

FOURTH REPORT.

Issued in September, 1888.

THE MURCHISON, GREENOUGH, IRWIN, CHAMPION BAY, AND NORTHAMPTON DISTRICTS.

On July 3rd I left Geraldton on a trip to the North-East to examine a newly reported discovery of gold at Mulga Mulga or Berin, which is situated about 250 miles from the coast, between Austin's Lake and the Weld Range.

Immediately after crossing the sand dunes which follow the coast, there is a large alluvial flat, the Northern extremity of the back flats of Greenough, and probably in former times the bed of the river of that name, which would then have discharged its waters into Champion Bay, somewhere about the mouth of the present Chapman River. To the Eastward of this flat, the land rises into a series of flat-topped hills of Secondary age, of a decidedly unprepossessing appearance at first sight, but the bad impression is soon dispelled on passing through the valleys with rich soil and springs which break out here and there from the sandstone beds which form the capping of the ranges.

The table-land on the top of these hills is a scrubby, sandy plain, about 800 feet above the sea level, and extends inland for about 70 miles from the coast, only varied in patches by gum thickets, where the sandstone has been denuded, exposing the underlying clay beds (of Carboniferous age?), and by the deep gorge which is cut across it by the Greenough River, in the bed of which a fine series of sections of Mesozoic and Carboniferous rocks are exposed. At Mullewah the country entirely changes from sand plain to crystalline rocks, with numerous quartz reefs, which run nearly North and South, being the same line of beds that form Peterwangy Hill and the Tallering Range. There has been some prospecting done about here, but at present without success.

Between Mullewah and Bunbenoo the rocks met with are mica schists, quartzites, sandstones, gneiss, granite, and hornblende rocks, with numerous quartz reefs and diorite dykes, capped in many places by newer beds of ferruginous clay-stone and sandstone.

There are several springs along this belt of country, the waters of which contain large quantities of lime, as large deposits of travertine and calcareous conglomerates are met with round them; these latter deposits are a sure indication of water. One of these springs called Karla contains a good deal of mineral matter and is not fit to drink, but I was unable to test it, as it is impossible to carry samples of water far on a pack horse with safety.

The country on to Gabbeon is mostly metamorphic with outcrops of granite and belts of schistose rocks, with quartz reefs, covered here and there by sandy flats. To the North-East for 100 miles the country is mostly of one description, *i.e.* large clay flats with bold granite hills and low ridges of metamorphic and crystalline rocks, often capped with nodular clay-stones and ferruginous sandstones.

Gold has been discovered in a reef in one of these low ridges, between Austin's Lake and the Weld Range. The reef appears to be what miners call a saddle reef, that is it dips both ways; one leg dipping to the East, and one to the West. The stone is a saccharoid quartz, containing a little pyrites and sulphide of antimony, and shows gold freely in the Western leg a little to the South of, or lower down the hill than the junction. The reef runs a little to the East of North, dipping to the West where the gold was found. It joins another reef a little higher up the hill, which I take to be the other leg. The width is yet

uncertain, but I should judge it to be between two and three feet; it is of a very promising character, and in the hands of Messrs. Birk & Co. will, I believe, be thoroughly tested.

The great feature of this part of the country is the number of quartz reefs which are seen rising through the low hills, and standing up as ridges out of the flats, and miles of the country are covered with their *débris*.

There are three or four different classes of reefs, probably of different ages, but which series carries gold cannot yet be determined.

The country to the South of Warra Warra has also a very promising appearance for gold; there are small beds of slate between hornblende schists and quartzites with quartz reefs and iron lodes. To the North of this again the bold granite hills burst through the surface, with sand and clay plains between them in places. Similar country extends as far as the Sanford River, where the fine alluvial plains of the Murchison are sometimes broken by low ridges of metamorphic rock generally capped by sandstone. Between Murgoo and Yewin the water parting of the Murchison and Greenough has to be crossed: it consists of a high belt of country running in an East and West direction, the main portion is granite flanked on either side by metamorphic rocks, the whole often being covered by the newer sandstones. From Yewin to Bunbenoo you cross a series of low hills of sand or light loam, with the older rocks again making their appearance about three miles North of Bunbenoo. This district is full of patches that should be prospected, first the line between Peterwangy and Talling, about half way between Pindar and Bunbenoo, the country about Yilgady which is South of Warra Warra, and the country, where gold has been found to the North of Austin's Lake, which is of great extent, and I should judge from its position to be the Northern extension of the Golden Valley country, as the stone and the rocks are very similar in character. It lies, as the Southern discovery does, to the Eastward of a line of granite country, which is also about the same width, but as the Murchison district crosses it diagonally, it appears to be of much greater extent. This question I hope to be able to settle in my next Report after visiting the country between these two points.

There is no reason why this country should not be thoroughly tested as water can be obtained almost everywhere without any trouble, which will give it a great advantage should it prove to be rich.

NORTHAMPTON AND GERALDINE.—I visited the Northampton district with Captain Mitchell and was very distressed to see the extensive plant and buildings going to ruin, the large quantity of good ore at grass or ready for stoping, and Northampton, which almost might be called a deserted village, all at a standstill on account of the low price of lead. There are several old copper mines in the district, one of which Captain Bartley is now testing, and it is to be hoped that he will be successful; but I am very much afraid from the appearance of the ore that it will not contain a high enough percentage to pay unless copper keeps very high in price. Several of the old mines, that were worked at a profit years ago, ought to be starting again now, as everything can be done so much more economically and the market price of copper is again higher.

At the Geraldine two mines are still at work, the South Geraldine lead mine and a copper mine a little farther East on the North side of the Murchison River.

The South Geraldine is being worked by Captain Mitchell, in spite of the low price of lead, at a slight profit owing to its great richness, the large size of the lode, and the shallowness of the present workings. The lode contains from three to four feet of solid galena, which is so clean that it requires scarcely any dressing.

The copper mine on the North side of the Murchison River is also being worked by Captain Mitchell: the lode here consists of rich bunches of grey ore, and being easy to "win" it pays to send it home as ballast in the wool ships.

One very marked feature of this district is the pooriness of the galenas in silver, which seems so universal in this part that I do not think if this metal is found it will be associated with lead, but with copper or iron gossan, specimens of which I shall test when I get the means. This district I hope to visit again shortly, when I intend to speak more fully about the lodes and formation of the country, but it is very difficult to obtain information about these old mines, or to examine them, as the shafts are not safe and are frequently full of water.

THE IRWIN DISTRICT.—Between Geraldton and the Irwin River, after leaving the flats, there is not much beside sand plains with here and there little gum flats as at Allanooka Swamp and Heelan's Swamp. The river above Yaragadee cuts through these recent rocks, and exposes the large clay beds which underlie the sandstone. These beds are seen all the way up to the coal seam, where there is a change, beds of limestone with fossils, micaceous clays, ferruginous sandstones; and clays with beds of coal dipping at about 20 deg. to the North make their appearance; but what relation these beds bear to those seen further down the river I have yet to work out.

The new discovery of coal is just outside the Government reserve on the North side, and up the Northern branch of the river; it is between two and three feet in thickness and appears to be of very fair quality. It is very easy to work, as one bed is seen running away into the face of the cliff, and being within fifteen miles of the Midland Railway, if it answers for steam purposes, will be very valuable.

On the journey back to Perth I did not examine the country off the road, as I propose to return this way better prepared to do so in detail; but it struck me that quite an erroneous idea seemed to exist with regard to it, and I think that if some prospecting were done a little nearer home it would be crowned with success.

FIFTH REPORT.

Issued in December, 1888.

THE COUNTRY BETWEEN PERTH AND GERALDTON, INCLUDING THE IRWIN COAL SEAM.

On September 28th I left Guildford to examine the country to the North-East, and if possible to tap the line of country between the Yilgarn and Berin goldfields; also to visit Bindoon, Arino, Peterwangy, and the coal seam, to examine and make a collection of the fossils at Gingin, Dandaragan, the Irwin River, and the Horse Hills near Geraldton. I therefore propose dividing this report into two sections; the first on the overland road and the coal seam, the second to be a sketch of the country from Berkshire Valley by Jibeding, Ninghan to Mt. Kenneth, returning by New Gulleway, Gulleway and Peterwangy.

For the first ten miles from Guildford the road follows the rich alluvial flats of the Swan, but after crossing the bridge a section of mottled clay is exposed, in a railway cutting through a low hill, very similar in character to the old river deposits and deep leads of the Eastern colonies. The road from here runs nearly due North following for about fifteen miles the course of Ellen's Brook, which is in reality a series of swampy flats with a low range of clay and limestone hills capped with nodular clay ironstone, and ferruginous sandstone, to the East, which would be very suitable for grape growing, while the flats with their black