

GEOLOGICAL RECONNAISSANCE
OF SOUTH DUNDAS DISTRICT.

INTRODUCTION.

Recent prospecting for gold and osmiridium in the South Dundas District has occasioned an examination of the separate areas covered by prospecting parties and a preliminary geological survey of the district generally.

Very little actual mining appears to have been carried out in the past in that part of the mapped area to the east of Little Henty River.

A large proportion of the surface has been held under mineral lease in the past. The leases referred to were in most cases held for the purpose of developing silver-lead deposits, but results in most cases were not encouraging. Several areas, including a reward claim, were also held for limestone mining but little was done in that direction.

Varying amounts of alluvial gold have been recovered in a small way in the past years from the beds of some of the smaller creeks.

LOCATION & ACCESS.

The district examined is immediately south-east of Zeehan and extends in that general direction as far as Lake Margaret Hydro-Electric Power Station, a distance of some 13 miles by track.

Access is gained by means of two main pack tracks one of which follows the Electric Transmission Line from the E.Z. Company Smelters, $1\frac{1}{2}$ miles south of Zeehan, to the Lake Margaret Power Station.

The other pack track is that connecting Zeehan with Queenstown, and this crosses the first mentioned track at Ewart Creek, approximately 11 miles from Zeehan.

The Zeehan-Strahan railway borders the western extremity of the district and provides means of access to the south-western quarter.

The Old Mariposa tram, now only suitable for a track, connects Oceana, on the Zeehan-Strahan line, with the Zeehan-Queenstown track in the vicinity of Mariposa Creek.

The sections of Colman's old track, which can now be traced on the ground, are delineated on the accompanying plan. In places, even over the portions shown, this track is difficult to follow, being almost obliterated by re-growth.

PHYSIOGRAPHY.

The district generally is represented by remnants of an ancient peneplain gently sloping to the west, which is now much dissected by the present watercourses. Elevations vary from 528 feet at Zeehan to 1,045 feet above sea level at Lake Margaret Power Station. No very prominent peaks or mountains are represented in the area. Gently undulating hilltops

are frequent features of the west and central portions as instanced by the open button grass country shown on the plan.

Towards the east the topography becomes more rugged with increased heights, where sharp spurs and steep hillsides are the rule.

Two main river systems have been developed viz:-

(1). Little Henty River System.

This river flows in a general southerly direction along the west of the district but on leaving the area proceeds westerly to the ocean where it empties into Trial Harbour.

The river is reinforced by three main branches namely, Dundas Rivulet, Farrell Rivulet (main lower portion formerly branch of Little Henty River) and Amber Rivulet.

These latter flow south-westerly and join Little Henty River separately, at no great distance apart, in the proximity of Oceana.

(2). Henty River System.

Drains the eastern region. Its main streams flow southerly and comprise Henty River, Langdon River and Yolande River. Langdon River combines with Yolande River $1\frac{1}{2}$ miles south west of Lake Margaret Power House, after which the conjoined streams are known by the latter name.

Yolande River then continues south until its junction with Henty River outside the mapped area. Henty River eventually courses westerly and reaches the sea about 15 miles south of Trial Harbour.

Owing to the lesser elevation of the western country the lower parts of the main streams of Little Henty River System have reached a stage much closer to their base level than has Henty River combination to the east. Whereas the former have winding courses over flat open valleys the latter are characterised by narrow and deep valleys which in places develop into steep gorges.

GEOLOGY.

Sedimentary Rocks.

Silurian System - The greater part of the surface is occupied by rocks of this system. These are represented by:-

- (1) Fine to coarse grained sandstones of white to light grey colour; the latter at times merging into a quartz grit. These in places contain abundant characteristic Silurian fossils. The sandstones consist of quartz sand and a little white mica cemented by silica and are probably the weathered representatives of the hard grey quartzite, which may be seen in recent cuttings.

- (2) Interbedded with the sandstones and quartzites are dark grey to black slates also containing casts of undoubted Silurian fossils.
- (3) Limestones appear in four separate places in the area and in at least three cases they are apparently bedded with sandstones, slates and quartzites of Silurian Age.
- (4) In the vicinity of Langdon River at crossing of transmission line track are fissile, grey-green and dark grey slates together with green quartzite and light coloured sandstone, the whole in contact with acid and basic porphyries.

Numerous doubtful fossil casts are preserved in the grey-green slates only one of which, a crinoid stem, could be identified. The stem is similar to others that have been ascribed to the Silurian period. On this evidence and that of lithological resemblance to typical types near Zeehan the series has been assigned to that age.

- (5) About the vicinage of Farrell Rivulet on Transmission Line track are some poorly exposed and weathered types of fine grained quartz-felspar (?) breccias. They have a speckled red and green character and appear to be interbedded with fine grained blue-grey slates and thin bands of indurated sandstone. In places the breccias seem to grade by way of a fine quartz grit into the sandstone. The breccias resemble to a marked degree similar rock types in the Dundas Series. As there is here no field evidence for or against them belonging to that Series they are placed provisionally with the Silurian rocks, together with the slates and sandstones with which they are associated.

Tertiary.

The rocks developed in this period are few, and consist of coarse and fine gravels, clays and sediment. The pebbles in the gravels are waterworn and composed of quartzite, white opaque reef quartz, and quartzose breccia and conglomerate in a finer matrix. Where observed clays rest upon the gravels but in places grits and fine gravels may be seen as narrow bands in the former. No section is available from top to bottom through the deposit and its lineal extent is difficult to follow.

Pleistocene.

Quartzose conglomerates, belonging to the West Coast Range Conglomerate series, are exposed in the form of boulders of all sizes. Some of these reach gigantic proportions on the southern slopes of Bald Hill between Sutton Creek and Yolande River. Other smaller patches occur between Poles 49 and 59 on Lake Margaret to Zeehan transmission Line.

The conglomerates were not seen definitely in-situ anywhere and it is considered that the boulders are a superficial deposit probably connected with the Pleistocene ice age.

Recent.

The rivers and smaller streams which are at present engaged in cutting down their courses have deposited gravels and alluvium over their beds in various places. These deposits consist chiefly of waterworn and angular reef quartz, metamorphosed sandstone and conglomerate boulders.

The Igneous Rocks.

Devonian - Two general types of igneous rocks are developed in the district and both are believed to be of post-Silurian origin and probably belonging to the Devonian period of vulcanism.

(1) Dolerite outcrops from Ewart Creek easterly across Henty River to Pole 41 of the transmission line, except for a break between Poles 49 and 59 where West Coast Range Conglomerates boulders appear at surface.

The dolerite is generally a fine to medium grain type of dark grey-green colour, but coarser varieties approximating gabbro are also found.

The rock has the appearance of being intrusive into silurian sedimentaries of the locality and would, therefore, be younger than the latter.

(2) From Langdon River, on the transmission line track, there extends for 1 mile to the west a series of porphyries exhibiting acid and probably basic types. The whole are much weathered at surface and fresh specimens are hard to obtain. The more acid variety predominates and is seen to be a fine grained granitic type. It consists of small phenocrysts of glassy quartz with lesser quantities of dark mica set in a groundmass of altered felspar. The freshly broken rock shows a greenish-grey colour but the weathered surface is almost white.

The porphyries are intrusive into slates and quartzites of the neighbourhood.

In the valley of Yolande River, adjacent to Lake Margaret Power Station, a sheared basic porphyry is exposed extending beneath the cover of West Coast Range. The colour on freshly broken surfaces is dark green but on weathering changes to cream. Con-
glomerate
boulders.

These porphyries as a whole are evidently related to the "Porphyroid Series" of igneous rocks as developed on the Dundas Range and elsewhere in the West Coast districts where they intrude rocks of Cambro-Ordovician age. In the South Dundas area, however, they are intrusive into what are here taken to represent Silurian sediments, and would, therefore, be much younger than they have been considered in the past.

ECONOMIC GEOLOGY.(a). Farrell Rivulet Lead.

Commencing at a point half a mile east of the junction of Farrell Rivulet with Little Henty River, and extending along the top of the comparatively low ridge dividing the former from Amber Rivulet, beds of old gravels have been traced for a distance of one mile in a general north easterly direction.

The occurrence appears to be on the site of an ancient course of Farrell Rivulet. The width of the supposed lead cannot be stated definitely, but as far as could be ascertained from surface indications, is in the vicinity of 5 chains.

It is very probable that the gravels have been distributed down the hillside in the general process of denudation and now cover a greater area laterally than was originally the case.

The deposit consists of waterworn boulders, smaller gravels and grits of quartzite, reef quartz and breccia conglomerate together with clays and sands.

No signs of prospecting can be seen on the main portion of the lead, but numbers of holes have been sunk in the small creeks running north-westerly into Farrell Rivulet from the ridge on which the gold gravels occur.

The prospect holes are all within 10 chains of the Rivulet and the more shallow ones, from 2 to 4 feet in depth, have gone through gravels and bottomed on slate of Silurian age which is the bed rock in this part. However, at 7 chains up from the mouth of the small branching creek (junctioning at small island shown on plan) and 25 feet above it, the slate bottom is seen to dip suddenly away to the south. At this point, resting against a smoothly polished slate side, a good body of wash is exposed in a hole 7 feet deep with gravels still in the bottom.

Prospects of fine gold and osmiridium are said to have been panned throughout this section but the hole was not continued deeper owing to water filling the excavation.

On the creek side $\frac{3}{4}$ chains higher up another hole exposes 3 feet of light brown clay overlying at least 7 feet of fine to medium sized wash in a clay sediment matrix. This hole also did not go down to bedrock.

One dish of wash taken from just below the clay gave several colours of fine gold and osmiridium.

In other prospecting holes in the small western branches of the same creek and in the two small creeks immediately to the north-east very similar results were obtained. This was particularly noticeable with regard to those on about the same level as the ones already described. In each case the bedrock dipped away to the south and gave place to gravels, the base of which was not reached.

The most elevated exposed remains of the main portion of the old lead are at least 70 feet above the highest prospect holes described and it seems possible that the deeper gravels in the vicinity of the latter delineate portion of the lead periphery.

Although osmiridium and gold results obtained from the prospecting in this area were poor it must be

understood that the work carried out was only prosecuted on a small portion of the edge of the lead and in shallow wash shed from it in the present valley.

(b). Deegan & Sutton Creek Alluvial Workings.

These two creeks cross Zeehan-Margaret track $\frac{3}{4}$ mile west of Lake Margaret Power Station and run south easterly to join Yolande River.

The wash in Deegan Creek is practically all sharp milky reef quartz and seldom exceeds 18 inches in thickness.

In Sutton Creek the gravels obtain greater depth and in places exceed 3 feet. They consist of angular reef quartz together with boulders and pebbles from West Coast Range Conglomerates.

Colours and small pieces of gold were recovered by means of prospecting dish in different places on both sides of the track from gravels in these two creeks.

Much work in the form of ground sluicing and panning has been instituted in the creeks in the past few years and a good deal of alluvial gold recovery has resulted. From a reliable source it was learned that one party alone retrieved 300 ozs. of gold. Specimens of this were inspected and a good deal of the metal proved to be coarse in character. The largest weighed 4 dwts. and it was said that the best dish washed yielded $1\frac{1}{2}$ ozs. of gold.

It would appear from the extent of the workings that these creeks are nearly worked out and search must now be made in other directions.

Colours of gold were panned from most of the small creeks west of Deegan Creek as far as Truscott Creek.

(c). Westerway Creek Alluvial Prospect.

Westerway Creek is a good sized stream flowing into Tom Creek (formerly upper portion of Branch of Little Henty River) a little south of where it is crossed by Zeehan-Queenstown track. The lower portions of the upper branches of the creek near the crossing of Coleman's old track have lately been prospected and worked to a small extent for osmiridium and gold.

The results proved disappointing although small amounts of each metal, particularly the former, were recovered.

It was stated, and specimens seen confirm this, that the osmiridium was generally of a coarse nature, but the concentration was slight. Dishes of wash panned during the examination gave fine colours of osmiridium from several places in the different branches of Westerway Creek.

The bed rock in this part of the country is Silurian slates and sandstones with a few narrow conglomerate bands. The creek wash resting on these rocks is chiefly waterworn pebbles and gravels of reef quartz and metamorphosed sandstone, ranging from 1 foot to 3 feet in thickness.

1. Vicinity of Deegan and Sutton Creeks. Bed rock in this area comprises slates, sandstones and quartzites intruded by porphyries. Stringers, veins and lodes of reef quartz ramify both the sedimentary and igneous rocks and it is assumed that these were brought about by a later siliceous phase of the porphyry intrusion.

The siliceous emanations not only solidified within the porphyries but invaded the surrounding sedimentary rocks.

It is thought that the source of gold of the area is associated with some of the quartz so injected and that the alluvial gold in the creeks has been shed from it along with the quartz gravel with which the metal is connected. Search should be instituted in the creeks within the porphyry boundary and along the periphery of them in the slates, sandstones etc., on each side.

As a working hypothesis it is suggested that Langdon River with its tributaries coming in from both sides, and Truscott Creek and its branches be looked to as a possible source of gold.

2. Westerway Creek Area. No sign of Serpentine, the recognised source of osmiridium could be found in the district examined.

The closest known serpentine is that mapped by A.M. Reid in 1925, (Geological Survey Bulletin 36) about the Adelaide Mine one and a quarter miles to the north; but it may occur in the intervening unmapped portion.

The source of osmiridium in the Westerway Creek area and also gold associated with it may be looked for in the belt of Serpentine referred to above.

To further prosecute the search for alluvial osmiridium and gold in this locality the following creeks are suggested for that purpose.

- (a). The heads of Westerway Creek above these already prospected recently.
- (b). The upper branches of Farrell Rivulet and Tom Creek.
- (c). The creeks running westerly to Dundas Rivulet south of Dundas township.

3. Farrell Rivulet Lead - As this deep lead appears to follow fairly generally the course of Farrell Rivulet it seems feasible that the original source of osmiridium and gold found in the former is the same as that for the occurrence of those metals at Westerway Creek, namely Serpentine to the north of the district.

For testing the deposit a search should first be made for the western outlet of the lead since this would be the lowest and most accessible point, besides being the logical place for starting any sluicing operations that might be contemplated in the future.

To obtain the outlet a number of holes should be sunk to bedrock at different levels along the hillside about half a mile up stream from the junction of Amber Rivulet with Little Henty River, on Amber Rivulet fall of the hill.

If this proves successful a series of bore-holes or shafts extending in lines at intervals across the width of the lead could then be undertaken. Means would thus be afforded of picking up the main gutter and so testing the bottom wash where the best values would be most likely found.

Steps should be taken to trace a continuation of these Tertiary sediments which is most probably in the direction of gravels of similar type seen along the Zeehan-Margaret transmission line track.

These extend from a point eight chains east of Farrell Rivulet for approximately 15 chains. The gravels here have much the same characteristics as those along the course of the supposed deep lead.

CONCLUSION.

The general geology of the district has been mapped and discussed while at least one important geological factor disclosed, namely the intrusion of Silurian sediments by porphyries of the "Porphyroid Igneous Complex".

It is shown that small quantities of gold and osmiridium exist at separate points in the area and that some have been worked with varying results.

The likely source of gold and osmiridium is pointed out and recommendations made for further search for the metals.

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