

REPORT ON THE LAKE RIVER GOLDFIELD(WESTERN TIERS)I. Introduction

In the early months of the present year, (1932) it was announced in the press that gold had been discovered in the Western Tiers to the south of Cressy. There were no departmental reports upon this district, and gold had not been officially reported before. However it was learned subsequently that a small amount of prospecting had been carried out in previous years, but that no gold was produced. A survey of the district reveals the fact that numerous old prospect shafts and cuts exist and so confirm the above statements. It is stated by local residents that some of this work was performed by one Ayres some 50 years ago, but that most of the work was carried out by Temple about 30 years ago. To the north near Dabool Rivulet, some prospecting was carried out by Stackhouse.

In May, Mr. J.B. Scott made a one-day examination of the field and submitted a report thereon.

II. Location & Access

The locality in which the gold has been obtained is situated in the Little Den, a small basin through which the Lake River flows. The Little Den is located some five miles upstream from or south of, the bridge over the Lake River over which the road through Connorville passes.

The most ready means of access is by the road through the Connorville estate. This road branches off the Campbell Town - Cressy road about one mile south of the Lake River and runs parallel to the river for 8 or 9 miles whence it crosses over the bridge referred to above. The road then continues S.W. for a mile to join the track from Parknook. The Connorville road is a private one, but is available to the public except for a few days each year when the gates are locked.

The public road (through Parknook) traverses the opposite side of the river and joins the Connorville road as stated above. This road is passable for motor cars as far as the Dabool Rivulet but it is impossible to traverse the remaining three miles except possibly in the summer.

The two roads join near J. Casey's house and from here a cart track runs south on the western side of the river, to the Little Den (5 miles) and Big Den or Regent's Plain (7 miles). This track is steep and rough and impassable for motor cars.

III. Topography

The district exhibits striking contrasts in topography being mainly of high relief, and part of low relief. This contrast is due to the fact that the district occupies part of the Western Tiers. The dominant features are:-

- (1) Central Plateau. Though not actually embraced in the districts, portions of the Central Plateau occur to the south and west thereof. The general level of the plateau is 3100 feet above sea level in the vicinity of Arthurs Lakes. The edge of the plateau representing the summit of the Western Tiers is considerably higher (see below).
- (2) Western Tiers. These represent the edge of the Central Plateau and the steep face which it presents to the north and east. The tiers have a general W.N.W. - E.S.E. trend through the district except where crossed by the Lake River.

Millers Bluff to the east of the Lake River has a height of 3977 feet, and Brady's Lookout to the west, a height of 4497 feet above sea-level.

The face of the Tiers is very steep, the fall from the heights of 4000 feet and more at the top to those of less than 1000 feet at the foot occurring generally within a short distance.

- (3) The plains of the Launceston Tertiary Basin. These plains approach and generally extend to the foothills of the Western Tiers. The surface of these plains originally had a height of approximately 700 feet above sea level. Subsequent denudation has modified the surface which now ranges from 500 to 700 feet.
- (4) The gorge of the Lake River. The Lake River rises in Arthur's Lakes on the surface of the Central Plateau and flows in a circuitous course and eventually it attains a general northerly direction and has cut a deep gorge through the Western Tiers to emerge onto the plains. The gorge has a depth of 2000 - 3000 feet where crossing the line of the Tiers and the sides are steep and rugged. Most of the region examined was confined to this gorge and the adjacent plains at its mouth.

#### IV Geology

A number of rock formations occur within the district and will be described below in their order of age beginning with the oldest. The age of some of the formations is in doubt but the possibilities will be included in the descriptions.

(1) Proterozoic. Rocks assigned to this era occur around Abraham Creek and Dabool Rivulet in the northern part of the district. They include fine mica schists and schistose slates. The beds are either horizontal or dip at only low angles. In a quarry alongside the road on the north side of Abraham Creek, the strike is  $360^{\circ}$  and the dip  $10^{\circ}$  to the east.

These rocks contain quartz veins which tends to prove that they are Pre-Devonian. This latter age is also suggested as they appear to be intruded by a dolerite dyke which is considered on account of its lithological nature to be of devonian age. These represent the only evidence of age and the rocks may be either Lower Palaeozoic or Proterozoic in age. By virtue of their metamorphic nature they are referred to as Proterozoic and mapped accordingly.

The schistose rocks to the east of the Lake River have not been included here but are described as sheared Devonian igneous rocks (see below).

(2) Cambro-Ordovician. A small area of rocks assigned to this age occur on the south side of the Lake River at the Little Den. The rocks consist of dark and light coloured slates. Outcrops are few, but an adit driven by M. Blaherty has exposed a section of them. In the adit the slates are folded into a shallow anticline and syncline, the strike being about north-east. In a creek to the N.N.W., the slates strike at  $70^{\circ}$  and dip to the south at  $25^{\circ}$ .

The slates contain a few quartz veins which tend to prove that they are pre-Devonian. They are distinctly older than the adjacent Permo-Carboniferous rocks which probably overlie them although no sections showed the relationship. From their lithological characters they are referred to the Lower Palaeozoic, and in particular to the Cambro-Ordovician, system.

(3) Devonian Dolerite. A small outcrop of dolerite occurs on the western side of the Lake River, and some 30 chains south of Abraham Creek. It is bounded on the east by alluvium and on the west by schists. The rock is distinct from the Mesozoic diabase or dolerite and is identical with similar rocks at Montagu, Emithton, Penguin and the Zeehan-Queenstown district. In the latter district they intrude Silurian rocks and are regarded as being of Devonian age.

The dolerite is a light greyish, fine grained type and contains small veins of calcite and quartz and small grains of pyrite and chalcopyrite. It appears to intrude the schists as a lenticular dyke. Its relation to the Mesozoic diabase to the south cannot be determined.

(4) Devonian Porphyries. (Massive and sheared). These occur in two areas and as distinct types occur in each, the areas will be described separately.

(a) Little Den The portion of the Little Den on the western side of the Lake River is occupied mainly by alluvial grits, gravels, soil &c. Outcrops of igneous rocks occur at a number of places and it would appear that these rocks underlie the alluvium.

These rocks outcrop near the bridge over the river, 25 chains west of the bridge; and at the south-western corner of the Little Den. Outcrops exist at other places but are too small to be mapped.

In general the rocks are fine to medium in grain and intermediate to basic in composition. Occasionally weather ferr-magnesium minerals (probably pyroxene) stand out in relief on weathered surface, the crystals being a quarter of an inch in length. Close to the bridge, the rock shows numerous felspar crystals and is probably a felspar porphyry of intermediate composition. In addition to the above massive types, slightly sheared types appeared to be associated with them particularly to the west of the bridge.

A section (No. 1008) of a slightly schistose basic type showed that the rock consisted of phenocrysts of augite and plagioclase in a slightly schistose ground

mass. The ground mass was largely dark-coloured and opaque, but augite and plagioclase were recognised in the fresh portions. The rock is a gabbro porphyrite. An outcrop on the western bank of the river to the N.W. of the bridge exposes a more sheared type resembling a schistose rock. Under the microscope, this rock (No. 1009) was found to consist of phenocrysts of feldspars in a schistose groundmass. The groundmass is largely opaque, but feldspar is recognisable in it. The ferro-magnesium minerals if present have been almost completely altered. Small flakes of chlorite are present, and large areas of a yellow-brown opaque mineral may represent the altered and weathered augite. The rock is a sheared feldspar porphyrite or sheared gabbro porphyrite.

These rocks are overlain by Permo-Carboniferous sedimentary rocks (metamorphosed by the Mesozoic diabase) at the south-west corner of the Little Den and are therefore pre-Permo-Carboniferous. Their relations with the Cambro-Ordovician rocks cannot be determined as they do not come into contact at the surface. From the fact that the gold is associated with them and that they resemble porphyries (both massive and sheared) of Devonian age in other parts of the State, they are regarded as being of the same age, viz. Devonian.

(b) The track through the Connorville estate to the Lake River passes over schistose igneous rocks for several miles on the eastern and southern sides of O'Connor Sugarloaf. These rocks extend as far as the river but do not outcrop on the western side. The rocks are schistose and on examination prove to be generally similar to the sheared igneous porphyries exposed near the bridge at the Little Den. However the rocks are much more schistose or sheared than those at the Little Den and occupy a much larger area, and evidence of a possibly different origin was sought but was not found. No types of definitely sedimentary origin were found, though a loose piece of mica schist was found about a mile south-east of the bridge. The schists however contained fragments of slate and appeared to contain round pebbles of other types. The slate fragments could represent pieces of intruded rocks that were caught up by the porphyry intrusion. The apparently rounded pebbles consist in some cases of igneous rocks generally similar to the schists and porphyries, and they may therefore represent unaltered "eyes".

Two specimens were sectioned and examined under the microscope. One (No. 1010) was a slightly schistose type of greyish colour with some dark green patches. Under the microscope, it was found to consist of large phenocrysts of augite and partly altered to chlorite (representing the dark green patches) and smaller ones of plagioclase in a slightly schistose groundmass of the same two minerals. The other (No. 1011) was more schistose and without the dark patches. It consisted of phenocrysts of feldspar and to a less extent, augite in a schistose groundmass of the same two minerals. The rocks are therefore sheared or

Or schistose gabbro porphyrites. They are therefore of igneous origin and the pieces of slate &c. referred to above must be portions of the intruded rocks.

(5) Permo-Carboniferous System. Rocks belonging to this system outcrop in a number of parts of the district.

(a) Big Den. On the east edge of the Big Den and east of Woods Creek, dark shales are exposed in a small quarry. It is also stated that when the river is low, that flat layers of rock can be seen in its bed throughout the Big Den. The basin-like structure of the Den also suggests that it is occupied by the soft Permo-Carboniferous rocks which are obscured by the superficial layers of gravel and alluvium.

The large diabase intrusion to the east of the Den is transgressive.

(b) Little Den. This basin was also formerly occupied by Permo-Carboniferous rocks but they have been almost completely removed by denudation which has exposed the underlying slates, porphyries &c. A narrow fringe of pebbly shales remain along the western side and shales along the southern side. In both places the shales have been hardened due to metamorphic action of the Mesozoic diabase.

(c) At the mouth of the Gorge (about 1 mile south of Tierney), Permo-Carboniferous rocks occur on both sides of the river and extend up a tributary creek on the western bank. The rocks consist of dark shales and siliceous mud-stones. A few imperfect specimens of fenestella, protoretepora and spirifer occur.

(d) West side of Lake River. The largest area of Permo-Carboniferous rocks occur in this locality and fringe the diabase of the Western Tiers. The rocks consist of conglomerates, sandstones, shale and carbonaceous shale. In Thunderstorm Creek above J. Casey's house, imperfect fossil plants (probably gangamopteris and neoggeropteris) were obtained from the sandstone. On the north side of Sugarloaf Creek, the shales yielded fenestella, protoretepora and spirifer.

(e) East side of Lake River. In this area Permo-Carboniferous rocks extend easterly and northerly from Lake River flood plain, in the vicinity of Tierney Town Reserve, to the steep slopes of Mitford Hills. The rocks in this vicinity consist of interbedded sandstones, sandy grits, siliceous mudstones, black shales and fine grained shale conglomerate.

Where exposed on the face of a small waterfall in a branch of Deep Creek, the black shales are seen to have level bedding planes.

In the same locality these shales contain fossil remains of fenestella, spirifer and stenopora. Along the northwestern boundary of this belt the Permo-Carboniferous rocks are in contact with sheared Devonian porphyries and apparently overlie them.

The fossils obtained indicate that the rocks belong to the Permo-Carboniferous system as they were typically Permian Carboniferous types as found in

Tasmania. The fenestella and protoretrepora suggested that the main series present is the Lower Marine one. The fossil leaves suggested that the sandstones probably represent the Greta series overlying the Lower Marine. In the Little Den and on the east side of the Lake River the beds were conglomerates and as they overlie the porphyries and schists, probably represent the basal conglomerates.

(6) Mesozoic Diabase. Diabase (or dolerite) occupies a large proportion of the surface of the district, and the adjacent region. It is especially prominent on the summit and flanks of the western Tiers to the north-west and south-east of the district. The surface of the Central Plateau probably represents the upper surface of a large irregular sill.

Whether the Western Tiers form the natural edge or end of this sill, or have been caused by faulting is not definitely established. Faulting has undoubtedly occurred east of and parallel to the Western Tiers, but it is generally so associated with the actual intrusion of the diabase, that either of the above explanations may be the correct one.

Several large bodies occur within the district at much lower altitudes than the Tiers. These are definitely transgressive with regard to Permo-Carboniferous rock and also to the basement of older rocks. One such body occurs between the Big Den and the Little Den. Another occurs in the Gorge to the north of the Little Den, with a smaller one on its north-western side. A further one exists in the northern part and at its eastern end forms O'Connor Sugarloaf. These bodies all connect up with the main body of diabase on the Tiers to the west and probably also with that on the Tiers to the east. They are below the level of the probable irregular sill forming the Central Plateau, and form large dykes transgressive to the Permo-Carboniferous rocks and the basement of older rocks representing feeders to the sill.

The diabase is typical of that found elsewhere in the State and needs no further petrological description. In general it is coarse grained, which corresponds to the depth at which it crystallised.

The metamorphism of the Permo-Carboniferous rocks near the diabase contacts at the Little Den proves that the latter rocks is intrusive and post Permo-Carboniferous. In other districts it intrudes the Triassic rocks and is generally regarded as of Middle Mesozoic age.

(7) Tertiary The Tertiary gravels clays &c. of the Launceston Basin do not extend into the district but occur immediately to the north-east thereof. Probably the alluvial deposits along the Lake River were forming continuously from the Tertiary to Recent times, but they have been mapped as recent and will be described under that heading.

(8) Recent. Recent deposits exist at the Big Den, Little Den, and along the River to the north of the Gorge.

No sections are available in the Big Den and the deposits consist of a thin superficial layer of alluvium and fine gravels and soil detritus from the surrounding hills.

In the Little Den similar deposits occur. On the western side of the river and in the vicinity of the alluvial gold workings, they have a considerable range in nature. The matrix is a brownish grit composed of fragments of rocks, quartz &c. mixed with brown clayey material apparently derived from the underlying porphyries and possibly also from the adjacent diabase hills. Waterworn pebbles occur to a limited extent, and boulders of quartz, diabase and porphyry occur at the surface near the river. Further east clayey beds occur in the gutters eroded in recent years.

The deposits to the north of the Gorge vary from place to place. At the mouth of the Gorge and for at least a mile downstream they consist of very large boulders of diabase many feet in diameter, with finer material between. The size of the boulders becomes smaller as the distance from the mouth of the gorge increases. To the north of Cherry-tree Rivulet the boulders occur in the present and older courses of the river. In the higher flats bounding the river on the east, diabase pebbles are not common, and the beds are gravels and gravelly clays, the pebbles being of quartzite, quartz, and Permo-Carboniferous rocks. Further north towards the bridge the gravels become finer.

#### v. Economic Geology

The only mineral so far located is the gold in the Little Den. It is by no means impossible that others might be found, but that has not yet occurred. The only areas in which metallic minerals are likely to be found are in the Little Den, the area east of the bridge over the Lake River, and around Dabool Rivulet. These areas are occupied by sedimentary and igneous rocks of the Proterozoic and Lower Palaeozoic systems and it is only in areas of such rocks that mineral deposits occur in Tasmania. This does not imply that alluvial deposits may not be found on younger rocks, e.g. Permo-Carboniferous shales, as the minerals may be washed off the older rocks on to the younger ones. Thus gold &c. may be found in the above areas, but not in the Big Den, because there are no older rocks adjacent thereto from which the gold &c. could be washed.

The Permo-Carboniferous rocks contain the horizon (Greta) where coal or oil shale might be found, but no trace of either has been revealed.

Gold has only been definitely located in one locality, viz, the Little Den. It is present in alluvial form on the west side of the river where the schistose gabbro porphyrites form the bedrock. In many places in the State alluvial gold has been found in regions occupied by Devonian porphyries and this is apparently also the case in the Little Den. As a general rule, however, the porphyries are acid or intermediate in composition, but in the Little Den, they are basic. Gold has not

been found apparently on the area of similar rocks to the east of the Lake River Bridge.

To the east of the Lake River at the Little Den slates occur with quartz veins but as far as tested the latter do not carry any gold.

In the schists around Dabool Creek, old workings on quartz reefs exist, but the quartz does not appear to carry gold.

#### A. Workings on Reef Quartz.

(1) Little Den. On the east side of the Lake River and on the western part of the land block of 482 acres charted in the name of A. O'Connor, M.A. O'Flaherty and J. Gosshad an application for lease (182P/M) of 10 acres, which was later withdrawn. The country consists of slates probably of Cambro-Ordovician age. Several outcrops of quartz occur on the lease. One such is situated near the centre of the ground that was applied for and had been opened up by a trench and a short adit. In the northern end of the trench, two irregular quartz veins occur about 2 feet apart. They strike about E & W and dip North at a low angle. The adit has been driven from a point to the north of the trench in a S E direction for about 30 feet. The slates in the adit are gently folded and an irregular quartz vein up to 3 feet in width follows the small folds. The face is just below the trench but the relations between the two bodies of quartz is not clear. Assays by the prospectors from the adit gave a "nil" return of gold and only a trace of silver per ton. A sample taken by Mr. J.B. Scott from the trench is stated to have yielded an assay of a few pennyweights of gold per ton. On the whole however, the grade appeared too low to be worth prospecting as is evident from the cessation of work by the prospectors. There appears to be a line of quartz extending in a general southerly direction from the workings, but this was not opened up. There also is another parallel line to the south-west and on the opposite side of the creek, but this was not opened up. To the north-west of the workings an east-west vein of quartz occurs in the creek. The quartz is white and contains residual slate fragments, but has not been opened up.

On the adjacent land block to the south (715 ac., Ed. Casey), W. O'Flaherty was prospecting on isolated quartz outcrops in a flat. Several old holes occur in this vicinity and W. Flaherty sank a hole 4 feet deep. There may be a reef trending northerly towards the workings of M. O'Flaherty but the outcrops are too isolated to be connected up as one reef. At test of a sample for W. Flaherty gave a "nil" return for gold.

(2) Dabool Rivulet. A number of quartz outcrops occur near the southern boundary of the schist country to the south and old shafts and trenches provide evidence of former prospecting.

The most easterly workings is an old shaft a few chains west of the dolerite dyke. Pieces of schist and quartz were found on the dump, but nothing could be seen in the shaft as it was nearly filled up.

Some 20 chains to the S.W. and on the north side of the small gully, a trench and shaft exist and it is stated that they were dug by Stenhouse about 25 years ago. Pieces of slaty schist and quartz occur on the dump of the fallen in shaft. The trench was 40 feet long in a N-S direction and exposed a reddish soil with cherty material in it, the quartz veins in the shaft not being apparent.

About 15 chains to the west and in the N.E. corner of Brett's property, a large outcrop of quartz exists and had been partly opened up by Stenhouse. The quartz has an E.W. strike for 12 feet and was 5 feet wide at the eastern end. A sample across this end gave on assay a return of Gold - nil, and Silver - trace.

Ten chains further to the west an old shaft shows pieces of quartz on the dump together with argillaceous schist. Further to the S.W., a small cut exposed horizontally bedded mica, schists with narrow veins of quartz trending east and west.

The quartz in the above occurrences is apparently not gold-bearing and has no economic importance.

#### B. Alluvial Gold Workings.

The only alluvial workings are those at the Little Den on the Western side of Lake River. The bedrock of this part of the Little Den is the gabbro porphyrite, but it outcrops in only a few places, the remainder being covered by Recent alluvium and gravels.

The old workings are restricted to a narrow strip some 15 chains west of the Lake River bridge in the Little Den. The nature of the alluvium and gravels have already been described above.

The largest workings were at the south end of the above strip, but the largest did not exceed one chain square, with a depth of 1 to 3 feet. At the south end, a patch 10 yds. square was worked by M. O'Flaherty and afterwards by G. Casey. The latter has applied for a lease probably to include this and adjacent workings but as it has not been surveyed, the position is not definitely known. The largest working was that of Priest, Hodges, & Youd. Other places were worked by Jenkins, Quinn, W. O'Flaherty, M. O'Flaherty, R. Smith and others.

In general the results of the working were not remunerative and though continued over a period of 3 to 4 months a total amount of only 10 ozs. of gold are stated to have been obtained.

#### C. Area south-east of O'Connor Sugarloaf.

Although a fairly large area of schistose porphyrites occur in this locality, no gold has been reported to have been found. It is stated that one or two old shafts had been sunk but these were not located.

### VI Conclusions

The above descriptions show that the area of possible mineral-bearing country in the Lake River district is limited, being confined to:

- (a) Little Den, where small quantities of alluvial gold have been obtained, and a few quartz reefs containing little or no gold have been found.
- (b) Area south-east of O'Connor Sugarloaf where schistose porphyries occur, but no gold has been found.
- (c) Area south of Dabool Rivulet where quartz veins occur in the schists, but are not auriferous.

The results of past prospecting have revealed as the only possible mineral deposit, the alluvial gold of the Little Den which was not present in payable quantities. The possibilities of development of the field are therefore very small.

Signed

(P.B. Nye)  
GOVERNMENT GEOLOGIST.

Signed

(F Blake)  
ASSISTANT GEOLOGIST.

Mines Department,  
Hobart.

10th July, 1933.