

(1) Introduction

It has been considered that the completion of the new West Coast Road would render a large area of somewhat inhospitable country much more accessible to the prospector than has been the case in the past. During March and April of this year a geological reconnaissance of some 50 square miles of country adjoining the road was undertaken with the object of obtaining some idea of the possible mineral wealth of the area. In addition to the general geological work, a good deal of prospecting was carried out throughout the area.

The northern portion of the area, from Mounts Arrowsmith and Hardy southwards across the road to the Loddon River, was examined by one of us (F. Blake), while the area south from the Loddon River, including the Frenchman's Cap and Adam Ranges, was examined by the other (K.J. Binucane). A total period of five weeks was spent in the district.

(2) Previous Reports

In 1908, L.K. Ward, then assistant Government Geologist, made an examination of the country on either side of the Linda track, from the King River to Mt. King William 1st. In the following year Ward worked south from the Franklin River along J.L. Moore's track and reached the junction of the Jane and Acheron Rivers. The results of these examinations were published in the "Annual Report of the Department of Lands & Surveys" for the years 1907-8 and 1908-9 respectively.

(3) The area Examined

This is located in the west-central highlands and extends along the road from the King William Saddle, 114½ miles from Hobart, to the junction of the Collingwood and Alma Rivers, 129½ miles. North of the road the examination was extended to Mounts Arrowsmith and Hardy, while to the south it included the foothills of Algonkian Mountain and the Frenchman's Cap Range.

A base camp was established at a point on the road 70 chains west of the Franklin River Bridge (120½ miles from Hobart) and from the vicinity of the camp a short track was cut to connect with J.L. Moore's track to Calder's Pass; as the log-bridge across the Franklin had been washed away, a wire suspension bridge was constructed at a point about one mile below the road bridge. This work shortened the track to Calder's Pass and excluded a rather rough portion extending from the road bridge along the south side of the Franklin River.

A second base camp was then established on the south side of the Loddon River, and another temporary camp was erected at Calder's Pass.

Work was seriously hampered throughout by exceedingly bad weather, and for the guidance of parties traversing

this portion of the State, it is suggested that much more could be accomplished during the months of January and February than in any other portion of the year.

The northern party worked along the road and examined the country for some distance both to the north and south. Work was then extended southwards along J.L. Moore's track as far as the Loddon River, which was followed for some distance eastwards.

The southern party worked along J.L. Moore's track as far as Calders Pass and then followed a rough track cut by some prospectors as far as the junction of the Jane River and the Erebus Rivulet. This route follows Thirkell creek as far as the Jane River and then keeps on the northern bank of the river. An attempt was made to ascend Algonkian Mountain but, after crossing the foothills and reaching the base of the mountain, the party was obliged to return to the Calder's Pass camp owing to limited food supplies. Philips track to the Frenchman's Cap was followed as far as Lake Vera and a high peak on the range, immediately above the lake, was ascended. Moore's track was followed for a distance of approximately two and a half miles beyond Calder's Pass but was found to be in such bad condition that it was impossible to carry heavy loads over it.

(4) The Tracks

The main track south of the road is that cut by J.L. Moore in 1900. This extends from the road in a general southerly direction to Calder's Pass and thence southwards towards the Surveyor Range. This was re-blazed and staked as far as Calder's Pass but beyond the pass it was found to be in such a bad state of repair, due to fallen logs and the growth of scrub, that it was impossible, in the time at our disposal, to proceed far along it.

The route from Calder's Pass along Thirkell Creek and thence to the junction of the Erebus Rivulet with the Jane River, is fairly easy to follow but is exceedingly rough and badly graded over the first three miles. At Stannard's grave approximately six miles from Calder's Pass, the track turns sharply to the left and after crossing a short stretch of button grass it follows close to the bank of the Jane River. The Erebus Rivulet is about two and a half to three miles from the grave.

Philps track to the Frenchman's Cap leaves Moore's track at the South Loddon River and extends in a south-westerly direction along a button grass plain to the base of the range, a distance of about two and half miles from the South Loddon. The track then turns in a general westerly direction along the range and passes around the northern and western sides of Lake Vera. Most of the old stakes along the button grass have now rotted away and, beyond Philp Creek, the track is very much overgrown.

The old Linda pack-track is located quite close to the road from the vicinity of the Franklin River westwards.

East of the Franklin, near the base of Mt. Arrowsmith, it leaves the road and rises sharply to the summit of the mountain. It then turns in a general easterly direction towards Lake St. Clair. This track is now of very little use owing to its proximity to the road.

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All/the tracks south of the road are foot-tracks and it would be quite impossible to take pack-horses along them. Very few traces remain of Frodsham's track, which is shown on the Lands Department sketch map.

(5) Topography

The country as a whole is rugged and mountainous. The highest and most conspicuous peak within the area is the Frenchman's Cap which rises to a height of 4756 feet above sea-level. From the Cap a ragged, broken range extends in a general south-easterly direction to Calder's Pass. Mount King William 1st is located about one mile to the south-east of King William Saddle. It has four prominent peaks the most northerly of which is 4360 feet above sea-level. The King William Range extends in a general southerly direction from Mount King William 1st. Mount Arrowsmith is situated about four and a half miles west of Mt. King William 1st. The King William saddle lies between the two; it is 2720 feet above sea level and represents the highest point on the road. Algonkian Mountain lies at the northern end of the Prince of Wales Range and is about twelve and a half miles south of Mt. King William 1st. It extends over a length of about four miles and probably attains a height of more than 3,000 feet; it is heavily timbered almost to the summit. Mounts Hardy and Mullens, Junction Peak, Sharland Peak, the Loddon and Adam Ranges, and Staff Hill are other prominent landmarks in the area.

The drainage of the area is affected by the Franklin River and its tributaries. The Franklin rises to the north of the mapped area, in Lakes Undine and Dixon, and flows in a general south-westerly direction to the west of the Frenchman's Cap; it then turns abruptly and flows in a general southerly direction to join the Gordon River. The Alma and Collingwood Rivers and Stonehaven Creek are the main northern tributaries of the Franklin, while the Surprise and Loddon Rivers enter it from the east. The South Loddon River rises in Calder's Pass and flows in a northerly direction to join the Loddon. The Jane River rises between the Surveyor and Frenchman Ranges and flows in an east to south-easterly direction towards Algonkian Mountain; it then turns south and, later, west, and eventually joins the Franklin. The Erebus Rivulet rises to the north of Algonkian Mountain.

Several comparatively narrow plains extend along the valleys of some of the larger streams. The largest of these is that occurring along the valley of the South Loddon, and known as the Loddon Plain. The river and its tributaries are fringed with narrow strips of timbered country, consisting mainly of gums, but otherwise the button grass is continuous from Calder's Pass northwards to the Loddon River, a total distance of five miles. The Loddon River is fringed by narrow belts of rich alluvial soil carrying a heavy growth of myrtles, and narrow strips of button grass, up to ten chains wide, extend along either side of these.

Several smaller areas of button-grass occur at various parts within the area, notably to the east of the Erebus Rivulet, on either side of Thirkell Creek above its junction with the Jane River and on the south side of the Jane River above Stannards grave.

Lake Vera which lies on the northern slopes of the Frenchman's Cap Range and at a height of more than 2,000 feet above sea level, is the largest lake within the area. It is approximately forty chains long and twenty chains wide. Several smaller lakes, or tarns, occur further west along the range. Lake Shirley is located on the south side of the road, at 118 miles from Hobart. It is a shallow depression covering not more than a quarter of an acre.

(6) Geology

The rocks occurring within the area may be sub-divided as shown in the following tables

(a) Sedimentary

Age	Lithological Character
Pre Cambrian	Quartz schists, quartz-sericite schists, argillaceous schists, limestones, and chloritic schists.
Silurian	Sandstones, conglomerates, limestones, slates etc.
Permo-Carboniferous	Conglomerates, mudstones etc.
Pleistocene - Recent	Gravels, sands, clays and alluvium.

(b) Igneous

Age	Rock Types
Devonian (?)	Dolerites and Porphyrites.
Mesozoic	Diabase (Dolerite).

(a) Sedimentary Rocks

Pre Cambrian:- These consist of quartzite, quartz-sericite, chloritic and argillaceous schists, slates, quartzites and dolomitic limestones. The quartzitic schists are white to greenish coloured rocks and show comparatively little grain; the schistose character is much more apparent in weathered specimens and very often the rocks show a considerable amount of puckering of the schist planes. The quartz-sericite schists are generally coarse grained. The unshattered quartzites are usually dense and some types resemble reef quartz; they

vary in colour from white, to green, to pink. The argillaceous schists are usually black or grey in colour and very often contain lenses of slates in which the original bedding planes may be seen. Excellent exposures of the various rock types occur in the numerous cuttings and quarries along the road.

At 118 miles from Hobart a blue-grey partly dolomitised limestone is exposed in the road cuttings over a length of seven chains. In some places it is replaced by silica and has been converted into a dense black chert. In a number of cases in this section there appeared to be a transition from dolomitised limestone to a fine grained chert-conglomerate to dense chert, and an impression was gained that the formation of the chert-conglomerate may have represented one stage in the process of silicification of the limestone. Similar chert-conglomerates were observed in the Smithton district in 1930; these occurred along a belt of quartzose-breccias and cherts which were thought to have been formed by the silicification of dolomites. At that time however, it was considered that the chert-conglomerates were probably true sedimentary deposits, though nothing could be advanced to explain the regularity, in size and shape, of the chert pebbles. At Smithton the cherts, quartzose-breccia, chert-conglomerates and dolomites were interbedded with slates and breccias of the Dundas Series which are now considered to be of Ordovician age. The limestone in the road cutting is associated with sheared black slates and schists but the nature of the relationships could not be determined; it may be interbedded with the Pre-Cambrian schists etc., or it may be in faulted relationship with them.

In the vicinity of 116 miles from Hobart, normal black slates are exposed over a width of ten chains and, immediately north-east of these, sheared black slates and chloritic schists are exposed over fifty chains of the road. Further east there are chloritic and quartzitic schists with occasional beds of dense quartzite.

As a general rule the caps of the mountains are composed of quartzitic schists while the chloritic and argillaceous types occur along the foothills.

In numerous places along the bed of the Jane River, below Thirkell Creek, there are numerous outcrops of dolomitic limestone. These rarely extend beyond the waters edge though a few outcrops were observed on the south side of the river at a distance of three to five chains from it. Similar outcrops were observed in one or two places along Thirkell Creek. The outcrops south of the Jane River were partly silicified and portions of the rock had been converted to a dense chert. Hence the general restriction of the dolomitic limestone to the river bed may be partly explained perhaps by surface silicification having taken place away from the waters edge, so that outcrops at a short distance away from the river would be of chert and not limestone. An outcrop of chert, generally similar to that associated with the dolomitic-limestone south of the Jane, was observed on the east side of Thirkell Creek at a point about fifteen chains from the creek itself.

An analysis by the Government Assayer of a sample of unsilicified dolomitic limestone from Jane River gave the following result:

CaO	:	MgO
30.50%	:	16.65%

At numerous places in the vicinity of Calder's Pass, particularly on the low range east of Staff Hill, the chloritic schists etc. are traversed by numerous quartz veins containing chlorite or vermiculite.

During the examination of the Frenchman's Cap Range and also that of the country in the vicinity of Algonkian Mountain, no evidence was obtained to support Ward's suggested subdivision of the Pre-Cambrian rocks. (L.K. Ward "Report of the Department of Lands & Surveys" 1908-9, page 35.) The apparent gentle folding on the top of Frenchman's Cap Range as viewed from a distance is due partly to contortion of the schists along more or less horizontal lines, and partly also to irregular joints developed parallel with the surface, and, when examined in detail, the quartzitic schists occurring along the top of the range are found to be identical with those in other portions of the area. Although the top of Algonkian Mountain was not reached, the southern party penetrated to within about two miles of it: Like those of the Frenchman's Cap Range, the foothills are composed of soft chloritic schists, and the rocks along the top of the mountain, as seen through a pair of field glasses, appear to consist of white quartzitic schists. It was unfortunate that these could not be examined in detail, but there seems to be no adequate reason for supposing that they would be in any way different from those occurring along the Frenchman's Cap Range.

The schist planes throughout the area strike in a general north-westerly to westerly direction and dip to the south-west at 30° to 80°. At thirty chains west of Stonehaven Creek an anticlinal fold was observed in the series, and a syncline was seen at a point one mile to the east of Lake Shirley. As far as could be determined the strike of the schistosity conforms with that of the original bedding.

The Pre-Cambrian rocks occupy approximately 75% of the mapped area.

Silurian:- Rocks of this age occurring within the area consist of breccia-conglomerates, sandstone-grits, quartzites, sandstones, slates and dolomitic limestones. The breccia-conglomerate is an exceedingly coarse grained rock consisting of angular and rounded pebbles of quartz and quartzitic schist set in a highly siliceous ground mass; the schist pebbles are identical with the quartzitic schists of the Pre-Cambrian rocks and have doubtless been derived from them. The sandstones are fairly normal fine grained types consisting of quartz sand and a little mica. They are generally light grey in colour but some ferruginous types occur along the base of the series. Many of the sandstones show a very distinct current bedding and some contain numerous tubular casts; the latter are generally known as the "Tubicolar" sandstones. The slates are normal types and may be black, grey or green.

The Silurian rocks have their greatest development along the valley of the South Loddon River. The base of the series skirts the foot-hills of the Frenchman's Gap Range and extends in a general southerly direction to Calder's Pass. Along the valley of the Loddon River they were traced by the northern party over a width of $3\frac{1}{2}$ miles above Moore's track and were found to be bounded on the east by Pre-Cambrian schists. Interbedded slates, quartzites and dolomitic limestones outcrop along Carbonate Creek; numerous sink holes occur in the limestones along this creek. Sandstones outcrop along Moore's track where it passes around the eastern end of Mt. Mullens. A small patch of sandstone-grits, sandstones and breccia-conglomerates outcrops at a big bend in the Jane River about one mile east of Stannard's grave and an extensive outcrop of current-bedded sandstones occurs on a high button grass knob about one mile to the east of the junction of the Erebus Rivulet and the Jane.

The dolomite limestone in Carbonate Creek has been analysed with the following result:-

Analysis of dolomitic limestone, Carbonate Creek

CaO	:	MgO
29.90%	:	18.53%

Analyst, L.H. Bath.

Limestone of a similar character outcrops in a number of places along the Franklin River on either side of the mouth of Carbonate Creek.

The general sequence of the rock types from the base of the series upwards is as follows:-

Coarse breccia-conglomerate.
 Sandstone-grits and ferruginous sandstones.
 Tubicolour sandstones.
 Current-bedded sandstones.
 Fossiliferous sandstones and slates with some limestones.

At a point about one half to three quarters of a mile north of where Moor's track crosses the South Loddon River, the basal members of the Silurian rocks may be seen resting unconformably on the Pre-Cambrian schists. They strike N15°W and dip to the north-east at 40°. Further south, on the western extremity of Adam Range the strike is N10°W and the dip is to the east at 25°.

In the northern portion of the area near Carbonate Creek, observed strikes ranged from N15°W to N70°W and the dips were to the south-west at 15° to 45°.

The Silurian rocks were regarded by Ward as being of Cambrian Age, but more recent work and the identification of the fossils from the upper fossiliferous sandstones show that the rocks belong to the Silurian. A number of specimens of fossiliferous sandstone were obtained from the hills to the east of the South Loddon, and also from a prominent hill on the Loddon River east of Moore's Track. The chief forms recognised are as follows:

Fenestalla, Stenopora, Crinoid stem ossicles and Spirifers.

From the outcrop of the basal members of the Silurian, located about three quarters of a mile north of the track crossing at the South Loddon River, a curious rounded fossil was obtained from the sandstones. Quite a number of similar casts were observed on this outcrop. This fossil has not yet been identified definitely but is considered by Mr. Q.J. Henderson to resemble the cast of the lithistid sponge, *Cnemidiastrum*, being turbinate, with deep cloaca, thick walls and skeletal elements as yet undetermined.

Boulders of Silurian sandstone, containing the fossil forms *Orthis*, *Camarotoechia*, *Spirifer lyellensis* and other spirifer, occur on the north-western portion of Mt. Arrowsmith.

Permo-Carboniferous. - In two small quarries on the south side of the road, at fifteen chains and one mile east, respectively, of King William Saddle, mudstone conglomerates are seen to rest unconformably on the Pre-Cambrian schists. The conglomerate consists of small waterworn pebbles of schist, slate and quartzite set in a mudstone matrix.

Beds of dark coloured shale and mudstone-conglomerates similar to those described above also outcrop on the north-western portion of Mt. Arrowsmith close to the Linda Track. These dip to the north-west at 5°.

The mudstone conglomerates and shales are identical with those of the Permo-Carboniferous system as developed elsewhere in the State.

Pleistocene to Recent:- Gravels, sands and clays are exposed at numerous points along the valley of the Franklin River and an extensive area of river gravels extends along the valley of the South Loddon River. Similar belts extend along portions of the Jane and Loddon Rivers.

Recent gravels and alluvium also occur along the beds of many of the smaller streams.

(b) The Igneous Rocks

Devonian:- Two dolerite dykes were observed in road cuttings in the vicinity of 117 miles from Hobart. These are approximately four chains apart and appear to intrude the Pre-Cambrian schists. They are fine to medium grained rocks, and, under the microscope are seen to consist mainly of augite and plagioclase felspar with ilmenite and leucozene as accessories. Traces of ophitic structure were observed in portions of the rock sections.

In a quarry on the north bank of the Surprise River three chains south of the road and about half a mile east of the Franklin River bridge, an intermediate to basic igneous rock occurs which also appears to intrude the Pre-Cambrian schists. Under the microscope this rock is seen to consist of phenocrysts of augite set in a fine grained ground mass of felspar with a little augite. It may be described as an augite porphyrite.

A few chains south-east of the quarry and on the opposite side of the river a few boulders of porphyrite were also observed. This rock differs from the above in that it contains large phenocrysts of plagioclase in addition to those of augite. The proportion of phenocrysts to base is roughly equal.

Mesozoic Diabase (dolerite). - This outcrops along the King William Range, on portion of the Loddon Range and also on some low hills located about two and a half miles to the north-east of Mt. Arrowsmith. The various exposures were not examined in detail but the rocks are identical with the diabase as developed elsewhere throughout Tasmania.

(7) Economic Geology

Alluvial:- During the course of the examination a good deal of prospecting was carried out by our field assistants Messrs. Waxman, Brown and McRae. Creek and river gravels were tested in the following localities, viz. -

- (1) A number of small creeks entering the Franklin River between Moore's track and the Surprise River.
- (2) Small creeks flowing into the Surprise River over a distance of one and a half miles from its mouth.
- (3) All of the creeks crossing Moore's track between the Franklin and Loddon Rivers.
- (4) That portion of the Loddon River, including small tributary streams, above Moore's track.
- (5) Creeks entering the South Loddon River and crossed by Moore's track.
- (6) Creeks in the vicinity of Calders Pass.
- (7) The main southern tributary of the Loddon River heading from the east side of the Adam Range.
- (8) Thirkell Creek and creeks in the button grass plain on the eastern side of it.
- (9) Creeks south of the Jane River in the vicinity of Stannard's grave.
- (10) Junction of the Jane River with the Erebus Rivulet, and small creeks flowing in from the east.

In the majority of cases only a little "black sand", consisting of magnetite and ilmenite, was obtained.

One colour of gold was obtained from a tiny creek which crosses Moore's track at a point thirty chains south-east of the wire suspension bridge. Further prospecting along this creek yielded negative results.

Another colour of gold was obtained from a small creek flowing from the Loddon Range and entering the Surprise River at a point about three quarters of a mile above its junction with the Franklin. About one chain to the east of the abovementioned creek, another small creek has been sluiced over a length of half a chain but dish prospects from the gravels all yielded negative results.

Lodes and Reefs:- Numerous small quartz veins and reefs traverse the Pre-Cambrian schists and slates of the area. Most of these veins appear to be of secondary origin but in a few cases small primary quartz veins were observed to contain minor quantities of metallic sulphides. In cuttings along the road at 116 $\frac{1}{2}$ miles from Hobart a few small, irregular quartz veins, having a maximum width of 6 inches, were observed to contain siderite and manganosiderite and small amounts of pyrite, chalcopyrite, galena, tetrahedrite and arsenopyrite.

On Moon's track, at a point about two miles south of Carbonate Creek, a good deal of iron oxide was observed to be leaching from graphitic schists containing a little pyrite.

In Carbonate Creek, fifty-chains below Moore's track, a large white quartz reef outcrops on the face of a small waterfall. The reef extends along the stream for about fifteen feet and contains numerous small fragments of the enclosing limestone. These fragments and also the wall rocks are partly silicified. A little pyrite was seen in the quartz in one or two places. A representative sample of the quartz was tested in the Government Laboratory, Launceston and gave a return of gold, nil, and silver, a trace.

During 1930/32 several samples of quartz-pyrite-carbonate veins from the vicinity of the road were forwarded to the Government Chemist and Assayer by various prospectors. The results obtained from these are tabulated below:-

Assays of Samples from West Coast Road

Name of Prospector or Agent	Gold			Silver			Copper
	ozs.	dwts.	grs.	ozs.	dwts.	grs.	
Priest and Manson			trace	0	4	17	N.D.*
C.E. Rayner			nil	0	13	2	"
"			"		Nil		"
"			"	0	13	2	6.7%
"			"		nil		N.D.*
"			"		"		"
Marriott & Evans			"		"		"
"			"		"		"
T. Cunningham			"		"		"
L.E. Page			"	0	2	21	"
F. Marriott	0	0	13	0	6	16	"
T. E. Bantick	0	0	6	1	1	18	"
"	0	0	13	0	3	16	"

*Not determined

(8) Conclusions.

The geological reconnaissance of the area has shown that the rocks consist mainly of Pre-Cambrian

schists and Silurian slates and sandstones, and, in Tasmania, the former have not been found to contain payable ore bodies.

The Cambro-Ordovician sediments, in which a large number of our payable ore bodies are found, are entirely absent. What is more important, however, is the fact that with the exception of the small dykes occurring along the road there is an entire absence of the Devonian igneous rocks with which practically the whole of the ore bodies of the State are genetically associated. For example there are no large masses of granite such as these occurring in the tin-bearing country of the North-East; nor are there extensive belts of porphyritic rocks such as those occurring along the main mineral belt of the West Coast. The absence of these rocks renders it unlikely that any important discovery will ever be made in the area.

The general conclusions given above are supported by the prospecting work carried out during the examination.

A possible source of wealth exists in the extensive belts of Huon pine occurring along the Jane River. These extend over a distance of more than three miles and appear to have been worked extensively in the past. According to hear-say however, it would appear that very few of the logs cut have ever reached the Gordon River. During the course of the work along the Jane River, the southern party counted sixty two pine logs varying in diameter from one foot to three feet six inches. These appear to have been stranded by floods. All were in a good state of preservation and were branded with the letters AB and a cross inside a circle.

In conclusion we would like to place on record our appreciation of the able and willing assistance rendered by Messrs. Waxman, Brown and McRae.

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