

"There is unquestionably a large quantity of payable stone in sight along the outcrop, but so far the limited explorations in depth have been of rather a negative character, this however is very possibly due to the fact that a reef of such variable size at the surface will maintain this character at a depth, therefore until it has been driven upon at the water level it is quite impossible to express an opinion as to its character with any degree of confidence.

"A 10-head mill is in the course of erection, whilst a good water supply has been struck in the mine itself at a depth of 60 feet.

"Good timber for mining purposes, like the Bar-rambie district, is not over-plentiful in the immediate vicinity, but the firewood supply should last for some time.

"There are several other properties which are at the present time attracting considerable attention, the principal of these is the Three Star, G.M.L. 1490, which is situated at the north end of the belt. This is an east and west reef which dips southerly at an angle of about 45 degrees. Only a small outcrop was visible at the surface, but it has now been traced for a length of 3 chains, the cap being covered by from 4 to 8 feet of cement.

"The west shaft was sunk to a depth of 12 feet, from which a crosscut was driven 10 feet south to the footwall of the reef, from which 4 to 5 feet of stone was taken out which prospected well, the remainder of the reef upon the hanging wall side as far as tested by drill holes was of little value, but its size is unknown.

"About three chains south in the main shaft, which has been sunk to a vertical depth of 20 feet with a winze 25 feet, a reef was cut so identical in character to that in the west shaft that it is apparently the same.

"The stone from the footwall portion of this reef has been stoped from the 20ft. level to the surface for a distance of 30 feet east of the shaft, but at this end the ore body is small, being only a few inches in the face.

"Two crushings have been taken from this reef, the first reported in the March statistics is 10 tons, yielding 55.66 ozs. of fine gold, or 5.66 ozs. per ton; the tailings from this parcel are said to assay 23 dwts per ton. The second parcel is not yet officially reported, but the 41 tons crushed yielded gold at the rate of 2½ ozs. per ton, but the sands have not yet been assayed.

"To judge from the nature of the decomposed rock passed through in these workings the country is apparently a porphyritic rock, most probably a dyke.

"The Inheritance, G.M.L. 1528, is situated immediately to the eastward of the last mentioned, but the reef here, which may possibly be the northern extension of the Legacy, strikes north and south, dipping west. An underlay shaft has been sunk to a depth of 59 feet with a drive north for a distance of 30 feet, the stone in these workings averaging about 2 feet, but is only about 10 inches at the south end.

"The stone differs from the other in this locality, being schistose, gossany, and much ironstained, whilst the country is weathered greenstone.

"A parcel of 11 tons was crushed from this lease which yielded 19.25 ozs. of fine gold, or at the rate of 1.75 ozs. per ton, whilst the sands are reported to assay 1 oz. 22 dwts. per ton.

"About 2 chains to the northward, a shaft has been sunk to a vertical depth of 30 feet, where a decomposed granite bar was met with and some broken reef, but northward of this although several shafts have been sunk no stone has been cut.

"At the south end of the line is the Legacy South, G.M.L. 1470, upon which there is an outcrop which prospected well, being apparently the extension of the Legacy line. A shaft had been sunk upon this, but collapsed after the rain.

"Some two miles south a lease called the Bar-rambie Perseverance has been pegged upon a large quartz blow which strikes east and west and dips north. From a crosscut at the west end of the blow some good prospects were obtained, and a vertical shaft is now being sunk with the object of cutting the reef at the water level, the country passed through so far being apparently a decomposed porphyritic dyke.

"The outcrop can be traced for a distance of 5 chains to the westward of the blow, where it is considerably broken, one branch apparently turning away upon a southerly course.

"There are several other leases upon which gold has been discovered, but so little work has been done upon them that they are not worth mentioning.

"As a whole the district is a promising one on account of the size, number, and value of the auriferous outcrops, large quantities of stone from which should pay the owners well to crush, but no opinion can at the present stage of the developments be expressed upon the permanency of the ore bodies in depth."

LAWLERS, MOUNT SIR SAMUEL, MOUNT IDA, DARLOT, AND WILSON'S PATCH.

In connection with the field work on the East Murchison and Mount Margaret Goldfields, the following mining centres were examined and reported upon by Mr. Gibson, who furnished the following interim report:—

"Lawlers, Mount Ida, Mount Sir Samuel, Darlot, and Wilson's Patch; in addition to which a brief examination was made of the country between these places and also between Wilson's Patch and Laverton.

"*Lawlers.*—This place is the administrative centre of the East Murchison Goldfield, and is situated about 80 miles north-west from Leonora, which is the nearest railway station.

"The rocks comprising the auriferous series are the usual type of greenstones, intersected by bosses and dykes of granite, the intrusive nature of which is beyond dispute; this main body of quartz is, in turn, intersected by numerous felsitic dykes, these occurring chiefly along, or close to, the junction of the two classes of rocks.

"The auriferous belt has a width of from 12 to 16 miles, and is known to be continuous between Lawlers and Mount Sir Samuel, cutting out northerly a little to the north of Abbots, its southern limit being some ten miles or so to the south of

Lawlers, thus having a total length of from 50 to 60 miles.

"The ore deposits fall into three classes:—

- (a) contact reefs,
- (b) normal quartz reefs (fissure reefs), and
- (c) lodes.

"The first class occurs along the junction between the greenstones and the granite, and are usually somewhat irregular. Reefs of this description have been worked at the Eastern and Caroline mines.

"The second class is found both in the granite and the greenstones, but as a general rule it is only those in the greenstones that are auriferous; they are often of large size, and run for considerable distances. The reef worked at the Vivien may be taken as a typical example of this class.

"The only lode formation being worked is at the Waroonga, and this is of large size and very persistent.

"Generally speaking, all the deposits of the Lawlers district are low grade; they are however mostly of large size and shew every sign of permanency.

"There is a good supply of fresh water throughout the district, but timber is scarce and is rapidly becoming a serious item with the larger mines.

"The Leviathan District, Lawlers.—The Leviathan—or as it is better known locally, the Fairyland—district is situated some ten miles slightly south of east of Lawlers and within the same auriferous belt, close to its eastern junction with the main body of granite.

"At the time of my visit (Aug. 30th) the only lease being worked was the Leviathan, G.M.L. 846; other leases in the district on which work has been done in the past are the Excelsior, G.M.L. 762; Excelsior North, G.M.L. 786; Kinglike, G.M.L. 774, and Fairyland, G.M.L. 761.

"The country generally speaking is flat and mostly covered with a varying thickness of recent detrital deposits, so that very few reefs are found outcropping on the surface.

"There is a Government well close to the Fairyland lease from which a good supply of fresh water is obtainable.

"Leviathan G.M.L. 846.—This is a twenty-four acre block situated about two miles east-south-east from the Government well and about twelve miles from Lawlers. At the time of my visit, it was the only lease being worked, and only two men were employed on it.

"A quartz reef runs through the block on a bearing ranging between north and north-north-east; it is of fair size, and outcrops almost continuously for a length of about 20 chains, though towards the north end it is apparently a good deal broken and very irregular, and is also much smaller than at the south end.

"Close to the present workings, which are situated on a slight rise, and on the main line of reef, there is a very large outcrop, or 'blow,' of quartz some 6 or 8 feet in width but very irregular, as these large 'blows' almost invariably are. Just here there are three parallel lines of reef about 20 feet apart, the western one being the main line and the other two only extending on the surface for

a short distance. All these reefs dip at a fairly flat angle to the east.

"A little to the east of the main 'blow' two vertical shafts have been put down: No. 1 to a depth of 100 feet and No. 2 75 feet. No. 1, which is the most easterly, has not been sunk deep enough to cut any of the reefs, but should cut the east one in another 20 or 30 feet. No. 2 shaft has been put down on the middle reef, the first part underlay and the remainder vertical, and at the 75ft. level a crosscut has been put in about 30 feet to cut the reef, and about 40 feet of driving has been done on it; the west (main) reef comes into the shaft near the bottom and cuts out altogether in the shaft, but makes again in the bottom of the crosscut where it is some 18 inches in thickness. The reef on which work is being done at present is irregular and bunched, being about 12 inches in thickness at the crosscut, 5 feet a little farther north, 4½ feet in the north face of the drive, and 3 feet in the south face. The quartz is for the most part white and glassy and often laminated, with thin seams of chlorite along the cleavages; it carries a little pyrites at depth and is a good deal ironstained near the surface; a little metallic bismuth and oxide of bismuth is also present in places, and when this occurs the gold contents are said to be usually higher; this bismuth will prove troublesome when the stone comes to be cyanided, and will considerably detract from the value of the tailings.

"As a whole the gold contents of the stone are said to vary a good deal, some patches being very good whilst others again are just the reverse; the stone at present opened up is expected to average about 10 dwts. per ton. A parcel of about 30 tons obtained in sinking the first part of the shaft is said to have been crushed for an average yield of about 5 dwts.

"The country is a foliated greenstone, the foliation running about north and south, and is very soft and rotten and will require heavy timbering below water. Insufficient work has been done on the property to thoroughly prove the value of the main line of reef, which although of considerable length is very irregular both in size and gold contents; the lenticular character which is noticeable in the workings is also present at the surface, and it is difficult to form even an approximate estimate of its average size; generally speaking it is decidedly low grade and not likely to prove of much value to its owners as long as it is worked under existing conditions.

"The official returns from this lease to date are 31 tons for 7.95 ozs.

"Excelsior, G.M.L. 762.—On this property three lines of reef about a chain apart have been worked, but not much has been done on any of them. These reefs strike about east and west and dip at a fairly flat angle to the south; owing to the covering of recent deposits it is impossible to follow them on the surface, and the workings have not proved them for more than three or four chains. Most of the work has been done on the middle reef, which has been opened up to a depth of about 100 feet; the shaft however at the time of my visit had been filled in, and the workings were inaccessible; there appeared to be from 100 to 150 tons of stone at grass at this shaft; this reef at the surface was about 2 feet in thickness, and the quartz was very glassy and a good

deal ironstained. The south reef has also apparently been worked to a depth of about 100 feet, but the main underlay shaft on this has been filled in; the reef where visible near the surface is about 2 feet in thickness. The north reef appears to have been the smallest, and not much work has been done on it. Altogether on this lease there are probably a couple of hundred tons of stone at grass evidently too low grade to be of any value.

"From information received subsequent to my visit, it appears that the stone crushed was obtained from a small rubbly quartz leader along the footwall of the main reef and that this (the leader) cut out at a depth of about 90 feet. The stone in the main reef is said to be of no value.

"The total returns up to the end of August, 1906, are 30 tons for a yield of 53.85 ozs.

"Excelsior North, G.M.L. 786.—On this lease an underlay shaft has been put down to a depth of 50 or 60 feet on a small east and west quartz reef dipping pretty flat to the south. Apparently very little work has been done from the shaft, and only a couple of tons of stone are at grass. The property was undoubtedly abandoned owing to the poor quality of the stone. No stone has been crushed from this lease.

"Kinglike, G.M.L. 774.—No work worth speaking of has been done on this lease, and no stone has been crushed.

"Fairyland, G.M.L. 761.—The only work done on this block consists of a shaft down some 50 feet from which about twelve tons of low-grade stone has been raised. The workings were inaccessible but the reef, which runs east and west and dips south, appears to have been not more than 12 inches or so in thickness. There has been no stone crushed from the lease.

"In conclusion, I am of opinion that this district is a poor one and not likely to prove of any great importance. Prospecting will always be rendered difficult owing to the recent deposits which cover the greater part of the district and beneath which the reefs are hidden. The reefs, judging from those prospected, are irregular and very low grade, and the east and west reefs, of the class opened up on the Excelsior leases, are apparently of no value at all.

"The nearest public crushing plant at the present time is Smith's battery, near Lawlers and about 15 miles from the Leviathan.

"*Mount Sir Samuel.*—The town of Mount Sir Samuel is situated about 32 miles north from Lawlers on the north side of Lake Miranda and at the southern extremity of the Violet Range. This range is from one to two miles in width and extends northerly in an irregular line as far as Abbots; east and west of it flats covered with a considerable thickness of recent deposits extend indefinitely. The rocks forming the range are, for the most part, massive and foliated greenstones of the usual type, and generally speaking are pretty hard and unweathered; they are intersected by numerous granitic dykes, especially towards the northern end, these often being of considerable size and running in all directions, being evidently offshoots from the main body of granite which is said to make its appearance again a few miles to the east.

"Mining matters at the present time are very quiet at Mount Sir Samuel, there being only two mines working in the district, and on only one of these, the Bellevue, is any considerable amount of work being done. All the reefs that have been opened up are normal fissure reefs, and one or two of them are of fair size. Most of them are low grade, and this is a serious drawback in a district so far removed from the railway line.

"Timber is getting very scarce, and has to be brought in considerable distances, principally on camel teams. Salt water for battery purposes is of course plentiful enough near the lake, but the want of an adequate supply of fresh water for boiler use was proving a serious drawback to the big mine until a few months ago, when a good supply was met with on the flat a mile or so to the east.

"*Mt. Ida.*—This centre is situated in the North Coolgardie Goldfield some 65 to 70 miles north-west from Menzies, this being the nearest point on the railway. Travelling from Lawlers, the road passes over granite country the entire way until about three miles from Mt. Ida, where the greenstones again make their appearance. This greenstone belt is here said to have a width of some 12 miles or so, and runs in a somewhat north-westerly direction; it is apparently a continuation of that belt in which the auriferous deposits of Menzies are situated. At Mt. Ida a boss of granite some two miles in width and probably 12 miles or so in length has been rendered schistose for some distance on each side of it, and it is within these two belts of schists that the majority of the auriferous reefs are found. The schists run on a bearing generally slightly west of north and dip away from the granite on either side, and the reefs run and dip with the schists.

"The reefs, taking them as a whole, are of considerable length, but are generally small and irregular; those at present being worked are mostly, to a very marked degree, lenticular—being locally known as 'kidney' reefs—and consist often of merely a series of varying sized lenses of quartz connected by a thread of quartz and often only by the line of the walls. These lenses are sometimes almost contiguous, and sometimes are 50 or 100 feet apart, and as they vary greatly in length and depth, and there is nothing to show when they are going to cut out or come in, the reefs are naturally unsatisfactory for a prospector to work on; they have however the compensating feature that they are usually pretty high grade. There are a few well-defined and continuous lines of reef in the district which have been worked with success, and a good example of one of these is the Copperfield line, which has been opened up for a continuous length of over 1,000 feet. A typical example of the lenticular form of reef is being worked on the Unexpected lease.

"The district has been considerably handicapped owing to insufficient development having been done on many of the properties in past years, and I am of opinion that if one or two of the properties which are now abandoned were properly opened up and exploited they would turn out to be payable propositions.

"There is at present a fairly plentiful supply of timber in the district for mining and other purposes; there is also a good supply of water, fresh water being obtained in the granite country, while

the majority of that so far met with in the schists is salt.

"*Darlot*.—This centre is situated about 50 miles slightly north of east of Lawlers. The country between the two places consists of a granite tableland for the most part covered with extensive deposits of loose sand, this being the result of the gradual weathering and decomposition *in situ* of the granite.

"The workings at Darlot are situated within an area of greenstones of the usual type, the belt extending in width for three to four miles both east and west of Darlot townsite; its northern limit is not known, but it runs southerly for about 8 or 10 miles; east from Darlot, granite tableland country apparently extends uninterruptedly to the Erlistoun district.

"The country at Darlot is mostly flat and covered with a considerable thickness of recent deposits so that very few rock outcrops are visible. About three miles north of the townsite is a low ridge of 'break-away' hills trending in a general north-westerly direction and apparently marking a big fault or shearing line; it is along this line that most of the principal reefs have been worked and that all the alluvial which made Darlot famous some years ago was obtained.

"At the time of my visit mining at Darlot was fairly quiet; all the alluvial appears to have been worked out, and not much was being done in the reefing line.

"Several pretty good lines of reef have been worked in the past, and one of these (the Zanglar line) is now being opened up with apparently every chance of success. Taking the district as a whole, reefs are fairly numerous but vary greatly in size and values; they can for general purposes be divided into two classes:—

"(a) reefs in which the gold occurs in irregular bunches or pockets, and

"(b) reefs in which the gold is uniformly distributed throughout the stone.

"The first class is formed principally at the north end of the field along, or close to, the line of break-aways, and the pockets are usually found at the point where a second reef or leader comes into the main line. These pockets vary greatly in size, but when they are met with the stone is invariably dollying stone, the rest of the reef being practically barren. It is from the breaking down of the reefs of this class that the majority of the alluvial gold has been derived.

"The second class of reefs is by far the most important, as it is on these that the district has to depend for its future; they are usually of fair size, and can often be followed for considerable distances; they are well defined, and show all signs of permanency; whether the gold will live down with them is a matter that can only be proved by trial. So far the majority of these reefs have proved of pretty low grade. The Zangbar-Monte Christo reef is a good example of this type.

"Water is plentiful throughout the district, being salt on the west side towards the southerly continuation of Lake Darlot, but fresh at the townsite and to the north and east. Timber is not too plentiful, and will shortly have to be brought in from considerable distances.

"*Wilson's Patch*.—Mining operations at this centre are very quiet at the present time, there being only one mine working. The country is essentially granite, the area being part of the main belt which extends practically unbroken between Lawlers and Erlistoun. A few small isolated patches of greenstone occur scattered throughout this area, and it is usually along the junction of these with the granite that the principal gold-bearing reefs are found. There are however a good number of well-defined and fair-sized quartz reefs in the granite; these usually have an east and west trend, and so far have proved unpayable.

"The Great Western, which is the only mine working in the district, is working a quartz reef of an average width of about two feet which runs in an east and west direction alongside a lenticular mass of greenstone which has been caught up in the granite. The reef is pretty irregular, and taking it right through decidedly low grade.

"A good deal of alluvial gold has been got in this district in past years, mostly resulting from the breaking down of small quartz leaders in the granite; these patches however have been abandoned for some time, and nothing is being done in this line now, though I see no reason why this should be so.

"Water and timber are both fairly abundant in the district.

"From Wilson's Patch to Laverton, the road passes over granite country all the way until within a few miles of Mt. Morgans. This granite belt extends northerly indefinitely, but its southern limit is practically marked by the road as a mile or two south of this, and practically following it all the way, is that extensive area of greenstones in which the centres of Leonora, Mertondale, Malcolm, and Morgans are situated.

"About 25 miles from Wilson's Patch along this road are situated what are known as the Linger and Die workings. Here a small alluvial patch was worked about 10 years ago and a fair amount of gold won from it. At the present time a couple of small parties are working some small leaders in granite country. These leaders are only an inch or two in width but are sometimes exceptionally rich; no work however of any importance has been done.

"A full description, with geological map, of these centres and the mines working will be given in a bulletin now in course of preparation."

THE SAXON LEAD MINE, NORTHAMPTON.

Mr. Woodward reported, in November, on the Saxon Lead Mine, as follows:—

"This old mine is situated upon Location 470 in the Northampton district, being about 30 chains east of the railway line from a point about one mile north of the White Peak Railway Station, which is nine miles from Geraldton. The country rock is gneissic granite, the foliation of which runs in a northerly direction with an underlay to the westward. Following this is a well-defined quartzose lode of considerable size, upon which at a point a little north of the surveyed road near the centre of the block, a rich shoot of lead ore appears to have been worked. The workings consist of a winze (mostly collapsed) down to the water level (40 or 50 feet), from which the ore won from the stopes