

The main formation which runs through the Mystery and adjoining leases consists chiefly, in the oxidised zone, of kaolinic material, and is of considerable width; it contains numerous veins and stringers of quartz, striking across the lode, which generally carry values. There is also a series of flat tourmaline-bearing quartz veins which as a whole, are non-auriferous. Stringers and lenses of ironstone are common in the oxidised zone. It is possible that much of the gold in the upper levels is of secondary origin.

The Kapai or eastern line of lode is closely associated with one of those haematite-quartz rocks generally known as "jasper bars" which are so common on these goldfields.

But little gold is found in the haematite-quartz rock itself, the best values being obtained from cross leaders of quartz running roughly at right angles to the "jasper," and also in kaolinic material on the walls of the latter generally on the Western side.

As in the case with the Mystery line of lode, the Kapai line appears to owe much of its gold contents in the oxidised zone to secondary concentration, and neither appear to present the same possibilities at depth as the Western line.

The fieldwork in connection with the second section of the work was commenced on the 8th August. This section will complete the detailed examination of the North End of the field. Since the above date, my attention has been mainly devoted to the mapping of surface features generally.

This portion of the work was completed early in December, and the examination of the underground workings was then commenced.

The Country between Kalgoorlie and Coolgardie.

With the object of linking up mining centres, Mr. Honman mapped, in a more or less broad way, an area between these two centres, and brought several important facts to light. This officer summarises his work in the preliminary report which is as follows:—

A—Binduli mapped in detail, comprises an area of 16 square miles, extending two miles north of Binduli Railway Station, and three miles south of the same, and in an easterly and westerly direction from the Kurrawang conglomerate ridge, to within four miles of Kalgoorlie. Mr. C. G. Gibson, a former officer of the Survey, has already mapped the area in a broad way, and his classification of the rock areas is entirely confirmed by the detail work done last year. Mr. Gibson divided the rocks into two groups, viz.:—Porphyries and Sedimentaries. The Sedimentary Rocks occupy a considerable area of the country under review, about eight square miles. The topographical features compose a conglomerate ridge bearing 340° and running across the Coolgardie road at 16 miles 30 chains from Coolgardie, also a ridge of massive porphyry and schists bearing 325° to 330° crossing the railway line near the Binduli Railway Station. The general slope of the country is to the South where it terminates in breakaways and salt lakes. Two miles north of the Railway Station the country attains its highest elevation, and is very sandy; it falls very gradually northwards for many miles, and culminates in salt lake country; it consists of sand covered with mallee and spinifex.

The office work is not as yet far enough advanced for the formation of any final conclusions as regards the geological structure and history of the area, but the following features are brought out by the field work:—

The strike of the bedding planes does not necessarily coincide with the strike of the schistosity or cleavage.

The presence of conglomerate schists and slates in the porphyry area. The slates are apparently interbedded with the schistose porphyry.

The sedimentaries outside and west of the porphyritic area have a consistent dip to the west at a high angle, which becomes more pronounced in a westerly direction.

The conglomerate formation is persistent right across the area and the conglomerate series is at least half a mile thick.

There are two systems of fissuring in which quartz veins have formed:—

- (a.) Vertical coinciding with shear and cleavage planes caused by pressure at right angles to the strike of the cleavage.
- (b.) Flat, though with a slight southerly; the fissures are small and discontinuous.

The quartz veins occur both in the schists and the massive porphyry. In both they have been found to carry gold which from report averages about 10dwts. to the ton, but the veins are small and the porphyry is too hard to enable them to be worked profitably.

B.—*An area between Coolgardie and Kalgoorlie.*—This comprises 350 square miles and has been mapped broadly with the object of bringing out the structural relations of the different rocks.

The topographical features are controlled by the geological formations. The greenstone areas which occupy about 100 square miles are characterised by hilly country composed of long rugged hills with their longer axes coinciding with the dominant strike of the rocks which varies from 300 deg. to 340 deg. The granite and porphyry areas compose prominent rises characterised by flat-topped bosses of granite and porphyry. The sedimentary rocks with the exception of the conglomerate and quartzite occupy the depressions and flanks of the ridges. The conglomerates north of the lake which stretches from near Boulder towards Coolgardie form two well defined parallel ridges which are two miles apart and represent the eastern and western legs of the huge syncline. These encroach on the lake country which extends for about 14 miles in a south-westerly direction from M.H.L. 47E to within 7 miles of Coolgardie. This lake is separated from Hannans Lake by a prominent greenstone ridge and it is three miles wide in places. The northern margin of the lake is bounded by breakaways which in places exhibit excellent geological sections, while the southern edge is composed of sandhills and a white powdery deposit locally known as "Copi." The area comprises four main groups of rocks:—Sedimentary, Greenstone, Porphyry, and Granite.

No opportunity has yet occurred of definitely working out the relative ages of the respective rock groups, but when the necessary office work is more advanced the facts observed in the field can be properly studied and correlated. At the present stage the following statements can be provisionally made:—

An important syncline exists between Coolgardie and Kalgoorlie about 8 miles wide, the axis of which is very close to the Kurrawang Railway Station. The syncline has a strike of 340 deg. and if anything pitches very slightly to the North. The presence of this syncline suggests that the country is composed of big folds whose bedding planes have been destroyed by great lateral pressures producing schistosity and cleavage.

The Binduli porphyries persist with an almost uniform width for 24 miles passing through Wongi and are associated with sedimentary beds.

The conglomerates can be followed for over 15 miles along their strike.

Where the porphyries abut the greenstone rocks to the east they contain large phenocrysts of orthoclase which weather out in perfect crystals up to 1½ inches long.

Greenstone bands occur in the sedimentary rocks close to Mungari Railway Station, which make into a larger greenstone formation to the South striking 340 deg. and becoming wider while connecting with the greenstone area of which Mt. Herbert and Mt. Marion form prominent hills in the Hampton Lands and Railway Syndicate's Location 53.

Granite is intrusive into the sedimentary series and has transmuted those in close proximity into micaceous and chistolite schists. This has given the Coolgardie rocks a strike bearing more to the west of north than the main sedimentary area. It is probably to this intrusion that the highly metamorphosed state of the sedimentary rocks and the great abundance of tourmaline in the whole area is primarily due.

A greenstone area occurs at the western end of Location 53 and is probably continuous with that at Coolgardie.

A study of the conglomerates in the field shows conclusively that the bedding of the rocks is independent of the schistosity or cleavage, the elongation of the pebbles corresponding with the latter.

The whole area is intensely metamorphosed resulting from lateral pressure exerted in an easterly and westerly direction, and accentuated, if not actually caused, by the granite intrusions at the 8-Mile on the Coolgardie Road and at the Water Reserve 2956 in Location 53.

Petrological Work.

A brief synopsis of the results of the Petrologist's work during the year is given in his own words below:—

Most of the results of the year's work in detail either are now in the press or have already been issued in Bulletin form. Little more, therefore, is called for in these pages than a brief statement of the broad facts elicited in the examination of the rocks from the various districts. The more important localities from which specimens have been collected during the year are as follows:—

- The North Coolgardie and East Murchison Goldfields.
- The Kanowna Main Reef Linc.
- The North End Kalgoorlie Field.