

## PUBLICATIONS.

During the year the following publications have been issued and are now available to the public, viz.:—

Geological Sketch Map of Western Australia based on the work of the Geological Survey and revised to 1933. Scale 50 miles to one inch.

Bulletin 95.—The Physiography (Geomorphology) of Western Australia, by J. T. Jutson, B.Sc., L.L.B., second edition, revised.

Annual Progress Report for the year 1933.

## AERIAL, GEOLOGICAL AND GEOPHYSICAL SURVEY OF NORTHERN AUSTRALIA.

As a member of the executive committee of this survey I was absent from the State on two occasions, the first to attend the first meeting of the committee held at Canberra from 28th to 30th June and the second to attend a committee meeting held in Melbourne from the 29th to 31st October. The Melbourne meeting was held at the conclusion of an aerial reconnaissance flight by members of the executive committee over areas in Queensland, Northern Territory and Western Australia which it is proposed to include in the survey operations. In all some 12,000 miles were covered in this flight between 19th September and 20th October. My report on the Western Australian section of the flight was forwarded by the committee to the Hon. the Minister for Mines. Early in December I accompanied other members of the executive committee when they inspected the aerial survey work being carried out by the Western Mining Corporation in the Kalgoorlie district, and the geophysical work of the Electrical Prospecting Company of Sweden at Triton, Wiluna and Leonora.

The reports arising from the field work are attached, except in such instances when they were made for purely departmental use.

In conclusion, I take this opportunity to express my appreciation of the work and loyal support of the members of the staff during the year.

F. G. FORMAN,  
Government Geologist.

REPORT ON WELSH'S FIND NEAR YARRI,  
NORTH COOLGARDIE GOLDFIELD.

(T. Blatchford, B.A.)

*Location.*—Welsh's Find is situated near the 37-Mile Peg on the cut road which connects Yarri to Yerilla. It lies about four and a half miles west of Yarri and seven and a half miles east of Yilgangi.

*Topography.*—The area in the immediate vicinity of Welsh's Find may well be described as typical flat goldfields country with a gentle slope towards the south-east.

The only high ground near the leases is a short east and west ridge which lies about half a mile north of the main camp. With this exception there are no conspicuous landmarks.

*Geology.*—The geology in the immediate vicinity of Welsh's Find appears to be fairly simple, the main rock members consisting of porphyritic granite, felspar porphyries, and fine-grained sediments.

The porphyritic granite may be regarded as the main country rock, though there is a fair development of sedimentary rocks in the ridge lying to the north of the leases.

The most important rock member is the quartz felspar porphyry, for it is in this class of rock that the gold occurs.

*Quartz Felspar Porphyries.*—This series of rock no doubt intrudes the porphyritic granite. As may be seen on the sketch map attached to this report,\* the porphyry at the surface covers quite a large area, and the shaft at the S.W. corner of Lease 1086R proves that it extends further to the east for it was struck in the shaft at a vertical depth of 30 feet from the surface. In hand specimens it is quite evident that the porphyry has been submitted to intense shearing and mineralisation, the chief secondary mineral being quartz, often occurring in narrow veins along the lines of schistosity and pyrites. Coarse pink felspars are fairly common and are to be found embedded in a granular ground mass of quartz and felspar. No doubt the hardness of the rock is due to the impregnation of silica.

The occurrence of gold in this form of granitic rock is at least rare, and we have no record of a similar instance in this State. On the other hand, gold has been found indirectly associated with porphyries, good examples of which are those in the Red Hill, Kanowna.

With regard to the Kanowna porphyries, these intrude the conglomerate beds, which contain the main quartz reefs. The Kanowna porphyries are themselves barren of gold, but contain narrow but extensively rich quartz veins, the most noted being the celebrated Tom Doyle's leader.

At Yilgangi, 7½ miles west of Welsh's Find, we have a similar occurrence of conglomerate almost identical in form and composition with the Kanowna type and also invaded by a hornblende quartz porphyry. This porphyry has been impregnated with irregular quartz veins which no doubt—judging by the prospecting done—carried a certain amount of gold, but probably insufficient to be payable. The porphyry at Welsh's Find differs from both of the foregoing in that the gold is more closely associated with the mineral content than the quartz, the quartz veins being fairly free from at least payable gold values.

From the foregoing it is evident that no porphyries should be passed by prospectors, particularly those types which exhibit shearing or foliation.†

*Mining.*—Up to the present very little mining has been done and practically no deep mining, the bottom of the deepest shaft being not more than 30 feet from the surface.

It is therefore impossible to state what the prospects are of obtaining any large tonnages. On the other hand, this point could easily and cheaply be

\*Sketch Map not published.

†Attached as an appendix are petrological notes on samples of the porphyry and sediments of Welsh's Find.

decided by sinking or boring at several point into the porphyry. Regarding values, the only official battery returns to hand are as follows:—

- L. Welsh, G.M.L. 1126R—124½ tons: 7 dwts.  
3 grs. bullion over the plates; tails not known.  
F. P. Maingay, P.A. 1080R—138¾ tons: 1 dwt.  
5 grs.; tails not known.  
R. Welsh, P.A. 1079—31½ tons: 8.4 dwts. fine  
gold per ton; tails not known.

All the stone raised on Lease 1126R seems to have been taken to the mill and been crushed, I was informed by the man in charge, for values up to 10 dwts. per ton.

From what can be seen at present, the main points to be decided are:—

1. Is the porphyry (a) a wide more or less vertical dyke, (b) one narrow flat dyke, or (c) a series of flat dykes.
2. Do the shearing and mineralisation extend to any appreciable depth, which will also solve the amount of tonnage likely to be available.
3. Over what area do the gold values extend.

All these could easily be proved by shallow boring at a comparatively small expense.

#### *Description of the Rocks.*

1/5342 G.M.L., 1126R. Felspar porphyry:

Felspar porphyry sheared and penetrated along planes of schistosity by stringers and veins of quartz. The quartz thus serves as a binding agent and renders the rock extremely hard. Composed of phenocrysts of microcline, orthoclase, and albite embedded in a granular ground-mass of quartz and felspar. Abundant pyrite and some hydrated ferric oxide.

1/5341. P.A. 1092. Felspar porphyry:

More highly sheared than 1/5342, contains thin laminae of quartz along planes of schistosity. The rock is softer than 1/5342, in which the quartz occurs as fairly large veins up to an inch or more in width.

1/5341 may be a marginal phase of 1/5342.

1/5337. Sediments on hill half a mile north of Main Camp:

Composed of quartz, fine mica (sericite), chlorite, abundant ferric oxide (possibly hydrated), and tourmaline. The tourmaline is common and occurs as needles. The presence of tourmaline suggests contact metamorphism.

### THE GEOLOGY AND PETROLEUM PROSPECTS OF PART OF O.P.A. 253H, NEAR DANDARAGAN.

(F. G. FORMAN, B.Sc.)

O.P.A. 253H includes an area of 10,000 square miles, bounded on the south by a line from Eglington Rocks to Northam, on the east by the northern railway line from Northam to Buntine, and on the north by a line from Buntine to Green Head. The western boundary is the coast line from Green Head southwards to Eglington Rocks. This report is written after a traverse from Moora to the coast west of Dandaragan had been made to investigate supposed evidences of mineral oil in the coastal area. An inspection of this area showed that the supposed evi-

dences, structure and an oil seepage, were non-existent, but as much of the area traversed has not been previously described and as certain geological features were noted which are of interest and some promise in the search for oil, the inspection did not prove a waste of time.

#### TOPOGRAPHY.

The area traversed shows four sharply defined topographic zones of striking contrast. These are (a) Plateau Zone, (b) Sand Plain Zone, (c) Swamp Zone, and (d) Coastal Sandhill Zone.

(a) *Plateau Zone.*—Between Moora and Dandaragan the country consists of an elevated plateau lying about 850 feet above sea level with a gently undulating surface covered with sand, and in places ironstone laterite (duricrust). The continuous covering of sand and laterite (due to decomposition *in situ* of the underlying rocks) effectively hides the character of the sub-surface formations. To the east, and marked by a general north-south line in the vicinity of Moora, this elevated plateau junctions on the main mass of the eastern tablelands, consisting of a complex of Pre-Cambrian granites and metamorphosed sediments. This junction is marked by a low scarp, probably a fault scarp, the country to the east being maturely dissected and about 250 feet above the plateau to the west.

From an elevation of about 600 feet above sea level at Moora, the plateau steadily rises to the west until it reaches an elevation of about 1,100 feet at its western edge. The western edge of the plateau is marked by the westerly facing Dandaragan Scarp. This runs in a general north-south direction about three miles west of Dandaragan and is probably a northerly continuation of the Poison Hill-Quinn's Pole Scarp to the west of Gingin. The origin of this scarp will be discussed at a later stage.

*Drainage.*—The main drainage channel of the Plateau Zone is the Moore River. This stream, flowing in a westerly direction from the interior tablelands, turns sharply to the south in the vicinity of Moora and follows the westerly escarpment of the granite until it reaches Mogumber, where it again turns sharply to the west and after cutting the Dandaragan Scarp flows south for a considerable distance, finally turning again sharply westwards and entering the ocean to the west of Gingin. The southerly course of the Moore River from Moora to Mogumber was probably initiated by the uplift of the Dandaragan-Moora Plateau and its consequent easterly slope prevented the river from continuing westwards as in the upper part of its course. The Moore River probably flowed at one time into the Brockman River, a tributary of the Swan, but has since been captured in the vicinity of Mogumber by a short westerly flowing stream, which cut back through the Dandaragan Plateau and thus diverted the Moore River into its present westerly course.

Westwards from the vicinity of Koolbung Well about ten miles from Moora, the Moora-Dandaragan road follows a valley of mature type which carries an intermittent stream which, however, swells to a considerable volume after heavy rains. This stream, although not shown or named on the Lands Department litho., is really the upper part of Minyulo Brook and is apparently an antecedent stream which in its erosion has kept pace with the uplift and easterly tilting of the plateau. The sudden diversion near