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 microline, 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 evidences, 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

Dandaragan of this stream to a southerly course before its junction with the westerly flowing Minyulo Brook was no doubt caused by the same uplift.

(b) *Sand Plain Zone.*—The country for some 25 miles to the west of the Dandaragan Scarp consists of gently undulating sand plain with a general westerly (seaward) slope and covered by banksia and low scrub. It has an average elevation on its eastern side of about 500 feet and falls with a fairly even grade until it reaches the swampy ground on its western margin, where the elevation is by barometric readings from 50 to 100 feet above sea-level.

On the eastern margin of the sand plain lie several prominent hills of butte-like appearance, including Mt. Misery and Yandan Hill, both about 900 feet above sea-level, which are outliers of the Dandaragan Scarp. About six miles west of Mt. Misery lies Walyering Peak (731′) from which there extends a zone of high ground to the north. This will be referred to later because of the possibility of structure in this vicinity.

Drainage.—The sand plain west of Dandaragan is drained by Minyulo Brook which, after leaving the Dandaragan Scarp, takes a tortuous course around the west side of Mt. Misery and the east side of Walyering Peak and then flows in a south-south-west direction to Caro Swamp, from which it finds its way in a poorly defined channel southwards to the Moore River. There are also a number of poorly defined and insignificant watercourses which, flowing westwards, supply the swamps of the next zone.

(c) *Swamp Zone.*—This zone is really the relatively low-lying western edge of the Sand Plain Zone and is occupied by an irregular chain of swamps and small lakes fed by the run-off from the sand plain to the east, the flow of which is retarded on its way to the sea by a belt of sandhills between the sand plain and the coast. The water from these swamps and small west-flowing streams, in its attempt to reach the ocean, has had to travel underground, with the result that in a number of places underground caverns have been formed. Examples of such are the Namban Caves and the Stockyard Gully Caves, both to the North of the area traversed by me. These are described by W. D. Campbell.* Although no actual openings were observed, the hollow sound caused by passing horses in some parts of the area traversed suggests that caves also exist further south, though perhaps without accessible openings.

(d) *Coastal Sandhill Zone.*—The Coastal Sandhill Zone lies parallel with the coast and extends inland for varying distances. The Eastern edge of the sandhills where they meet the Swamp Zone was observed to be at least six miles inland at Coonmadodo, a resting place for travellers and stock on the old coastal stock route, due west of Dandaragan.

The sandhills lie in long irregular lines with axes parallel to the coast and reach elevations as much as 200 to 250 feet above sea level. There are two types of sandhills. The older or mature sandhills are partially consolidated and bear a vegetation of low scrub and tuart trees. The younger or juvenile sandhills are composed entirely of loose wind blown beach sand and are obviously still in the process of formation. The older hills are sometimes partially covered by dunes of more recent age, which have buried trees and scrub in their advance inland. In other places the mature type of hill has been attacked afresh by the wind and the material forming it has been removed and redeposited as a juvenile sand dune on the leeward side of the mature dune, the position of the old dune being marked by scattered hillocks of partially consolidated sand in which the false bedding caused by wind transport is clearly visible.

*"The Irwin River Coalfield and the Adjacent Districts from Arrino to Northampton"; by W. D. Campbell, G.S.W.A. Bull. 38.

GEOLOGY.

The rocks underlying the area examined may be classified as follows:—

Pre-Cambrian—Granite, gneiss and metamorphosed sediments.
Jurassic—Sediments with plant remains and crystalline limestones.
Cretaceous—Sediments including chalk with marine fossils and coprolite beds.
Tertiary or Sub-Recent.—Coastal limestone series.
Recent.—Sand and ferruginous laterite (duricrust) and sand dunes.
Age Uncertain—Glacial deposits.

Pre-Cambrian.—Granites, gneisses and metamorphosed sediments. These rocks occupy the dissected tableland to the east of Moora, the sediments, consisting of quartzites lying on the granite, dip steeply to the west and with a general north-south strike make up the western edge of the tableland. These rocks are part of the main Pre-Cambrian complex of the interior and in the present investigation are of no value as the occurrence of oil of economic value in such rocks is impossible.

Jurassic.—Rocks definitely of Jurassic age were not seen to outcrop anywhere within the area traversed, but strata probably of this age were cut in a bore, 2,230 feet in depth, which was sunk near Moora in 1913 in search of artesian water. A collection of portions of the core from this bore, now in the Geological Survey Collection, was examined by the writer and the notes made combined with notes by T. Blatchford, late Government Geologist, and R. A. Farquharson, one time petrologist to the Geological Survey, give a fairly complete account of the strata pierced. The following log is a composite one made up from the three sources named above.

Log by Moora Bore (Loc. 1¼ miles West of Moora Township boundary.)

Depth. feet.	Description of Strata.
0-56	white gritty sandstone.
56-62	gritty ferruginous sandstone.
62-86	yellowish micaceous clay.
86-170	grey micaceous clay.
170-266	uncompacted green sand.
266-286	dark gritty sandstone with carbonaceous matter.
286-355	uncompacted grey grit.
355-360	grey carbonaceous mudstone.
360-408	uncompacted grey grit.
at 415	band of hard dark red claystone.
408-417	argillaceous grit with carbonaceous matter.
417-458	grey shale with abundant woody matter.
458-485	grey micaceous mudstone.
at 508	grey micaceous mudstone.
at 525	grey micaceous mudstone with little carbonaceous matter.
525-534	grey carbonaceous mudstone (well preserved plant remains).
534-575	grey micaceous mudstone with pyrites nodules.
575-587	buff-coloured mudstone.
587-595	dark grey, very gritty, mudstone or argillaceous grit.
595-609	light grey arenaceous mudstone.
609-632	grey mudstone (plant remains).
632-696	grey micaceous mudstone (plant remains).
665-698	mudstone (plant remains).
696-726	yellow and grey arenaceous mudstone with little carbonaceous matter.

Depth. feet.	Description of Strata.
726-817	light grey arenaceous mudstone.
817-840	dark arenaceous mudstone.
840-840.5	lignite band.
840.5-864	dark micaceous mudstone with carbonaceous matter.
864-999	dark grey carbonaceous shale.
999-1008	arenaceous mudstone.
1008-1080	dark grey carbonaceous mudstone.
1080-1103	dark grey mudstone with bands of lignite.
1103-1145	dark grey carbonaceous shale.
1145-1169	coarse grained greensand with pebbles of quartz and felspar.
1169-1195	grey arenaceous and micaceous shale (with plant remains).
at 1269	coarse grained compacted greensand with large pebbles of quartz and quartzite.
1269-1300	light grey mudstone.
at 1304	pyrite nodules.
1304-1325	dark grey calcareous shale or argillaceous limestone.
1325-1370	grey micaceous crystalline limestone.
1370-1423	micaceous shale.
1423-1428	hard calcareous shale with septarian nodules.
1428-1441	calcareous carbonaceous and micaceous shale.
1441-1490	micaceous shale.
1490-1518	dark grey argillaceous grit.
1518-1542	dark grey and buff micaceous shale.
1542-1549	micaceous arenaceous shale.
1549-1626	micaceous shale.
1626-1709	micaceous shale.
1709-1712	micaceous crystalline limestone.
1712-1733	micaceous shale.
1733-1754	arenaceous and carbonaceous mudstone.
1754-1840	shale.
1840-1876	grey micaceous shale.
1876-1876.5	argillaceous and carbonaceous limestone.
1876.5-1909	calcareous carbonaceous arenaceous mudstone.
1909-1917	hard micaceous argillaceous and calcareous grit.
1917-1925	grey micaceous shale.
1925-1940	grey gritty micaceous shale.
1940-1954	carbonaceous mudstone.
1954-1974	grey micaceous and carbonaceous shale.
1974-1978	grey crystalline limestone.
1978-1981	calcareous shale with carbonaceous bands.
1981-2028	poorly compacted light grey calcareous sandstone.
2028-2050	mudstone.
2050-2116	poorly compacted sandstone.
2116-2118	grey calcareous sandstone.
2118-2202	grey calcareous sandstone with bands of shale.
2202-2207	grey micaceous mudstone.
2207-2230	poorly compacted argillaceous and calcareous sandstone.

Portions of this bore core from depths of 800 and 900 feet and bearing plant impressions were submitted to the late Mr. R. Etheridge of the Australian Museum in 1914, who determined the impressions as Taeniopteris and Otozamites. Miss K. Prendergast of the University of W.A., has found Taenopteris and Stenopteris in the core from a depth of between 665 and 698 feet and Otozamites between 1,109 and 1,195 feet. The strata pierced by the bore between these depths is, therefore, considered to be fairly certainly of Jurassic age. An inspection of the log will show that carbonaceous matter is present throughout almost the whole of the strata pierced, pointing to a probable lacustrine origin for the sediments. Alternations in the conditions of sedimentation between lacustrine and marine are suggested by the presence of glauconitic greensands between 1,145 and 1,169 feet and at 1,269 feet, and by the bands of crystalline limestone cut in the lower part of the bore. It is noticeable also that a distinct change occurs at about 1,300 feet, the shales and sandstones below this depth being predominantly calcareous while those above are definitely non-calcareous.

Coarse and fine-grained sandstones and micaceous shales outcropping at Mt. Misery and in the lower beds exposed along the Dandaragan Scarp have not so far yielded any fossil evidence of their age. They are possibly the westward extension of the Jurassic beds cut by the Moora bore.

Cretaceous.—The beds exposed in the upper part of the Dandaragan Scarp and covering the greater part of the Dandaragan district consist of ferruginous sandstones, micaceous shales, marls, glauconitic greensands and chalk. Between the chalk and the underlying sandstone (glauconitic in part) there is a layer rich in phosphatic nodules or coprolites, and apatised wood. Some of the phosphate is in the form of dufrenite which has no doubt been formed by interaction with the iron contained in the adjacent rocks. An account* of the occurrence of phosphatic material in the Dandaragan district has been written by Dr. E. S. Simpson.

The age of the beds is definitely fixed by the fossil organisms found in the chalk. A collection from Round Hill on Mr. Robert's property, "Kyanaba," is listed† by L. Glauert and includes the following forms:—

PORIFERA.
CALISPONGIAE.

Pharetronidea :
Peronidella (?) globosa (Eth. fil.).
Porosphaera globularis (Phil.).

ECHINODERMATA.
ELEUTHEROZOA-ECHINOIDEA.
Endocyclica.

Family *Cidaridae :*
Cidaris spp.

PELMATOZOA-CRINOIDEA.

Family *Uintacrinidae :*
Uintacrinus sp.

Family *Marsupitidae :*
Marsupites sp.

ANNELIDA.
POLYCHAETA.
Cryptocephala-Sabelliformia.

Family *Serpulidae :*
Serpula ampullacea, Sby.

MOLLUSCOIDEA.
BRACHIOPODA.
Testicardines.

Family *Terebratulidae :*
Terebratulina ovata (Eth. fil.).
Magas mesembrinus (Eth. fil.).
Trigonosemus acanthodes (Eth. fil.).
Magadina cretacea (Eth. fil.).

MOLLUSCA.
PELECYPODA.
Prionodesmacea.

Family *Mytilidae :*
Mytilus piriformis (Eth. fil.).

Family *Aviculidae :*
Inoceramus sp.

Family *Ostreidae :*
Ostrea, spp.
Gryphaea vesicularis (Lamk.).

Family *Pectinidae :*
Pecten ? sp.
Camptonectes ellipticus (Eth. fil.).

CRUSTACEA.
CIRRIPEDIA-THORACICA.
Lepadomorpha.

Family *Scalpellidae :*
Calantica (Scillaelepas) ginginensis (Eth. fil.).

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*"The Mineralogy of the Dandaragan District and its bearing on Pastures and Stock," by E. S. Simpson, D.Sc., B.E., F.A.C.I., Government Mineralogist and Analyst. Journal of Agric. of W.A., Vol. IX., Sept., 1932, pp. 420-431.

†A list of Western Australian fossils, by L. Glauert, F.G.S., G.S.W.A., Bull. 88, pp. 36-71.

These beds are, therefore, definitely linked with the Gingin Cretaceous beds, the fauna being similar in both cases.

On Mr. Bower's Block 284 at South Dandaragan the coprolite bed lies immediately under the chalk and is underlain in turn by a slightly calcareous hard brownish grey sandstone. Both the sandstone and the material of the coprolite bed when struck with a hammer or rubbed together emit a strong fetid odour, which the writer thought might have a bituminous origin.

Dr. Simpson, Government Mineralogist and Analyst, has reported on a sample of the sandstone as follows:—"The sample emitted an odour, resembling phosphoretted hydrogen, when two portions of the sandstone were rubbed together.

"When the sample was extracted with light petroleum spirit, it yielded a trace (0.005 per cent.) of clear wax-like extract.

"Subsequent treatment showed this extract to be unlike petroleum or its known residuums in chemical properties. It is apparently of vegetable origin.

"The sample contains 10.0 per cent. of phosphoric oxide (P_2O_5)."

Tertiary or Sub-recent.—The surface in the Swamp Zone and around the base of the sand dunes is covered by a calcareous capstone and the rounded upper ends of calcareous "nigger heads," similar to those found associated elsewhere on the coastal plain with the sub-recent coastal limestone series. No natural sections in this formation were seen during the traverse, but a description* of the coastal country further to the north and of the caves which occur there in the coastal limestone series, leaves no reason to believe that they are greater in age than Sub-Recent or Tertiary.

Recent.—Included under this heading is the surface sand which so effectively hides the underlying rocks both on the Moora-Dandaragan Plateau and on the sand plain west of Dandaragan. This sand is derived from the weathering *in situ* of the underlying sedimentary rocks. The higher parts of the two areas mentioned above are covered by a ferruginous laterite or duricrust which owes its origin to the decomposition of iron oxide from solutions drawn to the surface by capillarity.

The most recent deposits are the coastal sand dunes of obvious aeolian origin and still in the process of formation.

GLACIAL DEPOSITS.

An interesting discovery was made in the vicinity of Caro Homestead. No rock outcrops are visible, but on a low mound of loose yellow sand a number of rock fragments were picked up. These fragments include granite, various types of greenstone, quartz and quartzite and hard shale. They vary in size from that of a pea to lumps weighing several pounds and are entirely unsorted. The harder rocks are rounded or oval in shape with, in a few instances, doubtfully facetted faces. The softer fragments of shale have smooth faces, in which deep grooves, similar to ice scratches, are clearly visible. The presence of rock fragments of greatly varying size, and consisting of such a large mixture of rock types, together with the facetting and scratching on the softer specimens, all point to a glacial origin for this deposit. One angular fragment of glauconitic greensand with dufrenite, similar to the material occurring at Dandaragan, was included in the specimens obtained. This would suggest that the deposit was post-Cretaceous in age. It has been suggested to the writer by Professor E. de C. Clarke that this fragment may be a remnant of the Cretaceous beds which could originally have extended this far west and that, therefore, the pebbles showing glacial characteristics may be older than Cretaceous. On the other hand, moraine-like deposits, which appear to be of recent origin, have been noted by W. D. Campbell* near Mt. Hill in the Greenough District.

His description of the deposits is as follows:—

"These deposits at Mt. Hill consist of moraine-like lines of rocks arranged along the beds of the two gullies in the northern portion and heaps like terminal moraines. The blocks of rocks composing the heaps are of local origin and do not show any polishing or grooving, but are collected into these rows in a trough-like manner with a continuous lateral ridge like ordinary glacial moraines. Their regularity is far greater than would result from an adventitious gathering of fallen rocks and they have not been arranged by water, for the blocks are not sorted to size in beds nor are they mixed with gravel or sand. The bed of the gully is wholly filled by those rocks and there are numerous conical pits up to five feet diameter at the top and ranging to about three feet deep. The only explanation that appears to be able to account for these deposits is that of snow glaciation which was sufficiently solid to transport blocks of stone but not to groove them."

It therefore appears possible that the deposits at Caro may be of recent age and belong to the same period of glaciation that was responsible for the formation of the Mt. Hill moraines.

STRUCTURE.

The structural features of the area examined are clearly shown in the accompanying section from west of Walyering Peak to the east of Moora.

At Mt. Misery and Yandan Hill the Jurassic (?) sandstones and shales have a distinct dip to the east of between 3°—4°. The beds outcropping along the Dandaragan Scarp, in the lower sections exposed, probably of Jurassic age, and at the top definitely of Cretaceous age, appear generally to be horizontal, but in several places, particularly directly east of Mt. Misery, they have a distinct but low dip to the east.

The absence in the Moora Bore of any strata which can be correlated with the outcropping Cretaceous rocks of Dandaragan suggests that east of the Dandaragan Scarp the Cretaceous and possibly the Jurassic beds also are probably in a horizontal attitude. There is nothing to suggest an angular unconformity between these two series. The difference in the amount of dip between Mt. Misery and the Dandaragan Scarp is easily explained by folding.

The great depth of sedimentary rocks where pierced by the Moora Bore, so close to the Pre-Cambrian rocks to the east and without surface evidence of inclined strata beneath the Moora-Dandaragan Plateau, suggests that the junction of the sediments with the Pre-Cambrian igneous and metamorphic rocks may be along a line of north-south faulting as shown in the sections.

The writer is unable to agree with or see the necessity for a second fault to the east of Dandaragan as suggested by Mr. Blatchford in his section.† If there

*Campbell, W. D., Op. cit.

*Op. cit. p. 86.

†"The Possibility of Obtaining Artesian Water in the Vicinity of Moora," by T. Blatchford. G.S.W.A., Bull. 48, p. 56.

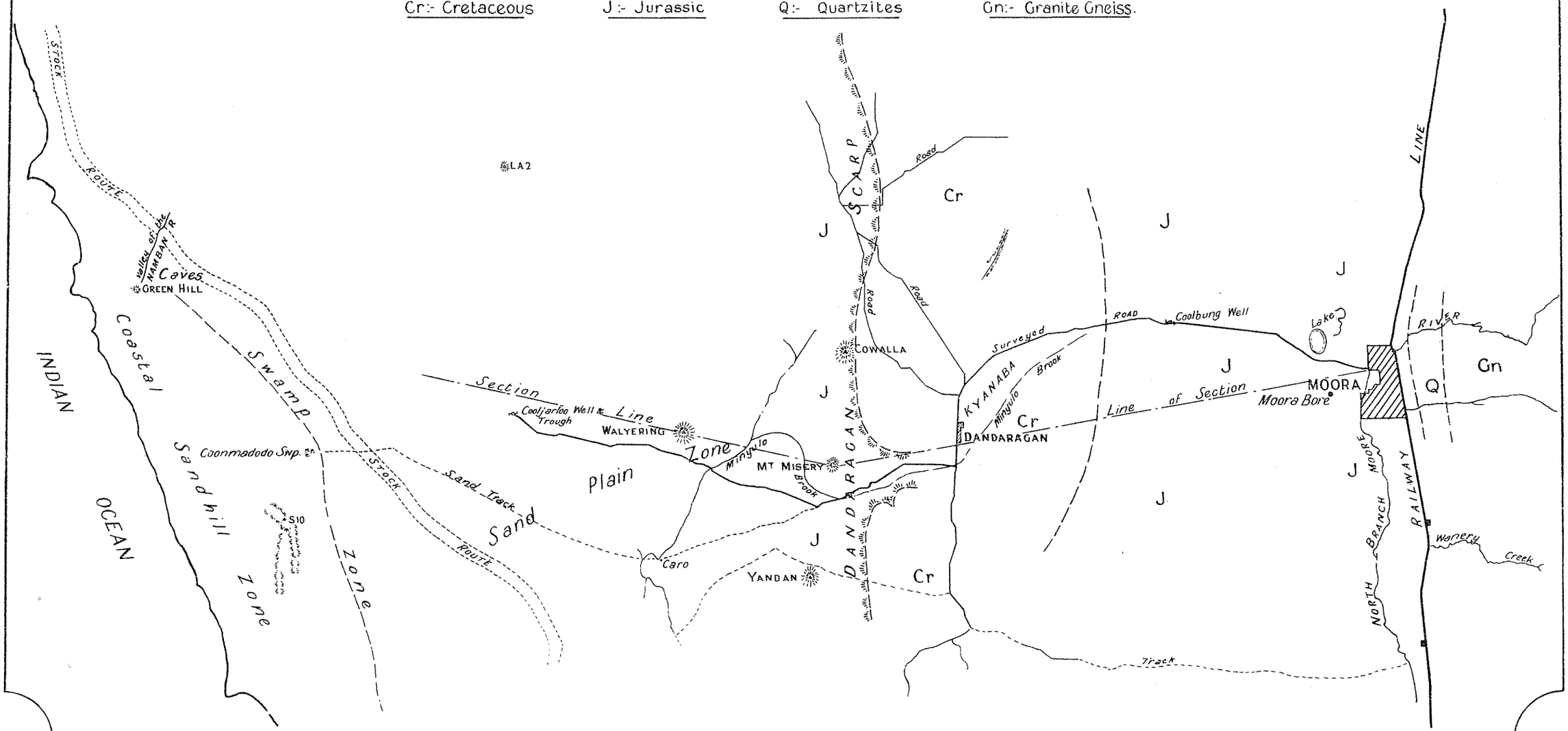
GEOLOGICAL SKETCH MAP

TO ACCOMPANY REPORT ON PART OF O.P.A. 253H NEAR DANDARAGAN, W.A.

Scale:- 300 Chains = 1 Inch

LEGEND

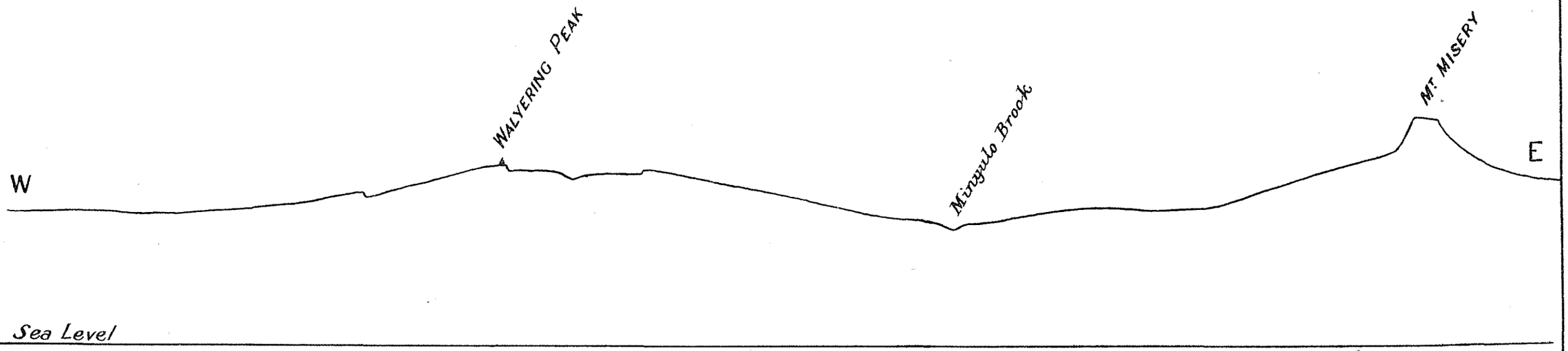
Cr:- Cretaceous J:- Jurassic Q:- Quartzites Gn:- Granite Gneiss.



SECTION THROUGH WALYERING PEAK AND MT MISERY

SHOWING TOPOGRAPHICAL FEATURES MENTIONED IN TEXT

Scale:- Horizontal :- 1 mile = 1 Inch
Vertical :- 500 Feet = 1 Inch

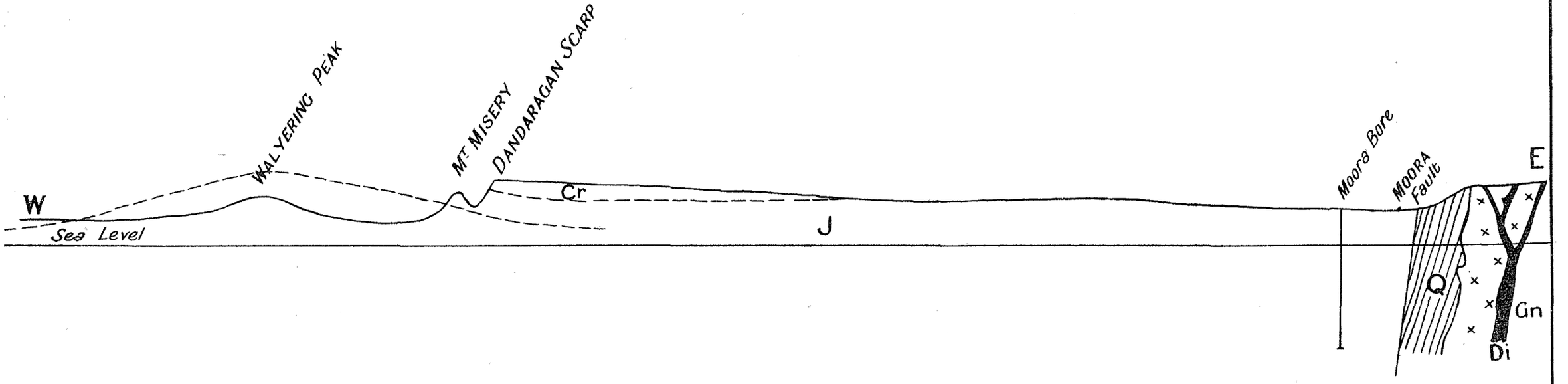


SECTION FROM WEST OF WALYERING PEAK TO MOORA

SHOWING STRUCTURAL FEATURES OF THE DISTRICT

Scale:- Horizontal :- 300 Chs. = 1 In.

Vertical :- 2000 Ft. = 1 In.



LEGEND

Cr:- Cretaceous Beds J:- Jurassic Beds Q:- Quartzites Gn :- Granite Di :- Greenstones

is a definite Dandaragan Ridge as suggested by Campbell and Blatchford, but which was not observed by the writer, it can best be explained by a normal erosion scarp in the soft Cretaceous beds which certainly do not extend eastwards to Moora.

The Dandaragan Scarp is considered to be a normal erosion scarp. Mt. Misery and Yandan Hill, both lying to the west of the Scarp, are suggestive of erosional outliers from the main mass, while the beds of which the upper part of Mt. Misery is made up are similar in all respects to the lower beds exposed in the main scarp. If there were a fault between the two with a downthrow to the west, one would expect to find Mt. Misery composed of Cretaceous or even younger rocks. There is nothing in the area to suggest this. In a report published by the writer in 1931* he suggested that the Poison Hill-Quinn's Pole Scarp, west of Gingin, which appears to be continuous with the Dandaragan Scarp was due to faulting, the evidence being the alignment with the main Darling Fault Scarp further south and the presence of a number of mound springs with a north and south alignment (roughly parallel with the scarp) on the sand plain to the west. The fact that the writer has since found that these springs do extend much further south, well out from the Darling Fault Scarp and apparently unconnected with faulting, and also the strong evidence obtained at Dandaragan lead him to alter his earlier views and to believe that the Dandaragan and the Poison Hill-Quinn's Pole Scarp are nothing more than normal features of erosion.

A striking feature in the sand plain and one which suggests reflected sub-surface structural conditions is seen in a mass of hills including Walyering Peak, about six miles west of Mt. Misery.

Viewed from some distance to the south the main hill is seen to be double-topped, Walyering Peak being the more westerly of the two, the other lying about 1¼ miles east being unnamed. There is a broad saddle between the two and the higher ground on both peaks is capped with duricrust. The striking feature of the peaks is that their outer slopes are gentle, conforming to the contour of the main hill while the slopes facing each other are steep and, although low, are of scarp-like appearance. The obvious easterly dip at Mt. Misery on the east and the appearance of dip slope topography in the two peaks themselves and in subsidiary hills on the western side of Walyering Peak suggests that the hills as a whole are a topographic reflection of a buried anticlinal structure. The features described above are illustrated in the accompanying sketch. From the top of Walyering Peak there is a similar suggestion of dip slopes to the south but to the north the hills run in irregular rolls as far as can be seen and further search to the north was not considered important until the suggestion of structure at the southern end was proved.

Owing to the complete mantling of the underlying rocks by loose sand and duricrust it was not possible on a reconnaissance to prove or disprove the presence of anticlinal conditions. It was noticed, however, that whereas most of the duricrust was of a coarse gritty nature and therefore formed in a sandstone or grit, there were fragments lying around the sides of the hills with a fine-grained laminated structure probably derived from a shale. It should, therefore, be possible by detailed survey with proper instruments to work out the structure of the underlying rocks.

*"Inspection of Gingin District for the Department of Agriculture," by F. G. Forman. G.S.W.A. Ann. Prog. Rep. for 1930, p. 8.

PETROLEUM PROSPECTS.

It can be said immediately that the area of igneous and metamorphic rocks of the interior tableland to the east of Moora is hopeless as regards petroleum prospects.

The presence of a supposed seepage of mineral oil in the coastal sandhills could not be confirmed owing to the failure of the original discoverer, Mr. Booter, to locate the occurrence. However, from his description and from my own observations of the locality it is highly improbable that an oil seepage exists.

The presence of a structure suitable for the retention of petroleum in commercial quantities in the vicinity of Walyering Peak can only be proved by detailed structural survey, assisted possibly by the sinking of shallow test pits or bore holes, by which to identify key horizons. Topographic suggestion of structure in this locality is certainly promising and justifies further work to supplement the at present meagre evidence.

As there are no naturally exposed sections in the area examined, very little of a definite nature can be said of the sub-surface formations. A study of the core from the Moora Bore leads one to expect that the sand plain country is underlain by strata of Jurassic age, which being predominantly argillaceous would serve well as cover rocks for the retention of petroleum.

The Jurassic strata are presumably underlain by rocks of Permo-Carboniferous age, by analogy with the Irwin River area further north where these two series are well exposed for study. Whether any of the Jurassic or Permo-Carboniferous strata are likely in the past to have been possible source rocks for petroleum the writer is unable to state, owing to insufficient personal knowledge of the areas in which these rocks outcrop.

Both the Jurassic and Permo-Carboniferous series where exposed to the north include porous beds suitable as reservoir rocks for the retention of oil, and there is little doubt that they should extend south under the area examined.

RECOMMENDATIONS.

If further work on the Dandaragan area is undertaken it must include not only the proving of the structure near Walyering Peak or the discovery of a suitable structure elsewhere, but a detailed examination of the large area of country to the north, where the rocks underlying the Dandaragan area presumably outcrop, with the object of deciding whether possible source rocks for the generation of petroleum are likely to exist.

Not until good structural conditions are found and the strata proved likely to be petroliferous, is further development of the area in any way justified.

PALMER'S FIND—YELLOWDINE, W.A.

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

LOCATION.

Palmer's Find is situated on a low rise on the western side of a salt lake about 8¾ miles S.S.E. of Yellowdine Siding on the Eastern Goldfields Railway, and about two miles east of the 8-mile peg on the road running south from Yellowdine to Parker's Range.