

From the nature of the rocks and the great scarcity of quartz in the part of the district I have seen, I do not see any prospect of its turning out a rich gold-field, but if prospectors intend to give it a trial, I would advise them to go prepared to make some flying trips to the N.E., as the ground all around the present discovery is already taken up, and nothing is left but clay or sand flats.

South of the Wongan Hill, for some miles, there are nothing but sand plains and salt lakes or swamps, but where the ground rises more towards the ranges clay ironstone, ferruginous sandstones and clay make their appearance, and here and there an outcrop of rock is exposed in some of the deep gullies. From Bulgate the road descends into the valley of the Toodyay Brook, where the same rocks are met with as were first passed over on leaving Newcastle.

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### THIRD REPORT.

*Issued in July, 1888.*

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#### COSSACK, ROEBOURNE, MALLINA, PEEAWAH, CROYDON, THE PYRAMID, AND WOOD BROOK.

COSSACK.—The first thing that strikes one on landing at Cossack is the black appearance of the rocks and the black streaks down the faces of many of the cliffs, which, from the sea, look as though tar had been poured down them. These streaks were at first taken for coal, but as they would not burn were put down as of volcanic origin, and indeed this part of the country presents at first sight very much that appearance; however, on examination, they proved to be veins of black tourmaline in a compact hornblende rock, evidently intrusive, as it has no signs of bedding, and much resembles diorite in character. There are also veins of quartz and hornblende, the latter generally very green in color, intersecting these rocks. These rocks form the rough bold cliffs and headlands which separate the sea from the low salt swamps that lie between Cossack and Roebourne. The sea finds its way round the back of these rocks at spring tides, covering them with a layer of water which evaporates before the next high tides, leaving its burden of salt.

On the Roebourne side of this swamp some low rocky ridges of ferruginous quartz make their appearance through the alluvium of the plain, and in these gold is said to have been found some years ago. The stone looks very well, but so many more tempting things have been found in the district that no attention has been paid to them of late.

ROEBOURNE is situated eight miles inland from Cossack on the Western side of the Harding river. It is built round the base of a hill called Mt. Welcome, which forms the Eastern end of a small range following the coast in a South-Westerly direction. The rocks of this range are very similar in appearance to those of Cossack, but as they show signs of bedding must be of sedimentary origin. They contain many dykes. On the Eastern side of the large alluvial flat of the Harding, which is about eight miles wide, is Mount Hall. This small range is composed of hornblende schists with trap dykes, and lies in the fork of the Harding, which a little higher up has split into two branches, one, the Western, flowing through a gorge past Roebourne into the sea at Cossack, and the other, the East Harding, flowing through the large alluvial flat it has formed, and which joins the large alluvial plain which here stretches all along the coast up to the ranges, which in some places are thirty miles inland. The surface of this plain is often broken by low ridges of rock, and it is skirted along

the sea shore by mangrove swamps, though occasionally, as at Cossack, it is separated by low rough ranges. The road between this place and Fisher's lies across these plains, passing several low, rough, isolated hills of granite, quartz, or quartzite, and skirting the low rolling ranges to the landward.

Between Fisher's and Withnell's there are some low broken ranges of actinolite and hornblende schists, quartzite with diorite dykes and quartz veins containing a good deal of hornblende. To the South are seen some bold rugged ranges, the rocks of which appear from a distance to be either quite black or red; beyond which the country appears to be a table-land, the top of the ranges being perfectly horizontal, with here and there a detached flat-topped mass, only one forming a peak, which is known as King's Pyramid. A large alluvial flat extends from Withnell's almost to Balla Balla Creek, but judging from the large quantities of quartz at places, the rocks cannot be far beneath the surface. Gneissic rock was struck in making a roadside well, and rock appears in two or three small hills nearer the coast.

At Balla Balla Creek there are low rolling hills of clay-slate, with numerous quartz veins of a highly promising character, which, taken together, form the nearest approach of anything I have yet seen to the gold bearing country of the other colonies. In this creek there is a fine large lode of copper, easily traced by the gossany cap, which is often strained by the copper, and in some holes, scratched out by the kangaroos, the walls and roof are perfectly green. Fine specimens of native copper, green carbonates of copper, and ferruginous oxides are to be found in the bed of the stream. I should strongly advise the testing of some of the gossany parts for gold and silver.

From this point extensive ranges run to the South-West, while to the North and West are some bold hills and masses of rock, standing out of the plain to the height of 600 and 800 feet, formed of amygdaloid, the cavities of which are filled with agate, calcite, and other minerals, and traversed occasionally by felstone dykes. I consider the gullies around these hills should be prospected for precious stones, for there is every chance of their being found. These hills are smooth and bare, with hardly a sign of vegetation, and are so steep as to be quite difficult to climb.

**MALLINA AND PEEAWAH.**—Mallina, 70 miles East of Roebourne, and about 20 miles South of the sea, is situated on the large low alluvial plain which extends along this North-West coast between the low ranges to the South, and the sea to the North.

On the Mallina claim there are two outcrops of quartz; the first, a large, white, barren-looking reef, rising out of the alluvial plain, and forming a hill running East and West, almost the length of the claim. The second, a small reef on the South side of the hill, from 9in. to 2ft. in width, following the contour of the hill, and apparently dipping slightly towards the larger reef. Both contain a certain amount of antimony.

In this smaller reef gold was first discovered, and it proved so rich that it was decided to sink a shaft on the large reef, to cut the junction, as these intersections of auriferous reefs have generally proved of great richness. A shaft was therefore sunk 27ft. on the South side (footwall) by the cap of the large reef, but without success, as down to that point no stone was struck. A drive was therefore put in to the North on this level, to test the main reef, which here proved to be slightly over 10ft. wide and of so greatly improved a character that the work of testing it was carried on in a Westerly direction by a series of steepes or stopes. The reef not only improves in this direction, but carries gold in the solid stone, the richest stone being on the footwall, where I have seen some nice specimens. Four tons of stone are now on their way to Melbourne, but should the trial crushing from the main reef not prove so good as is expected, I would still advise the proprietors to continue their work, as they have every reason to hope from the

large quantity of stone, its improving character in depth, and the richness of the small reef which will probably join it, that this will eventually prove to be a very valuable property.

There are several other claims on this line of reef, and I hear that, since I left, gold has been found in the adjoining ones; but at present very little work in the way of testing has been done, as there has been a great deal of trouble in finding the reef, which is covered by some eight or ten feet of red clay, and further the prospectors were not certain of its true bearing.

Martin's line of reef runs parallel to the latter, but a few hundred yards to the North. Gold was first found by Mr. Martin about half a mile to the Eastward in a small outcrop of quartz, which appeared above the clay plains. On opening it up, the reef proved to be about ten feet wide, and dipping, as the other did, to the North, but differing from it, as the reef seems to comprise two veins joined together: the small one from eighteen inches to two feet wide on the hanging wall, being very rich in gold, whilst the larger mass of the stone is at present of a more hungry looking character, but as this has only been opened up to about ten feet, it is rather early to form an opinion. The reefs on this ground are very promising in character, as their walls are well defined and they can be traced for a considerable distance; although they appear to be cut out, or to be thrown on one side by a fault, as on a small hill on the direct line of the reef, about one mile to the Eastward, there is no sign of quartz, and the rocks are rather different in character from those near the reef.

About five miles to the East another find has been made by Messrs. Wells & Co. It consists of a small reef from two to three feet in width, dipping to the South. The stone in places shows gold freely but is very different from that at Mallina, and contains a great deal of antimony, so much so, in fact, that I should be inclined to call it an auriferous antimony lode. A shaft has been sunk passing through the reef near the surface, to a depth of 47 feet (water level), and I believe they will now drive to the reef, which is about 15 feet South of the shaft, and test it along its line of strike.

I do not think this reef can be worked by the ordinary gold extracting processes, as the presence of so much antimony will cause great loss of gold, but as that metal will probably be found to carry a good deal of gold, the ore will either have to be dressed and sent away, or smelted on the spot. Mines of similar character have been worked with great success in Victoria, and proved to be very rich in gold.

There is another claim in this reef that has also struck gold, but it was not being worked when I visited the field. There are also several claims round about, but nothing has yet been struck having the character of a true vein.

The rocks near these reefs, where visible, are clay-slates of a slightly calcareous structure: they are, however, generally covered with thin deposits of travertine limestone, so that, as a rule, nothing is seen beyond either a blow of quartz or a large quantity of the same mineral scattered over the surface of the plain.

A little to the Westward of Mallina there are two or three isolated rugged stony peaks, one of which is called Mount Spinifex. The rocks are chiefly banded quartzite with ferruginous quartz reefs; these latter are not of a promising character.

Some miles South of Mallina some long low ranges occur, principally of quartzites and clay-slates with quartz reefs and trap dykes, having very much the appearance of the South Australian copper country. Following these ranges round to the South, and after crossing a low saddle of clay-slate, we come upon a large alluvial flat surrounded almost entirely by hills. These flats occur on all

the rivers just behind the hills, which seem to indicate that a long period elapsed before they cut channels through the hills, during which the water, being dammed in, deposited its sediment in what must then have been extensive swamps or shallow lakes. All along the edge of this flat and the hills to Croydon, on the Sherlock River, there are numerous quartz reefs, which have very much the appearance of gold bearing rock.

From Croydon the road runs in a Westerly direction across these alluvial plains to the crossing on the Sherlock, which, between the station and this point, makes a great bend to the South-West, following close under a rugged rocky range of amygdaloid rocks through a gorge along which the road also passes after it has crossed the river. The rocks here have all the appearance of a "tip" heap, except that the masses often weigh several tons; they are almost destitute of vegetation, and being nearly black in color the passage of this gorge on a hot afternoon is anything but agreeable.

It leads to another alluvial flat, several miles wide, reaching to Pyramid Station, so called after the hill before mentioned as seen from Fisher's. This hill is a few miles to the South, and is, as I had imagined, capped with a horizontally bedded sandstone, being a detached portion of the large formation extending into the interior as a great table-land. I, unfortunately, had not time on this trip to visit the latter.

From this point to Wood Brook the road follows a small flat, to the South of which are still seen the amygdaloid hills. These, however, on approaching the station, are replaced by a quartzite conglomerate, containing in places a good deal of iron pyrites. Between this and Roebourne the rocks again change, the crystalline schists being largely developed, and in the ranges large masses of trap stand out, looking quite black in contrast to the pale grey color of the schists, while here and there a wide alluvial flat occurs.

A few miles South of Roebourne some copper mines were worked a few years ago. They are situated at the base of some low slate and quartzite hills on the edge of a large flat formed by one of the branches of the Harding River. These lodes are chiefly ferruginous oxides of copper. In one shaft gold is often visible. There are two sets of lodes, one running more or less North and South and dipping East, while the other runs East and West and dips North.

A good deal of work was formerly done here, but has been discontinued—I suppose owing to the low price of copper—but as the ore I saw at the surface was so good, and the lodes are so large and so near a port that they could be worked cheaply, that now copper is realising a higher price, they ought certainly to be re-opened. In any case the one containing gold should be worked, as that metal can be separated from copper so much more economically than it could twenty years ago.

Galena has also been found in this district and proved to be very rich in silver, but for some reason has never been worked. I did not see the mine, as it was not in the direction I had to travel.

Taken as a whole, this is decidedly a mineral-bearing country; in fact, the most promising I have yet seen in the Colony. It should be thoroughly prospected, for as there are such large tracts of alluvium near to reefs that have been proved to be rich in gold, there is every prospect of rich alluvial deposits of that metal being found.

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