

5.—NOTES ON THE GEOLOGY OF THOMPSON'S FIND, EDJUDINA.

By F. G. FORMAN, B.Sc.

Thompson's Find is situated on the west shore of an arm of Lake Raeside, distant $6\frac{1}{2}$ miles south-east of Mining Lease No. 872E, Edjudina.

General Geology.—The country rock in the vicinity of the discovery consists of chloritic schists (greenstone schist) which can be traced without a break from the mining area of Edjudina, where they have been described by Gibb Maitland.*

These greenstone schists are traversed by a series of narrow but remarkably persistent bands of haematite jasper. Jasper Range with One Tree Hill at its southern end, running parallel to the shore of Lake Raeside and about a mile to the west, owes its existence to the resistance to denudation offered by a number of these closely parallel jasper bars, which may be observed running in a long unbroken line right along the range.

There are also a number of quartz blows or reefs of varying width occurring along the planes of foliation of the schists, and in the low lying country about the shores of the lake these blows form in places bold precipitous ridges running out as spurs into the otherwise flat bed of the lake.

It is one of these quartz reefs lying in the lake close to the western shore which has been found to be auriferous. Running parallel to this reef and about 200 feet west of it there is a dyke of very fine grained granitic rock standing out boldly above the floor of the lake and forming at this point its western shore. Although the country was carefully examined for at least a mile on either side of this granitic dyke no other occurrence of a similar nature could be seen.

The Greenstone Schists.—These rocks are intensely sheared and contain a high percentage of chlorite. They are similar in all respects to the greenstone schists of the Edjudina line of country and in fact appear to be the easterly extension of these rocks. The planes of schistosity of the greenstones have a general strike of about 35deg. west of north, magnetic.

The Haematite Jaspers.—These are of varying composition, ranging from almost pure silica to rocks which appear to contain a high percentage of haematite. None of the jaspers are more than three or four feet wide, but all are remarkable for their continuity and persistence of strike, which appears to be parallel to the foliation of the schists.

The Quartz Blows or Reefs.—The quartz reefs appear to be lenticular in shape, and as previously mentioned occur along the planes of foliation of the schists. In some places the quartz appears almost pure and quite massive, while in others it contains a large amount of iron and shows traces of foliation. Several places were noted where the planes of foliation of the quartz were covered with chlorite, while in others, masses of unaltered chloritic schist were seen to be included in the quartz. To my mind this would indicate the origin of the quartz reefs as replacements of the greenstone schists, the traces of

foliation and the occasional occurrence of schist included in the quartz being remnants of the former condition of the rock.

At the time of writing only the quartz reef in which the discovery was made has been proved auriferous. This reef can be traced along its strike for at least three hundred yards, and varies in width from about eighteen inches at its southern end to about ten feet at its central portion, where the reef is made up of at least three separate parallel lenses.

Some of the gold is associated with the ferruginous areas in the quartz, but it also occurs in the solid quartz, and in three places pieces as large as wheat grains were seen lying apparently in foliation planes.

The Granitic Rock.—This is a very fine-grained rock and is known locally as "quartz porphyry." On examination under a hand lens the rock is seen to be holocrystalline and to consist of quartz, felspar, and muscovite. In the absence of facilities for making a microscopic examination of the rock it is difficult to give an exact name, but I would point out the absence of a porphyritic structure.†

Conclusion.—The present examination shows this area to be geologically an extension eastwards of the Edjudina line of country.

There seems to be no doubt that the gold in the discovery reef is genetically related to the adjacent granitic dyke, as the relationship between acid intrusives and the occurrence of gold is such a marked feature of so many of our goldfields. For this reason also the auriferous belt will probably be confined to a narrow strip in the proximity of the granitic dyke and extension of the auriferous belt east and west is rather to be doubted.

Sufficient work has not been done on the discovery reef from which definite ideas on the vertical shape of the reef can be formed, but from the otherwise marked similarity between this and the Edjudina area, where the reefs occur characteristically as lenses or bulges of no great vertical depth, it might be inferred that similar conditions will be found in this case.

As the discovery reef occurs within the bed of a salt lake where the water table is normally at, or very close to the surface of the ground, it is likely that mining operations beneath the surface will meet with a difficult water problem.

PETROLOGICAL REPORTS.

(C. O. G. Larcombe, D.Sc.)

1.—BORING AT LALLA ROOKH G.M.

(For Locality Plans and Plans of Working see Dept. of Mines (S.M.E.'s) Report, 1929.)

No. 1 Bore.—Lalla Rookh South G.M.

1. This bore, judging from assay results, finished at 405 feet, but core to 298 feet only petrologically examined.

2. This bore from surface to 248 feet was in a felspar-chlorite rock containing scattered yellowish grains of leucoxene. From 248 to 298 feet the rock was strongly schisted and made of a carbonate-chlorite-quartz schist.

*A. Gibb Maitland: G.S.W.A. Bull. 11—"Notes on the Country between Edjudina and Yundamindera."

† A Petrological Report by Dr. Larcombe determines this rock to be a muscovite microgranite.

3. Fifty-four assays were made at the Government Analyst's Department; 51 of these contained no gold; two assayed a trace; and from 348 to 350 feet the core assayed 10 grains per ton.

No. 2 Bore.—Lalla Rookh North G.M.

1. This bore was completed at a depth of 394 feet.

2. The bore started at 21 feet in a fine-grained schist which continued to 161 feet. Between 161 feet and 216 feet is a well-defined carbonate-chlorite schist. The fine-grained chlorite continued from 216 to 315 feet, where the carbonate schist came in again and continued to 357 feet.

3. Details of the formations are as follow:—

Depth in feet.	Nature of rock.
21—102	.. Fine-grained chlorite schist.
102—125	.. Brown oxidised rock.
125—161	.. Fine-grained chlorite schist.
161—216	.. Schist country made of carbonate and chlorite.
216—315	.. Chlorite rock.
315—357	.. Mottled carbonate-chlorite schist.

4. No distinctive lodestuff was seen. The Government Analyst's Department made 55 assays, of which 53 contained no gold, one contained a trace, and from 373 to 375 feet the core assayed 3 dwt. 11 gr. per ton.

2.—BORING AT RIVERINA.

(For Plan of Bores see Dept. of Mines (S.M.E.'s) Report for 1929.)

No. 1 Bore.

1. This bore was put down at an angle of depression of 55 degrees to cut the lode below the 280ft. level. It reached a total depth of 597ft. 2in. along the direction of inclination.

2. The bore throughout its full length was in one rock formation, viz., a reconstructed amphibolite, more or less coarse in grain but of varying degrees of crystallinity.

3. Ore Deposits and Zones of Alteration:

Throughout the course of this bore three distinct zones of shearing and crushing—one being accompanied by a distinct quartz vein—were met with as follow:—

a. Zone 1, from 462' to 469' 9".—This zone contained a distinct lode formation from 465' to 469' 9". The assay values are as follow:—

462ft.-465ft.—Gold, a trace (under 3gr. per ton).

465ft.-469ft. 9in.—Gold, 1oz. 3dwt. 23 gr. per ton.

From 462 to 465 feet the rock was powerfully stained with biotite. Under the microscope it consisted of a mass of shapeless red-brown scales and cleavage strips of biotite set in a more or less water-clear material resolvable by high powers into a granular mass of quartz and felspar. This special granular mass and biotised rock—finely schistose—is evidently a feature of the hangingwall of the shear zone containing the lode from 465ft. to 469ft. 9in.

In the shear zone it is clear that this biotite rock has been formed by dynamic stress, heat and pressure, and has resulted from the breaking up of the hornblende of the reconstructed amphibolite.

From 465ft. to 469ft. 9in. is true siliceous pyritic lodestuff formed along a line of shearing. This lodestuff is quite interesting from the fact that it contains tourmaline and microcline. Under the microscope the lodestuff is made up of microcrystalline granular quartz and felspar with some biotite scales and rods of pale brown tourmaline, arranged parallel to the planes of foliation or schistosity.

This tourmalinised quartz-felspar schist is traversed by a coarse-textured mosaic of quartz—with a pseudo-elastic appearance—and occasional remarkable plates of microcline.

The tourmaline rods lie parallel to the quartz veins, and the microcline seems to frequent the borders of the secondarily introduced quartz. Iron pyrites (and possibly pyrrhotite) occurs in grains and veinlets cutting across the planes of foliation.

The hanging-wall rock from 451ft. 9in. to 460ft. 10in. was also assayed with the following results:—

451ft. 9in.-455ft. 10in.—Gold, nil.

455ft. 10in.-458ft. 3in.—Gold, 5gr. per ton.

458ft. 3in.-460ft. 10in.—Gold, 5 gr. per ton.

The footwall rock, represented by a specimen from 471 feet, was normal reconstructed amphibolite. Under the microscope it consisted of bunches and ragged plates of hornblende set in water-clear material made of a microcrystalline aggregate of quartz and felspar. No biotite was seen. A little more crushing would convert this rock into a hornblende schist.

b. Zone 2, from 504ft. 9in. to 509ft. 10in.—Between these depths there occurred another zone made up as follows:—

504ft.-506ft.—Granulated biotised schist.

506ft.-509ft. 10in.—Glassy quartz—slightly pyritic.

The assay results gave:—

504ft.-506ft.—Gold, 5gr. per ton.

506ft.-508ft.—Gold, nil.

508ft.-509ft. 10in.—Gold, 5gr. per ton.

The hangingwall rock from 504 to 506 feet was seen under the microscope to be a pyritic biotised granulated quartz-felspar schist (like that in Zone 1) with scattered grains and plates of hornblende traversed by veins and impregnated with patches of coarse silica mosaic and some carbonates.

The footwall of the quartz reef from 506ft. to 509ft. 10in. is reconstructed amphibolite grading into hornblende schist. Under the microscope it consists of bunches and sheaf-like aggregates and bundles of green hornblende separated by colourless interstitial material made of micro to almost microcrystalline mosaic of quartz mainly with traces of biotite.

c. Zone 3, from 383ft. 5in. to 588ft. 4in.—Between these depths was still another distinctly biotised and in part strongly schistose zone. According to assay results Zone 3 contained no gold. Core from this zone has not been microscopically examined, but macroscopically the zone appeared to contain—

(i) granulated biotised schist,

(ii) siliceous quartz rock, and

(iii) strongly schistose actinolite quartz rock.