syndicate, operating the three properties of Bell's Reward, Discoverer, and Godkin Extended, is now driving a low-level adit. The Godkin Extended Company won and sold a considerable quantity of ore averaging 114 ozs. of silver, which was, however, so highly zinciferous, that it did not pay to continue export with high transit charges. The loose nature of the ground, affording free access to oxidising agents, makes it probable that extending the abandoned upper workings, or any new work at this level, will not open up any quantity of the primary ores. The need for a lower adit is patent, and this is what the new syndicate has undertaken. The prosecution of work on this lode will ultimately lead to deep shaft-sinking; the low tunnel of the Victorian Magnet Company will eventually form a drainage outlet, and enable shaft-sinking to be undertaken with freedom from water difficulties.

Magnet (Victoria) Silver-Lead Mine.

When I was here, a large drainage tunnel was being driven from the Whyte River, to connect with the old 110-feet level in the Godkin Mine. The manager stated the intention was to drive and overhaul the old workings. Once the drainage is effected, the old works can be thoroughly examined, and the old main shaft put in working condition. Sinking at the north shaft can also be restarted, and the lode-belt thoroughly explored at depths considerably greater than previousy worked.

The deposition of ore on all this line of property, Godkin, Godkin Extended, Discoverer, Bell's Reward, has taken place under identical conditions; and if deep work is

successful in any one of them, there will be sufficient warrant for undertaking it in the others. The rich returns obtained from the lode at the Godkin certainly justify further endeavour. It would be folly, in the face of such yields, to supinely resign work because of the irregularity and patchiness of the ore at shallow levels and in the oxidised zone. Although the lode-line through three properties is geologically and essentially one and the same, the indications are that it has split in the northern Godkin section, going north. The main Godkin lode further north is represented by the large gossan belt in the low tunnel of the Discoverer, and keeps all along close to the contact-line: the western leg, or Godkin Extended lode, probably feathers out into the irregular gossan patches to the west, on the Discoverer and Bell's Reward. The remarks as to deep mining apply with equal force to that end of the lode.

The following are figures of the smelting returns for ore despatched by the Godkin Silver-mining Company for the half-year ending 1st September, 1891:—

	tons.	cwts.	qrs.	lbs.		Assays. Silver, ozs.	Lead, %
Good galena, No. 4 tunnel, from the native silver lode.....	14	2	2	18	=	156	27
Seconds galena.....	2	6	1	0	=	67	9
Manganese gossan.....	0	16	0	14	=	57	30
Galena from near surface.....	8	17	3	17	=	70	12
Seconds galena.....	0	1	0	22	=	55	6
Manganese gossan.....	0	10	0	27	=	56	12
Total	26	14	1	14			

The above was smelted at Dry Creek Works, S.A., and by Kennedy and Sons, Hobart.

For the half-year ending 1st March, 1892, two shipments were made:—

tons.	cwts.	qrs.	lbs.		ozs.	
3	18	3	25	=	41	silver to Kennedy and Sons, Hobart.
4	9	3	0	=	107	,, Clyde Works, Sydney.

These are, as far as I can see from the published reports, the total sales of ore by the company. The native silver "lode" was considered by Mr. Montgomery not to be a true lode at all, but a part of the limestone, fractured, and impregnated with galena in the cracks and joints.

Confidence Mine.

This mine on the 40-acre section 671-93, in the name of H. P. McCreery, is on the old Godkin tramway north of the Whyte River. Work has been carried on continuously since my last visit, principally in the low level, which, after driving the tunnel 160 feet, has followed the course of the lode about 550 feet in a direction east of north.

The adit was driven in serpentinous rock; and the dyke-matter is cut into by the adit for 10 feet beyond the intersection of the lode, which dips east. The drive is first in footwall country, carrying a narrow vein of pug, and serpentine continues to be the country-rock. About 140 feet in, the lode, consisting of a chrome-stained galena vein on each side of the drive, has apparently split, but a crosscut at 167 feet only intersected dolomitic veins for 10 feet, and stopped at a wall of serpentine. The lode in the drive then contracts and expands alternately to as much as 15 inches: a little ahead of the extension the walls are lost for a time: a bend has been made a little to the west of north, and the drive is in serpentine veined with calcite or dolomite. Good walls then came in, and a galena vein, 2 to 4 inches wide, was carried. The drive here has been carried very straight. There are 4 feet between walls, and the country contains carbonate of iron. Further on the footwall is lost, but the hanging-wall continues: the footwall side shows large heads of country, and the drive carries carbonate of iron, with pyrites and galena. Towards the end a crosscut west is put in to the footwall of the dyke, which is here 13½ feet wide, with a seam of rich galena on the footwall 2 or 3 inches wide, assaying nearly 2 ozs. of silver to the unit of lead, and a narrow vein along the hanging-wall side of very nearly the same assay value. It is evident that more crosscuts are wanted on the west side of drive. From here, carbonate of iron veined with galena continues on the footwall side. In the end the hanging-wall shows, the footwall is not carried. A vein of galena has been carried for the last 50 feet, on the hanging-wall; a seam of pug in the roof is ore-bearing at times; and the face consists of nice-looking dolomite and carbonate of iron veinstuff, regularly banded and impregnated with galena. Since my visit Mr. McCreery states that the face is now carrying more disseminated ore; and that another crosscut has been put in behind the end through good milling stuff.

The galena in this mine has undoubtedly good silver contents. Samples which I took from the bottom level have

been assayed by the Government Analyst, with the following results:—

	Gold.	Silver.	Lead.	Zinc.
	dwts.	ozs.	per cent.	per cent.
Coarse galena from footwall.....	—	175	66·7	—
Fine-grained galena from hanging wall.....	—	161	34·0	4·1
Galena from footwall side, 3 inches	—	129	82·6	traces
Pug from lode	2	55	24·0	2·0

The quality of the ore being highly satisfactory, all that is requisite is to increase the quantity. The level is being driven further north to come under the top level, where the former manager states there was very good ore for 60 feet in length, attaining a width of 1 foot for several feet, which assayed in bulk considerably over 100 ozs. silver, and from 40 to 50 per cent. lead.

Some of the pyrites from the mine has been assayed at Launceston (by Mr. H. Conder), and has returned over 70 ozs. silver; so what with the galena, pug, and pyrites, there are possibilities in this lode which should ensure it being explored on an adequate scale.

The intermediate tunnel, 94 feet above the lower one, was reported on after my last visit, and further work will depend upon the results of the lower drive. The upper tunnel, 40 feet higher, when worked, opened up some very good stoping ore in the north drive, the ore-shoot pitching north, and it is this deposit which the lower level is intended to tap lower down.

The gangue of the ore is a green- (nickel or chrome) stained dolomitised dyke-rock, which has been partly serpentinised, and its exact nature cannot be determined without spending more time upon it than seems necessary for the purposes of this report. All the conditions of the lode are favourable for the development of a good mine. It appears to be just on the eastern side of the granitic mass which exists between it and the Godkin, but how closely it is connected with this (and if at all) would require several days' exploration to ascertain. The galena in the lode makes first on one wall of the dyke, then on the other, sometimes on both sides as well as in the midde, and the indications and results already obtained from the comparatively trifling amount of work done warrant a continuance on a more vigorous scale. The sales of ore effected by Mr. McCreery show the quality to be from 2 to 3 ozs. of silver per unit of lead—a highly-satisfactory ratio. Among the accessory minerals, besides blende, a little copper pyrites and ruby

silver have been noticed. A pink-stained material resembling the latter, which I took away, gave the reactions of manganese; but both minerals have been identified in the ore from this mine.

Washington Hay Mine.

This mine is north of the Confidence, and also situate on the line of the old Godkin tram. Work was resumed here last year, though now discontinued for a time. About £250 worth of ore was sent away during that period, giving various returns, but all of them good. The assay notes, which have been shown to me, furnish a fair idea of the quality:—

Silver, ozs.	Lead, per. cent.	Zinc, per. cent.
98	76·5	2·7
78·4	59·8	4·6
91	63	
104	75	
100·5	76·2	

Outside the tunnel is a nice heap of good milling ore, from which a quantity could be knapped for firsts. The tunnel is about 25 feet above the river, and has been driven south-westerly for about 50 feet, and then follows the lode for 170 to 180 feet. The dyke is from 14 to 15 feet wide, and most of the ore won has been stoped from the ground below the level. At about 100 feet in, a winze has been sunk some 40 feet, when the water became troublesome. I was told that it carried ore all the way down, and that in the bottom were 4 or 5 inches of the very best metal in the mine. About two or three fathoms in advance of the stope the lode is 9 feet between walls, and about an inch of galena is, in places, close to the footwall. The whole of the dyke is not carried in the drive, and in the face narrow veins of quartz pass up and down the green-stained dyke-rock. Between the winze and end, the roof carries some good veins of galena. In advance of the tunnel, there is, at surface, a gossan outcrop with an 80-feet shaft, giving indications of galena, cerussite, lead chromate, blende, &c., and 70 or 80 feet more driving in the tunnel would come under this, at over 100 feet from the surface. In view of the really good ore which has been obtained from the mine, it ought to be vigorously developed. Mr. McCreery tells me that the old company sold about 10 tons of excellent ore, and that his sales, in March and July last year, were 20 tons 4 cwts. of the quality shown by the abovementioned assays. The ore-shoot inside the level should be followed down, and the level also extended into the hill. The trenching which has been done

at surface has disclosed the line of lode, which should be well examined. In all probability there is some part of this lode which would make a remunerative mine. My samples taken from the lode assayed 77 per cent. lead, 113 ozs. silver, 2 dwts. gold per ton, and 1 per cent. zinc.

Magnet Mine.

There has been a great change here since my last visit, the development of the mine having proceeded steadily. The old transport route *via* the Corinna-road to Waratah is no longer used. A new steam tramway, 2 feet gauge, and 10 miles in length, has been constructed, connecting the mine with the Emu Bay Railway, 1½ mile to the east of Waratah. A description of this line by Mr. R. F. Waller will be found in the Secretary for Mines' Report for 1901-2 (pp. cxix.-cxxxiii.). It has been built and equipped with rolling-stock, consisting of two locomotives, four 15-ton trucks, timber wagon, and a guard's van, at a total cost of a little over £20,000. This places the mine in railway communication with the West Coast, with Burnie, and every other railway station in the State. Its construction has made it possible for the company to deal profitably with the large quantities of medium and low-grade ores, which previously could not be got away economically owing to the high cost of cartage to the rail at Waratah. The ore from current breakings, with additions from the accumulated dumps, furnishes a marketable mixture, which is readily disposed of to smelting works in New South Wales and at Zeehan, with satisfactory results to the company, the ore being delivered at the Emu Bay railway line at a total cost for mining and transport of 23s. per ton. The heavy fall in the prices for silver and lead retarded, while the low quotations lasted, the developmental work of the mine, the ore dealt with being of comparatively low grade; but under the improved rates the mine is now rapidly overtaking any delay in development, and is immediately approaching a dividend-paying stage. The average metal contents of the ore being sent to market are 8 to 9 per cent. lead and just under 40 ozs. silver per ton, with an excess of 30 units of iron and manganese. The maintenance of this even average, notwithstanding the difficulties attaching to blending the different ores and the selection of stopes, is highly creditable to the management.

Regular shipments of 1000 tons per month are maintained, being consignments under contract to the Tasmanian Smelting Company, Zeehan, to Dapto and Cockle Creek, for smelting. The ore sales from the beginning to August 31

this year have reached the following figures, which have been kindly furnished to me by Mr. G. L. Meredith, the legal manager of the company:—

First-class Ore.

	Net weight.				Net value.		
	Tons.	cwts.	qrs.	lbs.	£	s.	d.
To 28th February, 1901	2684	6	2	14	28,513	4	9
Second-grade Ore.							
To 31st August, 1903.....	15,974	2	1	0	33,966	2	6
Total.....	18,658	8	3	14	£62,479	7	3

The work done in Nos. 1, 2, 3, and 4 levels has proved a large continuous ore-body, which was 575 feet in length in its upper part and 300 feet in the lowest level, averaging 5 to 8 feet in width, and often considerably wider.

The northern limit of the ore-shoot is a little more southerly in each level in descending. It is difficult to say positively whether a fault has occurred or not at the north end, or whether the termination of the shoot has been reached in this direction. Some short crosscuts in No. 4 level north behind the end, one to the west and the other to the east, show what look like indications of faulting, and there are also soft seams in the end which suggest movement. As the end is in dolomite, a homogeneous rock, signs of faulting may be difficult to detect. In general, however, the question of faulting or no faulting can always be readily settled in this mine by crosscuts, the length of which will be limited to the width of the dyke, for there is reason to believe that the movements which have taken place since the deposition of the galena are internal ones, *i.e.*, confined within the dyke walls. In the level above (No. 3) I could not see the north end, as it was blocked with timber, but it was reported to be in dolomite of very pronounced brecciated structure.

The bottom level has not ben driven so far south as any of the upper ones, but has been extended beyond the ore-shoot, which has taken horse or branched. The lode here appears to have continued right up to a fault, beyond which the drive is in barren dolomitic rock.

The ore-shoot in No. 4 level descends below it as a strong lode. An underlay winze has been sunk from the sole of the level to a depth of 47 feet. At 40 feet the lode was

intersected by a 17-feet crosscut, and proved to be 5 feet wide, 3½ feet of which consisted of bands of high-grade galena, the rest being second-class ore. Selected samples assayed 82 per cent. and 245 ozs. silver per ton. Preparations are now being made to sink to 100 feet at this spot, and then to stope up to the level. The lode below has maintained the width it had above the No. 4 level, and will probably contain a larger proportion of sulphidic ore than has characterised it in the higher levels. As the gossan in this mine has suffered a decrease in metal contents in going down, it is probable that its lower part, where it gives place to primary ore, will be found distinctly enriched. Judging from the length of the ore-shoot as worked between the "slides" in the upper part of the mine, its length at a depth of 40 feet below the bottom level would be about 280 feet, and this will give a splendid block of ore for stoping.

No. 3 level has been driven south a long distance beyond the slide, at which point the ground becomes mullocky, resembling the filling of a cross-course. After passing through this, the drive is in hard, dry rock. The end of the west branch off this level is in gossan, carrying little patches of metal. The southern extension of the main drive beyond the slide has passed through barren ground, which is below ore stoped above No. 1 south. The ore, in fact, has failed to put in an appearance in No. 3 beyond the fault, but work will be resumed here after the faulted part of the lode has been picked up by the new adit which is now being driven across the dyke south of No. 2 level.

The lode in No. 2 level going south also shows forking, the west branch behaving fairly well for 100 feet, but probably worked at a loss taken by itself. The drive on the east branch ends in dolomitised rock carrying a little lead and zinc. Opposed dips are seen in the end, indicating disturbance, and on going back a little way a soft cross-course is seen trending easterly, and containing broken fragments of dark dolomitic rock. This seems very clear proof of faulting, and consequently there are grounds for believing that the lode will be picked up again to the south.

The No. 1 south, 60 feet higher than No. 2, had payable ore for over 200 feet—the best of it towards the south, but in this direction it was cut off abruptly by a fault cutting the lode at a very acute angle. At the time of my visit the south end had been driven about 180 feet beyond the slide, and towards where it would come about 80 feet below an outcrop of rich silver-lead ore, from which I took a sample, assaying in the Government laboratories 66·1 per

ce t. lead and 338 ozs. silver per ton. The underlay of the lode in this level and at surface is east instead of west, though in the winze further north it reverts to the normal direction. The faulting or shearage planes seem nearly parallel with the drive, from which it may be inferred that the lateral displacement of the lode is inconsiderable. A winze sunk 4 or 5 yards north of the fault shows that the ore was cut off abruptly 3 fathoms below the level.

The surface indications on the property show that the dyke maintains its course south right through the two sections. Five lode occurrences have been exposed at surface following each other south of the present workings, viz.:— (1) The knob of rich ore referred to above; (2) an outcrop of 4 feet of lode showing galena, about 80 feet further south, from which I took a sample assaying 228 ozs. silver per ton; (3) lode outcrop 250 feet further south, with dolomitised rock showing galena; (4) and (5) two trenches, giving small silver assays on the south section. The dyke then continues into the Magnet Proprietary's section.

Since my visit an important development has taken place in the No. 1 south drive. The stope south and west of the winze disclosed rich ore outside the western wall, and this discovery has resulted in a drive south for 120 feet in the best ore that has ever been found in the mine. It consists of galena, antimonial lead, zinc, and ruby silver. The latter, I am told, has never been found before in the mine. There is more zinc in this ore, but against this the zinc carries silver which covers the smelting penalties. The lode in the end is officially reported as being 7 feet wide. A winze has been sunk on it for 27 feet, and the lode is still strong at the bottom.

The drive is 85 feet below the surface outcrop, and the present end appears to be a little to the west of this. A tunnel, No. 2 south, is being driven south-westerly into the hill 60 feet below, and at that depth is passing through the dolomitised dyke-rock. It has been driven 200 feet, and is now intersecting the vertical plane of the old No. 1 south end, and is going in a direction which, in about 60 feet more driving, will bring it vertically below the new end. But as the lode in this part of the mine seems to have altered its underlay to the east, the tunnel may, before that distance is driven, cut the ore. This is a good piece of work, for it will result in locating the lode definitely in ground which is admittedly disturbed. The relative positions of the surface outcrop and of the lode in the No. 1 south require some explanation in view of the easterly underlay,

and this tunnel will furnish it. If the lode at surface and that seen in the new No. 1 south end are one and the same, there has been a lateral displacement to the extent of over 70 feet. This amount of faulting is unexpectedly great. Heaves of this magnitude have not been met with hitherto in this mine. However, the question will be set at rest by the extension of the new tunnel.

The two places in the mine on which the owners are at present concentrating most of their attention are the south end and the lode below the No. 4 level. The ore reserves will be drawn from these, as stoping in the central part of the mine has nearly disposed of that large block of ground. The south workings will open up an altogether new block, which, however, may be hereafter connected back with the central part between the slides, and if so, will add enormously to the resources of the mine. The lode below No. 4 level, disclosed by the winze to 47 feet, will now be opened upon, and proved still deeper by further sinking.

Working this lower ground and the southern part together, it will be possible to maintain for some time the profitable mixture of ores, which has been so acceptable to smelters and advantageous to the company. If, however, the sulphidic ore of the deep workings reaches an undue proportion of the total ore won, it will be necessary to consider the question of ore-concentration. The general manager has this eventuality in view, and is examining the question. From appearances it would seem that the huge body of gossan upon which work has been carried on so long is the upper part of a large sulphidic lode, which, when opened up in depth, will furnish argentiferous galena, with the usual proportions of firsts and milling ore.

The mine employs regularly about 100 hands, and its success should stimulate work, not only on the same line of lode north and south, but also at the mines on the Whyte River, at some of which the geological conditions are somewhat similar.

No further progress in knowledge of the geology of the mine has been made since my previous visit; the conclusions then stated still hold good. The general absence of quartz from the lode still supports the theory of a basic source for the ore, especially when combined with the presence of chromates. In the antimonial outcrop, however, a little silica may be detected intimately mixed with the ore, but this is, I believe, the only instance of its occurrence. The nodular igneous rock on the west side of the dyke is traversed by quartz veins, which do not enter the Magnet dyke,

and would seem to have no connection with the lode. Between the dyke and the nodular rock there appears to be a band of slate, but I am not sure whether this is the case going north, for there are signs of the slate wedging out in that direction.

North Magnet Mine.

This mine is idle at present, but there is some probability of work being resumed. A low tunnel has been driven west into the hill, cutting the northern extension of the Magnet dyke. At this point it intersected 8 feet of white-banded dolomite, and passed into 9 feet of soft, puggy rock, which seems to be a part of the dyke. It would be desirable to extend this tunnel further in to make sure that the whole of the dyke has been intersected, or the cuddy west at the end of the drive could be extended beyond the pug. A drive has been put in south for 2 chains, first following the puggy rock on the hanging-wall side, leaving hard, massive, white dolomite on the east side. Towards the end, however, the level bears obliquely across to the dolomite, and carries it to the face. At the face a cuddy, or short crosscut, has been driven east and west for 17 feet. To the east it is in massive white dolomite, with a speck or two of mineral, but carrying no banded carbonate of iron. To the west it is in the soft hanging-wall rock, seamed with dolomite

This level was begun with the intention of driving it some 600 feet into the Magnet section, where it would come 90 feet below No. 4 level, with the advantage of proving the lode in driving. As, however, a galena lode has not been struck so far, and the opening up of the ground below the No. 4 level will be effected more expeditiously by sinking, further driving was suspended for a time. In view of the apparent faulting at the north end of the Magnet ore-body, it would be worth while proving the dyke at the North Magnet by longer crosscuts.

Badger Tin Mines.

These form a group of sections south of the main road to Corinna, five miles from Waratah, charted in the names of W. F. Johnson, J. Walsh, J. Pryde, W. H. Wesley, and A. N. Macnicol. At the time of my visit, a discovery had been made on Walsh, Pryde, and Company's ground, and Mr. W. Pryde showed me the work which had been done. Mr. Macnicol had just arranged to take it over on behalf of a syndicate. To get to it, the main road is left at the

turn-off over button-grass; thence the footpath leads through scrub to Webster's old workings, about a mile from the road; another ½ mile through scrub conducts to the workings.

I examined three trenches, which had been cut into a tin granite formation, by the side of a creek flowing into the Ramsay River. The unchanged country-rock is a porphyritic granite, with dark mica, but the process connected with the admission of tin solutions have converted this into a kaolinised and quartzose stanniferous formation, with a colourless and greenish secondary mica (identified by Mr. W. F. Petterd as gilbertite). This formation is identical with the tin-bearing belts in the granite mountains of Eastern Tasmania, and is a kind of greisenised granite. The tin ore (cassiterite) is lustrous black, and in crystals of uncommon form, viz., in tetragonal prisms considerably elongated. In this form it is known as "sparable" tin ore (determined by Mr. W. F. Petterd).

No. 1 trench was the principal one, exposing the tin-bearing formation for a width of over 10 feet, but the ore seems to extend into the country beyond this. Five bags of tin ore had been got from this cutting in five days, working, I was told, some days only a couple of hours. The granitic formation is decomposed, and encloses large lumps of green mica (gilbertite). The ground was very wet when I was there, and I broke several pounds' weight of samples from across the exposed surface indiscriminately, without being able to see whether they contained ore or not. These were assayed by Mr. W. F. Ward, Government Analyst, with a result of 9·2 per cent. metallic tin. This approximates to Mr. A. S. Wesley's figures of 7·77 per cent., kindly shown to me by Mr. Macnicol. Some very nice prospects of detrital ore from the capping of the formation are obtainable, averaging between 1 and 2 lbs. per dish.

No. 2 trench, nearer the creek, in tin granite, also carries fair ore. The samples taken from here assayed 1·2 per cent. metallic tin; and No. 3 trench, exposing 4 feet of formation, lower down, yielded assays of 1·1 per cent. This deposit has now been taken in hand for serious development. A small shaft has been sunk, and a drive put in on the course of the mineral. The backs obtainable are not much, but they can be increased by going further down the creek. In connection with the development work, while turning the proved deposit to good account, the behaviour of the ore in depth, over a convenient area, might well be ascertained by boring. This is a precaution, which experience of the capricious

nature of tin ore deposits has shown to be necessary before launching into work on a large scale. This is not the only deposit in the locality; another north and south belt is known to occur, and alluvial tin is distributed widely. Lower down the river good ore has been obtained from coarse wash 1 to 3 feet in thickness. This, however, is grey and ruby tin. I was informed that nuggets up to ½ lb. weight had been found in the river.

There is a good belt of granite country here, perhaps a mile in width, and tin-prospecting is going on now with more or less success. In Langmaid's Creek, north of Welsh's, Matthews and Kearns were working alluvial, and prospecting. In some places ½ lb. to the dish was got, but the net average may be put down as not exceeding ½ oz. The locality is receiving more attention than it has had for a long time. It is unlikely that the main mine now being worked is the only good deposit in this stanniferous zone; this, and the remunerative price ruling for tin, should incite renewed exploration.

Conclusion.

In concluding this report, I may say that I have seen no reason to change or modify the conclusions arrived at upon my former visit, viz., that the country along this line of route is a distinctly mineral area, encouraging at many points for exploration and development, whether for tin, silver-lead, gold, copper, nickel, or osmiridium. All these minerals are found in turn; and the production of gold and silver-lead has been considerable. The districts, however, from various causes, remain in a comparatively undeveloped state. The variable rates for metals, combined with serious transport difficulties, have had much to do with this, especially in connection with mines which have not been sufficiently remunerative from the start. Languishing financial conditions have been unfavourable to the investment of capital in undeveloped mines, and this again has reacted on prospecting, which is always active when development work is going on in a neighbourhood. The improvement in metal quotations permits, at present, work which could not be undertaken a little time back, and this has put new heart into the owners of mining properties in this part of the Island. A good deal of new activity is noticeable; with perseverance, discretion, and capital, some of these mines may fairly be expected to prove successful. In addition to these, there is a large area of untried ground in which any day discoveries of importance may be made.

I have to thank Messrs. H. H. Gill, Leslie Smith, R. F. Waller, T. H. Jones, and others for information and assistance kindly given to me on this visit.

I have the honour to be,

Sir,

Your obedient Servant,

W. H. TWELVETREES,

Government Geologist.

W. H. WALLACE, Esq.,

Secretary for Mines, Hobart.

JOHN VAIL,
GOVERNMENT PRINTER, TASMANIA.