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La Trobe, 23rd May, 1861.

Sir, one of the numerous lines of fault by which the district I had the honour, in a recent letter, to inform you that it would be necessary for me to defer my Report upon the Resinous Shales which crop out near the great bend of the River Mersey, until the termination of the operations undertaken by the recently formed Company for the purpose of proving the thickness and (partially) the extent of the beds exposed there.

GOVERNMENT GEOLOGIST

immediately by a mass of Basalt; which, commencing I felt convinced at that time - and the result has confirmed me in the opinion - that the apparent thickness of the Dysodile existing in the quarry opened was deceptive; and that it would be difficult to determine it satisfactorily without some slight practical examination of the character proposed. I was, moreover, desirous of ascertaining the relation which existed between the beds immediately associated with the Dysodile, and others occurring in the vicinity; and which (though obscure in that locality) would, I trusted, be rendered certain by a more extended examination of the district.

I am now in a position to furnish you with the information you requested, and beg to enclose a tracing of the property on which the mineral occurs, which may assist you in following my description.

Although the Dysodile must crop out, as indicated on the tracing, for a considerable distance in the northern portion of the property; it is prevented from appearing on the surface at more than a few points, by a superficial deposit of drift of inconsiderable thickness. At two of these points it has been quarried: in a third, it occurs isolated from the rest of the formation, through the intervention of a mass of clay slates and micaceous schists

general

which are largely developed in the vicinity.

In the last instance, it is questionable whether its position is due to the Dysodile having been originally deposited against the flanks of the older formation upon which it abuts, or to its having been thrown down against it by one of the numerous lines of fault by which the district is traversed. It occurs in the eastern bank of the river, and extends in a broad ledge across it to the opposite side; a thickness of some six or seven feet being exposed, dipping to the north east at an angle of eleven degrees.

Upon the western bank of the river it is interrupted almost immediately by a mass of Basalt; which, commencing near the north-west corner of the property, crosses the river, and extends for some distance to the south, cutting off the Dysodile and the beds associated with it.

Upon the eastern bank there is an interval of about 150 yards in the direction of the strike, between the river and the hill of clay slate bordering it. This interval is occupied by alluvial drift, below which it is probable that the Dysodile may continue.

The outcrop in the river, and its probable continuation, are indicated upon the tracing.

The whole of the space included in the sharp bend of the river, east of this point, is occupied by a series of steel and silver-grey clay slates, micaceous schists and grits, more or less foliated; and affecting a general strike in the direction N. 10° W. A portion of the series, consisting of micaceous schists, exposed lower down the river, and almost immediately in contact with the trap dyke, dips at angles varying from fifty to seventy degrees in the direction W. 10° S. The clay slate contains a few quartz veins, none of which are of any considerable size.

This formation is bounded on the north by a line of fault, which may be traced in the angle of the river near the centre of the property, and abuts against a thickness of nearly 300 feet of conglomerates, claystones, &c., forming part of the series containing the Dysodile. That mineral itself is exposed in the beds of two creeks about one quarter of a mile apart; lying in the one instance at eighty, and in the other at about sixty feet above the level of its bed.

In the first case, the quarry opened in it (marked A. in the tracing) was traversed by a fault, which caused a repetition of the stratum and a fictitious appearance of thickness. A cutting was made into the face of the quarry, upon my recommendation, for the purpose of ascertaining the direction of the fault, and the amount of the upthrow; the former proved to be about N. 85° W., and the latter between four and five feet. A shaft was also sunk by the Company upon the bank above the quarry, on the east, to a depth of thirty-eight feet.

The several sections thus opened for examination show great variation, both in the total thickness of the deposit and in the proportion which it is possible to work to advantage.

In detailing the particulars, I must premise that, in doing so, I have used the word Dysodile in a comparative sense, to indicate those portions of the deposit in which the resinous particles are sufficiently abundant to give it a decided character, in contradistinction to others where they are only present in a sparing proportion to the clay or sandy matter with which they are mingled.

Upon the north of the fault, the total thickness of the seam is about 6 feet 6 inches, consisting of:-

	Ft.	In.
Dysodile		3 to 4
Sandy clay, thinly impregnated with resinous particles	1	3 6
Dysodile	2	6 3

	Ft.	In.
Band of hard blue claystone, varying from	1	6 to 9
Dysodile	2	0 3

passing down into a hard dark blue rock, consisting of a fine deposit of mud and sand.

The seam is overlaid by a bed of buff-coloured and whitish rock, about five feet in thickness; and a bed of bluish-white clay, varying from a few inches to one foot in thickness.

Upon the south of the fault, the lower portion only of the seam is exposed, and the details are somewhat different from those given above. Thus, the 4 feet 6 inches exhibited are made up of :-

	Ft.	In.
Dysodile	1	0
Alternations of Dysodile in this bed, with brown and blue clays	1	1
White and yellow clay, with resinous particles thinly scattered in some layers	0	5
Dysodile	0	8
White and yellow clay	0	1
Dysodile	0	5
Clay	0	1
Dysodile	0	3
Clay	0	1
Dysodile	0	4

passing through a blue claystone (with feruginous partings) into a hard blue rock, as before.

In the shaft, the total thickness of the seam (including passage beds) was about seven feet, and the section as follows :-

	Ft.	In.
Drift	7	0
Hard, yellow, grey, and blue stone (a mixture of sand, mud, and clay) containing fossils	13	0
Soft blue clay, varying from		1 to 4
Passage bed		6
Dysodile	3	6
Hard blue band	1	3

continuation of its line of strike. Although the differences of dip and level in quarries A and B are sufficient indications of the existence of other faults besides those mentioned between them, there are none I believe of much magnitude; but it would be advisable, before laying out the quarry, and between it and the river, the space is occupied by pale and dark blue indurated clays, alternated with thin beds of sandstone and shales near the bottom. Above it, the rising ground is occupied by claystone, sandstone, and beds of conglomerate and breccia, containing pebbles and angular fragments of quartz and many of the primitive rocks, and including the remains of pecteus and other marine fossils.

There can be no doubt as to the Dysodile passing beneath these beds, and, consequently, underlying the whole of the northern half of the property. In the other instance, where the Dysodile crops out in the creek (marked quarry B.), a shaft was also sunk by the Company on the east of the quarry, and a thickness of twenty-four feet of hard blue rock passed without the Dysodile being intersected; indicating a fault, which I afterwards ascertained to exist between it and the outcrop in the creek, running nearly in the direction S. 55° E. and N. 55° W., and throwing the bed up about forty feet on the north side.

The beds exposed in the creek consist of :-

	Ft.	In.
Soft white and yellow clayey rock	2	0
Dysodile	6 to 8	E
Clay, with a little resinous matter	1	6
Dysodile	1	6

The Dysodile also crops out on the lower side of the fault, about 100 yards higher up the creek. East of this, it cannot be traced upon the surface, the few creeks existing in that portion of the property being of insufficient size to lay it bare; and it would therefore be necessary for its discovery in this direction, to go to some slight expense in trenching across the probable

continuation of its line of strike. Although the
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sufficient indications of the existence of other faults
north of it.

besides those mentioned between them, there are none I
believe of much magnitude; but it would be advisable,
before laying out the workings in the intermediate space,
to prove the continuity of the outcrop, by means of trial
trenches.

The appearance presented by the purer portions
of the Dysodile is that of a dark greenish or brownish-
grey shale, consisting of a mixture of sand and mud, with
resinous particles more or less thickly intermixed. It is
a marine deposit, and contains, though somewhat sparingly,
the remains of species of Productus Pecten Platyschisma,
Pachydomus, &c., which also occur in the beds immediately
above and below it. It occasionally contains pebbles of
quartz, clay stone, grit, &c., and nodules of iron pyrites
occur in thin irregular layers near the top.

The comparison of the various sections shows it
to be so variable a deposit, that a mere approximation
alone can be formed of the amount contained in the area
which it occupies.

It is impossible to form any satisfactory opinion
of the extent of the isolated mass in the south-west corner
of the property beyond this, that it cannot exceed 100 or
150 yards in length, by 40 or 50 in breadth. It lies

almost entirely beneath the level of the river, and the
amount of water held in retention by the loose drift above
it, would prove a most serious and expensive obstacle to
its extraction.

No such objection, however, exists with regard
to the main portion of the seam, which occupies an extensive
area over which it might be obtained at a moderate depth
and at little cost; for the Dysodile may be fairly assumed
to crop out on the sides of the hill, not merely in the
interval between the two quarries, but also for some
considerable distance upon either side of them. It might

thus be got, by open work upon the line of crop, or by means of shafts of moderate depth, at a short distance north of it.

The rise of the ground, taken in conjunction with the direction of the dip, throws it continually deeper as it approaches the back line of the property; and unless brought up again by faults, it must lie there at a distance of between 200 ^{or} ~~and~~ 300 feet beneath the surface. I have roughly estimated the area underlaid by the Dysodile in this portion of the property at about four hundred acres, in which it would lie at depths varying from Zero at the crop, to 200 or 300 feet at the back line on the north of it. The highest estimate which can be made of the thickness of Dysodile, worth extracting from the seam, is only five feet. At several of the points where it has yet been examined it is less. It would be desirable, therefore, in forming any general calculation with a view to working it, to assume some lesser amount, (say four feet, or four feet six inches, for instance), as the average likely to be met with throughout the workings. It is probable that in some instances it would exceed, and in others fall short of this amount.

I shall shortly have the honor of forwarding you a Report upon the Mersey and Don Coal Fields, and meanwhile

I remain,

Sir,

Your very obedient Servant

CHARLES GOULD.

The Honorable

the Colonial Secretary.