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REPORT ON THE COAL FIELDS AT OYSTER BAY, IN THE COUNTY OF GLAMORGAN.

*Geological Surveyor's Office, Launceston, 14th November, 1891.*

SIR,

I HAVE the honor to report that, in accordance with your instructions, I went to Swansea on the 28th of October for the purpose of inspecting several localities in the vicinity of Oyster Bay which have been considered likely to contain coal and other minerals. A prospecting association has been formed in the district for the purpose of testing these places by means of a diamond drill should the indications of coal be considered sufficiently favourable. My attention was therefore specially directed to the selection of localities where prospecting by boring could be carried on with the greatest advantage.

As this was only a flying visit no attempt has been made to survey the limits of the various formations seen, and on the maps sent herewith for explanation of this report these are only very roughly laid down, being sketched in mainly from information received from local residents. Should boring operations result in finding payable coal, it would be desirable to have a detailed geological survey of the district made in order to accurately define the probable coal-bearing areas. The maps are, however, sufficiently near the truth to give a good idea of the position and approximate extent of the coal measures.

Throughout the whole district the predominant rock is diabase greenstone. This forms all the hills inland from Oyster Bay, and extends without noteworthy interruption almost to Ross and Campbell Town. One or two small ridges and hills near the coast are composed of coal-measures sandstones, but as a rule the latter are only found in low-lying ground—in the valleys and flats. Going northward from Little Swanport we find them at Lisdillon and Mayfield, and again at Kelvedon, in patches of several hundreds of acres, after which nothing but greenstone is encountered until after crossing the Meredith River, when we reach extensive alluvial flats lying at the mouth of the Swan and Wye Rivers. A ridge of greenstone divides the valley of the Swan River from the Moulting Lagoon, but the latter and the flats just mentioned must be regarded as having been at one time shallow portions of Oyster Bay, which have in course of time been more or less filled up by the detritus brought down by the Meredith, Wye, Swan, and Apsley Rivers, or, possibly, elevated above sea-level by a slight rising of the land. Throughout all these flats occasional traces of the coal measures are met with, though the covering of alluvial matter is so thick that an occasional exposure of sandstone is all that is seen. Not only is there the covering of recent alluvial debris to obscure the older formations, but also a deposit probably belonging to the early Tertiary period, which, in places, is of considerable extent. This is met with on the main road about half a mile south of the Riversdale homestead, again at the junction of the Campbell Town and Bicheno roads, and is also well seen in a cutting on the latter road about half a mile north from the junction. Traces of it are again met with in the bank of the Swan River, opposite Glen Gala homestead, and also to the north west from this, on the slopes of some low hills, composed of coal measure sandstones, which there bound the alluvial plain of the

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**Swan River.** This deposit is made up of clays, beds of flaky impure brown iron ores, and highly ferruginous sandstones. At the junction of the roads a few fossil leaves were obtained in these last, closely resembling those found in the very similar leaf-beds of the Windmill Hill at Launceston, which are of Palæogene age. These Oyster Bay Tertiary beds have been much eroded since their formation, and are now only seen where they project as low hills through the later deposits of recent alluvial gravels. Their existence is most likely due to there having once been in the now Swan River valley a lagoon similar to the present Moulting Lagoon at the mouth of the Apsley River. This would argue that the general level of the land was in early Tertiary times much lower than at present,—a conclusion borne out by the other Tertiary deposits found at intervals all round the coast of Tasmania.

So much of the surface of the flat lands at the mouth of the Swan River being covered with these recent and Tertiary formations, and natural sections of any depth being few and far between, it is not easy to form an opinion with any certainty as to whether the coal measures exist below them. Near the junction of the Campbell Town and Bicheno roads, however, sandstone has been quarried for building purposes which is evidently got from the coal measures. It is the characteristic soft greyish felspathic or argillaceous sandstone so commonly met with in our coal measures above and in the vicinity of seams of coal. The same sandstone occurs again in a detached patch near Bellbrook, on the Wye River, and in the Swan River about a mile above Glen Gala homestead, about which occurrences more will be said presently. These isolated outcrops render it very likely that the carboniferous formation underlies a great portion of the alluvial flats. It would seem, indeed, that the whole of Oyster Bay had been once a coalfield, the remnants of the coal formation at Schouten Island and the south-west corner of Freycinet's Peninsula showing that it had extended to the east side of the Bay. Whether it has happened that the soft sandstones have been worn away in course of time by the rivers and the encroachments of the sea until water now occupies the place once held by dry land, or whether, as is possible, the coal measures in the floor of Oyster Bay have never been elevated into dry land, is of no economic importance, as in either case any coal contained is quite out of reach. We must make the best of such remnants as now exist along the shores. That the coal measures once existed in the flats at the mouth of the Swan River is, to my mind, hardly disputable; but to ascertain their present condition two serious factors must be taken into account, namely, the amount of erosion they may have suffered prior to the deposition of the Tertiary and recent beds that now cover them, and the amount of disturbance and alteration they may have been subjected to by intrusive masses of igneous rock (the greenstone). Before any conclusion can be definitely come to on these points borings will have to be executed. We cannot by any means foretell the depth of the basins and possible valleys that had been scooped out of the underlying rock before the superficial deposits were laid down, neither can it be predicted how and where the intrusive greenstone has broken through it. This latter feature is the one that is most to be feared, as being the more likely to lead to serious destruction of the coalfield. The numerous outcrops of solid greenstone even in the flat land prove that disturbance from igneous intrusions must be expected. The large area of possible coal-bearing land, however, gives grounds for hoping that there may be patches of undisturbed country worth working; and testing the ground by means of a diamond drill is therefore desirable, though it cannot be said that the prospects of a return for the expenditure are very good. Even supposing that the fears above expressed as to the coal measures being cut away by erosion or destroyed by igneous intrusions should prove to be groundless, there would still be the by no means unlikely chance that workable coal would not be found in them. The enterprise of boring, though highly commendable as proving the value of the district, is therefore not one that should be entered into with sanguine hopes of profit being the result; it should rather be regarded as one of the things that should be done in the public interest to set at rest a question of great importance to the whole community.

As in most of our Tasmanian Coal-fields, the relationship of the igneous greenstone formation to the coal measures with respect to age is a subject of the greatest importance, as on it depends the possibility of coal being found to extend right under the high hills of greenstone which appear to bound the carboniferous sandstones on the westward side. This has always been a matter on which there has been much difference of opinion among Tasmanian geologists. While all are agreed that some of the greenstone is of later age than the coal measures, of which fact there is abundant proof in numerous sections where the plutonic rock is seen to traverse the sandstones, it is a matter of controversy whether all the immense hills and masses of greenstone have been erupted since the coal was laid down, or if these were not two main periods of outflow of molten rock, one antecedent and one subsequent to the formation of the coal measures. Mr. R. M. Johnston, in his *Geology of Tasmania*, comes to the conclusion that the latter theory is the correct one, and speaks of a "newer" and an "older" greenstone. In this he is supported by the high authority of Dr. Selwyn, who, in describing the district in the vicinity of the Douglas River (Report upon some of the Coal Seams of Van Diemen's Land, 1855), says:—"Inland the country rises into massive greenstone ridges, against the steep escarpments and in the hollows of which the carboniferous beds have in all probability been deposited. One is irresistibly led to this conclusion from the apparently undisturbed and unaltered condition of the latter even where they are in closest proximity to the igneous mass." While very unwilling to differ from two such high authorities, my own observations in the field, coupled with the results of several borings made lately with diamond drills at Seymour, Spring Bay, Macquarie Plains, and Jerusalem, have led me to an opposite conclusion,—that the greenstone eruptions took place after the coal measures were laid down. It is impossible to prove that none of the greenstone existed before the coal era, but I would contend that if the great masses of it that exist inland from Oyster Bay can be shown to belong to the "Newer" Greenstone there is no reason for not conceding that the exactly similar greenstones of the Great Central Plateau, Mount Wellington, Ben Lomond, and other mountains, which have been assumed to be older than the coal measures, belong to the same period, of immense eruptive activity. The fact that alteration of the sedimentary strata in the neighbourhood of the Douglas River was not observed by Dr. Selwyn is not of itself sufficient to prove that the greenstone there was of different age from that at Lisdillon and Mayfield, where extreme metamorphism of shales in its vicinity is very noticeable. The igneous formation is continuous from the Douglas River to Lisdillon, and if the question of an older and newer

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greenstone had not arisen no one would ever have thought of disputing the identity of the rock at the two places. The extraordinarily partial action of volcanic intrusions in disturbing and metamorphosing the strata penetrated by them has often been noticed and commented upon, rocks being found at one time penetrated by igneous dykes and yet hardly at all altered even at the contact surface, and at other times changed almost beyond recognition. So, too, the dykes appear in cases to have worked their way through the rock without greatly or even appreciably disturbing the strata, while in other cases great bending and fracturing has been caused. The evidence that has been brought forward in favour of the theory of the existence of a pre-carboniferous greenstone appears to me to be easily explainable by this well-known behaviour of igneous intrusion. Besides the want of alteration and disturbance of strata in contact with the greenstone in certain sections, it has been put forward by Mr. Johnston as proof of there being greenstones of two different ages that he has observed a dyke of greenstone clearly penetrating an older mass of the same rock. This, however, should not be held to prove any considerable difference in the age of the two bodies, as it must frequently happen in the course of eruptions that dykes are thrown up through lava flows and other sheets of igneous matter of very recent formation.

Whether the enormous quantities of greenstone found throughout the whole colony are older or younger than the coal measures, the eruptions must have been of vast extent, and partaking rather of the nature of "fissure eruptions" than of those of the ordinary crater type. If this is allowed, it seems to me that there is no difficulty in believing that the elevation of the central and eastern part of the island was due to the outflow of these great molten masses, and that they forced up with them large portions of the surface strata. It is very possible that much of the rock now exposed on the surface was originally buried, the molten matter having formed intrusive sheets and "laccolites," from which the covering sandstones have been in course of time removed by denudation. This theory of the disruption and elevation of the coal measures by a mesozoic outflow of molten rock appears to me to satisfactorily explain the very broken nature of our coal measures, the great differences in elevation of very similar beds and the constant presence of dykes of greenstone, much better than that which assumes that the coal-bearing beds were originally laid down in an archipelago of greenstone islands, and that the differences of elevation have been caused by numerous faults and the intrusion of a second outflow of igneous material. When it is possible to account for the facts by referring all the greenstone masses throughout the colony to one great period of volcanic activity, it should require very strong evidence indeed to support the belief that there had been a similar period of very much greater age in which greenstone indistinguishable from that of the second period had been poured out.

A certain amount of positive evidence that the coal measures were not laid down in hollows of the pre-existent greenstone rocks is in many places afforded by the mineral constitution of the former. A good example may be seen in the Freestone Creek, which runs into the Wye River about two miles west of the Bellbrook homestead, in the district now under consideration. Here we find a limited patch of the coal measures, consisting of beds of grits, sandstones, and shales. In the Freestone Creek there is a considerable thickness of strata laid open to view. Though surrounded for miles in every direction by massive greenstone hills, the beds in this little hollow show no sign of having been derived from the disintegration of the circumjacent rock. Several of the beds contain coarse boulders and stones, but these are not fragments of greenstone, but of granite and Archæan or Silurian schists, slates, and sandstones. The coarse white grits, too, have all the appearance of being derived from the disintegration of granite. Mica is common throughout the beds. No possible doubt can be entertained after an examination of this section that the strata were derived from granite and Archæan and older Palæozoic rocks, and not from the greenstone now surrounding them. Though the patch is a small one and surrounded by a vast mass of once molten rock, no unusual hardening or change is apparent, and the strata lie inclined at low angles, the "undisturbed and unaltered condition" noted at the Douglas River by Dr. Selwyn obtaining in this locality also. Yet it is inconceivable that the sediments deposited in this small basin should have been derived from far distant granitic and Archæan formations without containing a very much larger proportion of material from the sides of the basin, the coarse pebbles and small boulders found proving that the strata were not laid down in deep water. The effect of the heat of the igneous mass is shown in some places, however, there being a great deal of vertical jointing visible on close inspection.

On the north coast of Maria Island there is a splendid section of the lower beds of the carboniferous system (described in my report of 19th September, 1890, on the Hydraulic Limestones of Maria Island), one end of which abuts against a large mass of greenstone. The lower beds of the limestone pass into coarse conglomerates. Had these, which are plainly a littoral deposit, been laid down at the foot of a pre-existing cliff of greenstone, they would no doubt have been full of fragments of this rock; but though I made special search for such I did not find a single pebble of greenstone. Pebbles and even heavy boulders of quartz, schists, metamorphic slate and sandstone and granite, were common. It is possible, of course, that the greenstone has been brought opposite to the carboniferous beds by a fault, but the latter have certainly not been laid down against a cliff of it, and it is just as likely that the volcanic rock is a later intrusion through them as it is that a fault has taken place.

The Spring Bay coal-field also presents evidence of the intrusive character of the main greenstone masses, and of the fact that the bedding of the strata has not been greatly altered in inclination by their agency. Here the coal measures lie in a deep basin surrounded by greenstone hills, and again we should expect to find debris of the surrounding rock constituting the main portion of the sediments. The sandstones, however, show fragments of felspar and mica, which point rather to their being derived from granite or metamorphic rocks. More direct and conclusive evidence of the greenstone being intrusive is furnished by the bores made in the early part of 1891 with the diamond drill in various parts of this basin. The first bore, after passing through sandstone, struck greenstone at 117 feet. This rock was here fine-grained, but rapidly became harder and coarser in crystallisation as it was penetrated. Three and a half feet of a clayey rock lying on the greenstone appeared to be the product of alteration of its contact with the sandstones. The

appearances to my mind consist much better with the theory of the greenstone being later than the sandstone in age than the contrary supposition. In the second bore the effects of alteration of the sandstones by heat became very marked at about 46 feet, though visible almost from the start, the shales being converted into flinty stone, the sandstone to brittle quartzite, and the felspathic sandstones to a hard greenish rock with vertical joints, not unlike greenstone itself in appearance. The alteration evidently increasing with depth, the bore was not carried down to the underlying greenstone. The third bore, however, bottomed on very dense aphanitic greenstone. In this bore the strata do not appear to have suffered alteration from the contact with the igneous rock. At Ravensdale, near Little Swanport, another bore was put down. This soon struck hard sandstones and flinty shales, and was abandoned in shale which had been altered to hornstone. The main mass of the greenstone was at only a short distance from this bore, and there can be little doubt that the alteration of the sedimentary rocks was due to contact with it. All through the district from Spring Bay to Bicheno dykes penetrating the sandstones are of common occurrence. Taking these in connection with the large mass of greenstone and the alteration of the strata proved by the above bores, it seems to me impossible to come to any other conclusion than that the greenstone is entirely younger than the period of deposition of the coal measures. This theory is to some extent corroborated by a comparison of the mineral composition of the Tertiary sandstones with those of the Mesozoic age. The former are highly ferruginous and clayey, as might be expected from their being mainly derived from the greenstone, while the coal measure sandstones are very free from iron.

I have discussed the relation of the greenstones to the sandstones at some length, as it is necessary to understand this question when considering the likelihood of finding coal. If my belief is correct that the igneous rock is all younger than the sandstones, it will follow that we may expect to find the coal measures varying very much in depth, altered considerably in parts, broken exceedingly, and penetrated in a haphazard way by numerous dykes. At the same time it is quite possible that large areas of coal may be found covered by superficial cappings of greenstone. I do not, however, anticipate that this latter occurrence will be frequent, as it seems probable that long-continued denudation has removed immense quantities of former superficial deposits, leaving us now the roots, as it were, of the great lava flows. It is most likely that where beds of sandstones are seen lying at the foot of greenstone hills they will not pass under the latter, but abut up against them, and be cut off by them.

The various localities on the western side of Oyster Bay where coal measures have been found will now be described in order, going northwards.

*Lisdillon and Mayfield.*—South of Lisdillon homestead there is found a patch of hard white sandstone, which appears to have been hardened and metamorphosed to some extent by contact with the surrounding greenstones. This sandstone is probably only a thin capping on the igneous rock, and is of no importance as probable coal-bearing ground. Between the Lisdillon and Buxton's Rivulets, and from the latter north nearly to the Old Man's Rivulet, there is a considerable stretch of the coal measures, but these are much broken by dykes of greenstone, and in parts highly metamorphosed. At the White Hill, near Lisdillon, and also on the Mayfield Estate quarries have been opened for the purpose of obtaining flints for metalling the road. These flint-beds are altered shales which have been silicified and hardened so as to become hornstone. The nearly horizontal bedding of the strata is clearly visible in the sections, and in one of the quarries rounded pebbles were visible in the altered strata. Strong vertical jointing and sharp conchoidal fracture characterise the hornstone beds. From their proximity to large greenstone masses the conclusion must be drawn that the latter have been the cause of the alteration. An interesting instance of the greenstone overlapping the sedimentary strata was observed in a small quarry about half a mile S. 27° E. from the road-bridge across Buxton's Rivulet. The lava rock was very much fissured by numerous vertical and inclined joints, which gave it a shingly character, and made quarrying very easy; and in the floor where the upper rock had been removed fossiliferous shales were showing. Similar shingly greenstone is again seen at Barber's Point, and there, too, the shales lie close to the foot of the promontory on the beach, and very likely run partly under it. Throughout the whole area signs of the proximity of the igneous rock are often apparent in the sedimentary beds, but nevertheless there are portions of these which appear not at all affected. Up Buxton's Rivulet above the bridge felspathic sandstones are found in the bed of the stream and in its banks for perhaps half a mile, and it is possible that coal might exist in this locality in some quantity. Another comparatively undisturbed patch of sandstones lies in the paddocks to the north-east from the Mayfield homestead, and can be examined in a small creek which runs out on to the beach opposite Christmas Island. An old shaft which was sunk many years ago in this part of the ground was not successful in finding coal, and has long been filled up. At the Old Man's Rivulet a small patch of sandstone is seen, and in this are some carbonaceous shales and small seams of very impure coal. Taking the Lisdillon and Mayfield district as a whole, the probability of finding payable coal is very small, and I would not recommend boring here unless operations further to the north should reveal valuable seams, when it might be worth while to ascertain if these existed under the little disturbed area of sandstone above mentioned.

*Kelvedon.*—Round Mr. Edward Cotton's homestead at Kelvedon, an area of some five or six hundred acres of coal measures is found, apparently unaltered by contact with igneous outflows. The sandstone is the soft felspathic sandstone which so generally accompanies our coal seams, and may therefore be regarded as a favourable indication of their probable existence. On the beach at low-water shales are visible, and from time to time blocks of highly carbonaceous shale and fairly good-looking coal have been found cast up on the beach. From an examination of some of these pieces I am of opinion that they are not lumps lost overboard from a passing vessel, and that they are probably torn from a seam cropping out below low-water mark; even without these, however, the undisturbed appearance of the sandstone beds and their considerable extent point this locality out as one very favourable for trial with the diamond drill. A bore on the cleared low spur about due west from Mr. Cotton's house would show very shortly whether there is

any coal in the formation. It might have a very considerable extension seaward; if the drill is taken into the district this portion should not be left untested.

*Bellbrook.*—Opposite Bellbrook homestead the Wye River has cut through and revealed the typical felspathic sandstones and shales of the coal measures; the former containing in this instance much fossil wood, carbonised and silicified, and the latter numerous prints of grass-like leaves. The strata are dipping to the westward about one foot in ten. A short distance down the valley from the homestead a dyke of greenstone, ten to twelve feet thick, may be seen cutting through the measures and faulting them down on the eastern side, and about a chain lower the massive greenstone cuts the strata off altogether. In a small creek, known as Black Creek, running north-westerly from Bellbrook, sandstone shows for about a mile; the beds dip pretty regularly E.S.E. about one foot in seven, and in ascending the creek the lower beds of the series are exposed; no coal has been found in these. The lower beds are much more quartzose than the upper ones which show nearer the Wye River, and a good deal of silicified shale or hornstone is seen in the gravel of the creek. North and east of the creek hard sandstones are found on the top of a small ridge in close proximity to large masses of greenstone. The whole area occupied by the coal measures here is probably not more than 300 acres, and the greater part of this is not likely to be coal-bearing, as the sandstones seem to belong to the quartzose series generally found below the horizon of the coal beds. The strata are evidently much broken by dykes of greenstone, and even if coal were found, as it might well be, near the homestead, it is not at all probable that it could be worked over any extensive area or with any profit. The place is somewhat difficult of access by tramways, and several miles from the coast; it would be, in my opinion, waste of money to test this spot by means of the diamond drill.

*Freestone Creek.*—This place has been already referred to as showing that the strata could not have been laid down in hollows of the greenstone. The patch of coal measure rocks here found is of small extent, and so surrounded by high greenstone hills as to be practically inaccessible even if it did contain coal; this, however, I do not regard as at all probable, the strata most likely belonging to a horizon in the carboniferous system far below that of the coal. The beds dip down the creek faster than its grade and the section therefore exposed some thickness of them, but no sign of coal was observed. Coarse quartz grits, shales, and mudstones, containing coarse gravel and boulders of Silurian and Archæan slates, schists, and granites, are the principal rocks seen; strong vertical joints are seen in parts of the formation, probably due to the influence of the underlying igneous rock.

*Riversdale to Glen Gala.*—Mention has been already made of the extensive alluvial flats lying at the mouth of the Swan River, and of the fact that they are partly occupied by an older Tertiary formation which, with the recent alluvial gravels, renders it impossible to obtain information on the subject as to the nature of the underlying strata, and of the necessity of boring before definite conclusions can be reached as to these. The extent of the possible coal-field renders a trial of the ground by a diamond drill very desirable, although, as already pointed out, the probabilities are against the enterprise resulting in a profit. The best section is seen near Glen Gala, in the Swan River. Here the felspathic sandstone forms the bed of the stream for about a mile above Glen Gala homestead, though not plainly appearing all the way. Highly carbonaceous shale is often found washed up from the bottom of the river, and points to the likelihood of there being coal seams also. The malign influence of the greenstone dykes is well seen in the side of the river about half a mile above Glen Gala, the lower coarse quartzose sandstones being exposed dipping from 45° to 60° to the south, in close proximity to one of them, evidently having been forced up to surface by it. Both above and below this spot the felspathic sandstones in the river are lying nearly level or with only slight angles of dip, showing that the inclination of the strata alongside the dyke is abnormal. The sandstone formation extends westward from the river for nearly two miles, rising into a range of low hills. The most westerly beds are mudstones and sandstones highly charged with the characteristic carboniferous marine fossils, such as *Fenestella*, *Aricolopecten*, *Spirifera*, and *Productus*. The dip of the beds was nowhere obtainable, but from their succession it is probably easterly, these marine mudstones being much lower in the coal measures than the felspathic sandstones found further to the east. Any coal that may exist in this part of the district would be almost certainly confined to the flat land immediately west of the outcrops of sandstone in the River Swan. The best site for a bore-hole would be near the river. Between the flats just mentioned and those lower down the river there is a large dyke of greenstone which crosses the Swan at the bridge on the road to Bicheno, and connects the main greenstone masses to the westward with the large spur of the same rock which separates the valley of the Swan from the Moulting Lagoon. Down the river below this dyke the alluvial covering is so deep that the sandstone, if existing there, is not visible. Being found at Glen Gala and near the junction of the roads from Swansea to Campbell Town and Bicheno, it is most probable that it does exist. One or two bore-holes in these flats would be required to settle the question.

*Comb End, Apsley Meadows.*—For about four miles from Glen Gala the road to Bicheno passes over nothing but greenstone; but very soon after passing the summit of the range which is here crossed, coal measures make their appearance, and continue down the valley through which the road passes nearly to Apslawn. In the cuttings on the side of the road leading down from the summit to Comb End occasional carbonaceous seams are noticed, and prospecting would have a very good chance of discovering coal in this neighbourhood. Round Apslawn the greenstone has again come in, but the coal measures seem to be pretty continuous from Comb End to Apsley Meadows. Towards the north-east of the Township of Llandaff they are again crossed by the road. The strata showing at this point are the quartzose sandstones, which lie as a rule below the coal horizon. North of Llandaff the sandstones extend for perhaps two miles, rising into hills which are crowned with solid greenstone. A heavy talus of loose greenstone blocks has fallen away from the tops of the hills and completely conceals the junction of the two formations. The sandstones here rise to a considerable height, and in them several seams of coal have been discovered. A section is afforded by a small stream known as Barber's Creek, which lies to the north and north-west of Mr. T. Board's farm. This creek has eroded a rather deep valley, in which are exposed the sandstones

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lying under the talus of loose greenstone blocks. A little work had been done on some of the beds of coal exposed in this section, though not yet enough to prospect them at all satisfactorily. The principal working was on almost the highest part of the section exposed, at a level some 550 feet above the sea. Above this point, though a few stones of sandstone in the creek indicate that the coal measures extend still higher, the loose greenstone becomes so heavy that nothing can be seen of the rock underlying it. About 10 chains above the workings the greenstone appears to be in solid masses, and from this westward the hills are entirely composed of this rock. It is possible that the coal measures extend under, or partly under, these hills, but I am more inclined to believe that they will be cut off abruptly by the greenstone. The question could be tested by a bore some 200 feet deep from the flat at the head of the creek, or by driving into the hills in the coal seams themselves. The hardness of the greenstone would render boring an expensive matter, and there would be considerable difficulty also in getting a diamond drill up on to the flat.

The section exposed by the workings in the creek (an open cutting and two or three small pits) is as follows, taking the beds in descending order:—

		ft. in.
Felspathic sandstone.....		40 0
Thin bands of shale and carbonaceous shale.....		12 0
	ft. in.	
A. <i>Coal Seam</i> .—Shaly coal.....	0 2	} 4 8
Dark stony coal.....	1 0	
Hard black flinty band.....	0 6	
Bright coal.....	1 0	
Sandstone.....	0 1	
Shaly coal.....	0 8	
Hard silicious band.....	0 2	
Bright coal.....	1 1	
Shale.....		0 11
Bright coal.....		0 2
Grey hard fireclay.....		2 9
B. <i>Bright Coal</i> .....		1 5
Dark shale bottom.....		10 and more.

Samples taken from the coal seams A. and B. from top to bottom of the beds, such bands as could be picked out in working on a large scale being omitted, were analysed by Mr. W. F. Ward, Government Analyst, with the following results:—

	A.	B.
Fixed carbon.....	44.4	49.8
Volatile at red heat.....	18.8	20.2
Mineral matter (ash).....	33.4	27.0
Moisture.....	3.4	3.0
	<hr style="width: 50px; margin: 0 auto;"/>	<hr style="width: 50px; margin: 0 auto;"/>
	100.0	100.0
	<hr style="width: 50px; margin: 0 auto;"/>	<hr style="width: 50px; margin: 0 auto;"/>

The proportion of ash in these coals is too great to allow of their use under present market conditions. It is possible that by using a coal-washing machine a good deal of the stony matter might be taken out, but this is out of the question so long as there is a plentiful supply of good coal in the market.

The seams strike north and south, and have a dip to the west of 7 degrees. Below the above seams the bed of the creek is obscured for some three or four chains by fallen rock, and then another outcrop of coal is met with; this is an impure coal with a few bright seams through it, and appears to be about three feet thick, but has not been cut through so as to reveal it properly; the floor is a shale or dark fireclay, strike N. and S., dip to W. 5½°. No assay was made of the coal from this outcrop, as it was much weathered and required to be cut into. Below this seam a thick bed of felspathic sandstone is seen in the creek bed for about four chains, when a small seam of coal 12 inches thick comes in under it; this is of poor quality. The bed of the creek below this is obscured by fallen greenstone for some distance, and at one part seems to lie in solid greenstone; but some 10 chains lower down yet another seam of coal crops out, this time about two feet in thickness, dipping slightly to the west, but not so much as the higher seams. Some of this is nice bright-looking coal, but the outcrop should be cut into before the exact thickness and quality of the seam can be determined. This seam is about 130 feet below the top workings. There are probably other seams in the measures still lower down, but owing to the creek now having a flatter grade and being much filled with debris no more are seen for a considerable distance. About 200 feet above sea level, however, yet another is exposed. On the top of this is about a foot of bad soft coal and shale, then there is 2 feet 1 inch of fair bright coal with a sandstone band half an inch thick in the middle, strike E. and W., dip to South 10°; this dip may be only local, the outcrop being probably a little disturbed. Two chains lower down the creek the strata, soft shale and felspathic sandstone, are lying as nearly as possible horizontally, from which we may infer that the coal seam would also be horizontal. An assay sample taken from this bed yielded to Mr. Ward's analysis:—

Fixed carbon.....	43.6
Volatile at red heat.....	23.4
Mineral matter.....	26.6
Moisture.....	6.4
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	100.0
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(8)

In some of the other small creeks near Barber's Creek traces of the above coal seams, or possibly of other ones, have been noticed. The measures here evidently contain a great many beds of coal, and it is not at all likely that those exposed are the only ones. It is very probable that if the creek bed were cleared down to the bed-rock in places where it is now choked with detritus other seams would be revealed, and borings might find others again below the lowest outcrop. There is a sufficient area of coal-bearing ground in this neighbourhood to make it worth while to make preliminary borings to ascertain if payable seams exist. As it would be rather difficult and expensive to take a diamond drill up to the highest workings in Barber's Creek, I would recommend that in the upper part of this gully, where the ground is steep and the bed-rock could be easily exposed by cleaning the loose stuff out of the creek, this should be done by open trenches. A small expense would prove about 200 feet in vertical depth of strata in this way. Having done this the lower strata should then be tested with a diamond drill. The prospects of finding payable coal here seem to me quite bright enough to warrant the expense of boring. Should a good seam be discovered a tramway about seven miles in length could easily be constructed to Bicheno, where I understand there is a fairly good shipping-place.

If any boring is done near Apsley Meadows it would be well to test the strata above Comb End at the same time, as the same seams are likely to be found at both places.

Neck of Freycinet Peninsula.- In company with Messrs. James and Frederick Lyne I made a very cursory visit to the country lying to the north east of the Moulting Lagoon, which was found to present several features of interest. Granite and greenstone, Tertiary, Carboniferous and Silurian strata are all found here, and indications of mineral veins are not infrequent. A belt of white quartz gravel of considerable depth extends from the head of the Lagoon northwards for some miles, and probably indicates the position of an older channel of the Apsley River. As there is much granite in the vicinity of this it is rather probable that gutters containing tin might be found below the surface gravel.

Tin has been found on the Freycinet Peninsular, but much to the south of this portion. The Silurian system is represented by a patch of slates and sandstones, forming a high ridge just at the neck of the Peninsula. Some quartz reefs have been noticed here, and one which I saw had a not "unkindly" appearance, but so far as I could learn no gold has been yet found in any of these. The formation being favourable for gold, however, it is quite likely that careful prospecting would discover its existence. Some small ironstone veins are noticed, and samples from two of these were assayed by Mr. Ward, but without finding any metal of value: their being found at all is an argument for further search for more payable ones. The granite formation which is largely developed from Bicheno down to the south of Half Moon Bay is seen again inland from Isaac's Point and in a small patch S.S.W. from Mount Peter, but does not occur plentifully in this part of the Peninsula, though largely found to the south of it. The Carboniferous system is represented by sandstones and fossiliferous mudstones and limestones of the Lower Marine Series. Near Isaac's Point a patch of coarse grits and conglomerates is found resting on granite, which is probably part of the base of the Carboniferous system. The pebbles in this conglomerate are of Silurian and Archaean and Granitic origin. Greenstone occurs at Mount Peter and again on the point opposite King Bay, at the mouth of the Moulting Lagoon.

From information gained in the district as to the lower part of the Freycinet Peninsula, I am inclined to believe that it deserves more attention from prospectors than it has hitherto had. A considerable quantity of tin has been obtained from time to time, and probably more would be found if search were made for it.

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Shipping facilities. - Should payable seams of coal be found in the Oyster Bay district, the want of a good port of shipment would be very much felt. Not having made any examination of the possible shipping-places I can only speak of them from hearsay, but I understand that Bicheno is a fairly good port for steamers, and would be capable of improvement so as to be able to deal with the produce of the Seymour, Douglas River, and Apsley Meadows fields. Any coal found in the field at the mouth of the Wye River might be shipped at Swansea so long as the output was small, but if it should become important a railway would have to be built to Cole's Bay on the east side of Oyster Bay, which is said to be a really first-rate harbour. Coal at Kelvedon, Mayfield, or Lisdillon would, I fear, have to be shipped from the beach in favourable weather, or else taken to Spring Bay.

In concluding this Report I feel bound to say that great kindness and courtesy was shown towards me by the Warden of the Municipality and by numerous other residents of the district.

I have, &c.

A. MONTGOMERY, M.A. Geological Surveyor.

The Secretary of Mines, Hobart.

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