

(No. 50.)



1861.

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T A S M A N I A.

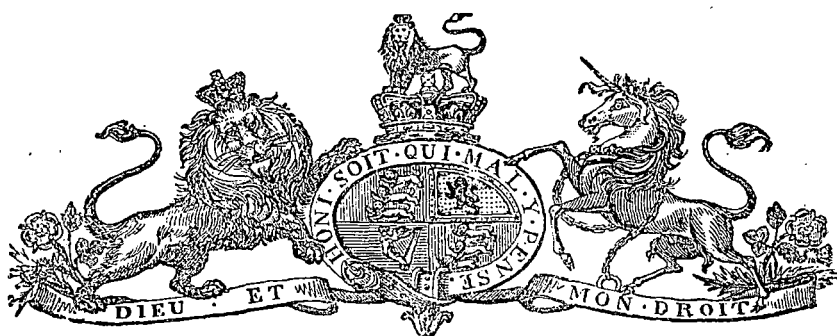
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M E R S E Y C O A L F I E L D S.

REPORT OF THE GOVERNMENT GEOLOGIST.

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Laid upon the Table by Mr. Henty, and ordered by the Council to be printed,  
1 November, 1861.



*Geological Survey Office, 29th October, 1861.*

SIR,

I HAVE the honor to forward a Report upon the Mersey Coal Field, together with explanatory Maps, and Sections.

I have the honor to be

Sir,

Your obedient Servant,

CHARLES GOULD.

*The Honorable the Colonial Secretary*

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THE portion of the Mersey Coal Field, which is the special subject of this Report, lies between the Rivers Mersey and Don, and extends for a distance of nearly eight miles south from the emergence of the formation in which the Coal occurs, from beneath the band of greenstone and basalt forming the coast line.

All the workings commenced up to the present date lie within this area, beneath a large proportion of which Coal has been ascertained to exist by means of borings, or from the discovery of its outcrop at the surface.

West of the Don, and to the south, the field is terminated by the rise of metamorphic and silurian strata; but to the east, across the Mersey, although Coal has not yet been discovered there, an extensive area is occupied by various portions of the Coal measure series. The general dip of the formation is to the north, but is subject to great variation in consequence of the presence of numerous and large faults. The Map and Sections to which this Report is appended, will convey the readiest impression of the association of the Coal measures with the older strata, and of the large extent of country in which they are concealed beneath overlying masses of greenstone and basalt.

The trap-rocks are so involved at many points, and the country occupied by them is so scrubby, that there is unusual difficulty in determining the lines of separation between them; and I have been compelled, in several instances in the accompanying map, to content myself with indicating approximately the boundaries of the two formations.

The more prominent headlands on the Coast, such as Point Sorell and the Mersey Bluff, consist of a greyish green crystalline prismatic greenstone, resembling in all essential particulars that which is so largely developed in many parts of the Colony, and which commencing at those points at the level of the sea, rises gradually, as it is prolonged southwards, and forms the summit of narrow elongated rocky tiers of moderate elevation; there is nothing either in the structure or associations of this greenstone which merits particular description, but more variation exists in the character of the tertiary basalt which appears at various points to penetrate, abut against, or overlie it. Nowhere, perhaps, is the dependance of the agricultural character of a country upon its geological formation more marked than in the present instance, for with the exception of the alluvial plains, nearly the whole of the land devoted to agriculture in the district is situated upon the basalt, or in immediate proximity to it. It usually decomposes into a rich brown or chocolate coloured soil, supporting dense dogwood, treefern, and sassafras scrubs, but in some cases a dark black soil, and open forest land are produced. The basalt is mostly of amorphous structure, but is occasionally

perfectly columnar, especially upon the west of the Don, along the coast between which river and the mouth of the Forth there occur numerous picturesque groups of extremely regular five and six-sided prisms, varying in diameter from a few inches to a couple of feet. These are supported upon layers of perfectly amorphous structure.

The appearance on fracture is usually that of a dark blue, compact, augitic rock, passing into vesicular varieties, containing amygdaloidal and irregular cavities, the latter sometimes incrustated with calcareous, and siliceous deposit.

The basalt appears to be the source of the hematite iron ore, which occurs in irregular nodules of more or less purity, in the surface deposits, at several localities in this district, near the mouth of the Mersey and on the flats towards the Kentish Plains.

The coast line behind the Sand Hills, between Port Frederick and the Mersey Bluff is occupied for a width varying from one quarter to half a mile by flat sandy deposits and marsh land of late tertiary origin. Estuary deposits of a similar character also occupy an extensive area upon the western side of Port Sorell, while the terraces of gravel bordering the Mersey River, for a considerable distance from its mouth upon either side, may probably be referred to the same date. Pebbles containing fossils similar or allied to those occurring in the raised beach at Table Cape may occasionally be met with upon this portion of the coast, but no portion of that formation has yet been found in situ.

The examination of the stratified deposits immediately succeeding the trap rocks and occupying the large extent of flat country contained between the bases of the tiers and ridges of the latter has convinced me that there is considerable disparity in point of age, between the Coal Measures in the neighbourhood of the Mersey and those at Mount Nicholas.

The great dissimilarity in lithological composition would alone be sufficient to cause a doubt on this point, and this is increased by the differences in the number of the seams and character of the Coal, and especially in the instances which I shall presently refer to, of the intimate association of those in the former district with strata containing marine fossils.

In a Report upon the Coal Measures of the Mount Nicholas and Douglas River Districts, already published, I have shown that sandstones of peculiar lithological character form the predominant feature in the formation; and that clays and shales exist only in a moderate proportion, and as subordinate members of the series. Numerous seams of Coal and bituminous shale, occur at intervals, and the whole formation is superior to, and distinct from, the fossiliferous limestone, marls, and sandstones which succeed them.

In the Mersey District, upon the other hand, no representative exists of the variegated sandstones which are there so largely developed, sandstone being rarely met with in thickness exceeding sixty or seventy feet. They are often thinly bedded, and invariably present a uniformity of appearance, contrasting strikingly with the speckled or variegated appearance of the other.

The difficulties presented by the surface of the country in the Mersey District, together with the extent to which the formation is broken by faults, render it impossible to obtain any continuous general section, but considerable information with regard to portions of it may be derived from the study of those at the various collieries. The Works at present in operation are the Alfred and Don Collieries. The Denison and Sherwood Collieries, together with the Mersey Coal Company's Works, have been abandoned. In the Alfred and Denison Collieries the Coal has been worked by adit level, in all others it has been necessary to sink.

The Alfred Colliery lies on the east of the Township of Tarleton, in distance about a mile; the Works consists of two adits driven into the eastern face of a hill, at a little above the level of the alluvium, cutting the seam at the distance of one hundred and thirty yards. The dip is to N. 10° E., about 5 inches in the yard, the outcrop of the seam on the summit of the hill is concealed by drift.

A fault with a downthrow (of unascertained amount) to the south-east, coursing from north-east to south-west, limits the workings upon the south. There is evidence of another upon the face of the hill, at a short distance to the north of the Colliery, which has not yet been worked up to. This, if it proves to be of any extent, will render the available area of Coal inconsiderable.

I am indebted to Mr. R. P. Crompton for the particulars of the following Section taken by him in boring at this Colliery.

	<i>Feet.</i>	<i>Inches.</i>
Surface soil and clay .....	6	0
Indurated clay .....	6	0
Gravel .....	6	0
Blue marl.....	14	0

	Feet.	Inches.
Sandstone, streaked yellow and white .....	20	0
Course grey sandstone.....	10	0
Fine grey sandstone .....	11	0
Parting .....	0	6
Grey sandstone, streaked with black.....	5	0
Very coarse sandstone.....	2	0
Coal .....	1	6
<b>TOTAL DEPTH .....</b>	<b>82</b>	<b>0</b>

The very coarse sandstone which here overlies the Coal is found in a similar position in all the Collieries. It varies in thickness, and is sometimes separated from the seam by a bed of black shale or clod; it is familiar to the miners of the district as the "rough sandstone." The thickness of the seam in this Colliery fairly represents the average throughout the district. The Coal is very bituminous, and differs remarkably from that in the Mount Nicholas seams, in presenting the appearance of vegetable impressions wherever fractured in the direction of the bedding. It is used by the coasting steamer *Titania*, and found to answer well. The only drawback is the presence of a rather considerable quantity of iron pyrites, or, as it is locally termed, sulphur. This is a slight objection to its use as a household fuel, but, *for manufacturing and steam purposes, it is a valuable Coal.*

In the endeavour to discover a second and thicker seam, a bore hole was put down in this Colliery to a depth of two hundred and fifty feet below the seam at present worked, the details of which I have considered it desirable to record, for comparison at any future period:—

300 Feet Bore at the Alfred Colliery.

	Feet.	Inches.
No. 1. Surface .....	3	0
2. Sand and stones.....	9	0
3. Gravel .....	5	0
4. Brown sandstone .....	4	2
5. Grey faikes .....	2	6
6. Dark faikes.....	1	4
7. Grey faikes .....	2	0
8. Grey sandstone .....	7	3
9. Grey faikes .....	1	6
10. Grey sandstone.....	9	6
11. Grey faikes .....	1	0
12. Coarse grey sandstone .....	6	8
13. Dark clod faike or parting .....	0	1
14. Coal, first seam.....	1	4
No. 1. Fire clay or damp .....	0	5
2. Sandstone in beds.....	3	10
3. Dark grey faikes .....	4	0
4. Grey sandstone .....	3	3
5. Dark faikes.....	1	9
6. Grey faikes .....	1	6
7. Dark grey sandstone .....	8	0
8. Dark faikes .....	3	9
9. Dark faikes and blaze .....	5	3
10. Dark grey sandstone.....	4	3
11. Grey faikes .....	8	5
12. Black blaze .....	1	4
13. Grey faikes .....	1	0
14. Dark blaze .....	10	3
15. Dark grey faikes .....	2	0
16. Dark faikes and blaze .....	12	6
17. Grey sandstone .....	1	0
18. Dark faikes and blaze .....	13	9
19. Dark grey sandstone .....	1	10
20. Grey faikes and blaze .....	16	8
21. Grey sandstone .....	0	6
22. Dark blaze .....	12	0
23. Grey faikes .....	3	0
24. Strong dark grey faikes .....	5	9
25. Dark blaze .....	5	0
26. Dark faikes and blaze .....	5	0
27. Strong dark grey faikes .....	16	6
28. Sandstone in beds.....	3	9
29. Dark grey faikes .....	3	10

	<i>Feet.</i>	<i>Inches.</i>
No. 30. Extra hard sandstone .....	0	10½
31. Strong dark grey faikes .....	12	5
32. Strong grey faikes .....	6	3
33. Dark sandstone .....	2	9
34. Dark grey faikes .....	1	6
35. Light grey sandstone .....	6	5
36. Dark grey faikes .....	4	4
37. Light grey sandstone .....	7	0
38. Light grey sandstone .....	0	10
39. Dark grey faikes .....	1	6
40. Grey sandstone .....	1	11
41. Grey faikes .....	0	9
42. Grey sandstone .....	34	1

At the distance of a few hundred yards north of the Colliery a seam has been struck by adits at several points within a short distance of the face of the hill, it varies in thickness from a few inches to over a foot, it is overlaid, as in the other case, by a very coarse sandstone, but with an intervening bed of bluish shale which thins rapidly from a thickness of three or four feet, which it exhibits in the face of the hill to less than one, a thin bed of white sandstone also exists between the shale or clod (as it is termed) and the Coal. Mr. Williams is of opinion that this seam is not identical with the one worked in the Alfred Colliery, and that there is an interval of three hundred feet between them. Mr. Bennett, however, (lessee of the Alfred Colliery), who has worked both seams, is thoroughly convinced of their identity, and I myself hold the same opinion.

With the section at the Alfred Colliery may be compared one taken by Mr. Crompton at the Sherwood Colliery (Mr. Dawson's), in which it will be observed that two thin seams of coal exist within a short distance above the main one.

Bore executed by Mr. Crompton at the Sherwood Colliery.

	<i>Feet.</i>	<i>Inches.</i>
Surface soil and clay .....	7	0
Gravel .....	1	0
Indurated clay .....	6	0
Marl or blue binds .....	32	0
Strong grey sandstone .....	10	0
Soft grey sandstone .....	10	0
Soft grey sandstone with thin shaley bands and streaks of carbonaceous matter .....	17	0
Light coloured shale .....	2	0
Coal .....	0	10½
Fire clay .....	1	0
Coal .....	0	6
Fire clay .....	1	0
Soft grey sandstone, very coarse and gritty .....	2	0
Black shale or "clod" .....	1	7½
Coal .....	2	0
<b>TOTAL DEPTH .....</b>	<b>94</b>	<b>0</b>

This Colliery is no longer working, in consequence of a disputed right of road, it is about three miles from the shipping place, a tramway is completed to it. The Coal in the shaft was struck at sixty feet, and the Coal proved by Mr. Crompton in the boring given above at a distance of one hundred and thirty yards somewhat to east of north. The dip in the workings stated to me by Mr. Dawson as being N. 30. W., which however hardly agrees with the position in which the Coal occurs cropping in the creek, unless a small fault happens to exist between the two points.

A bore hole put down on the western bank of Caroline Creek, immediately opposite to the first mentioned one, passed through 120 feet (principally of soft marl) without reaching the Coal. In the bed of the creek, west and south of west of the shaft, occur *blue sandy clays with spirifers and other marine fossils*. So small an amount of Coal has yet been obtained from this Colliery that it may be considered almost untouched, a large amount of available ground still remaining. Mr. Dawson informs me that it can be got at one shilling per ton less cost than that in any other Colliery; brilliant crystals of mispickel or arsenical iron pyrites are frequently found in the Coal in this Colliery.

### THE DENISON COLLIERY. (General dip N.)

The same seam crops close to the southern corner of the township of Tarleton, and has been worked by means of a number of short adit levels. The general section agrees with that in the Alfred Colliery, but the "clod" or black shale attains in this instance as great a thickness as six feet, and a six-inch seam sometimes existed above it. The Coal was worked in small patches, intercepted between faults, the most of which had a general direction of N.W. and S.E.

Upon driving about 100 yards due west from the south-westernmost level, a great downthrow was met which completely limited the Colliery in that direction. A large fault crossing the tramway near the weighbridge bounds the workings on the east, throwing *down* against the Coal, dark blue clay, slightly calcareous, and intermixed with sand and mica. It is highly fossiliferous, containing abundant specimens of *Orthonotæ* sp: several species of *Spiriferæ*, *Pachydomi*, *Fenestellæ*, *Eucrinites*, &c. &c. &c. My authority for the direction of the throw is Mr. Williams, who sunk a pit upon what he considered to be the back of this fault. If this supposition were correct, the fact of the superiority of the marine fossiliferous beds to the seam is established. I endeavoured to satisfy myself personally on this point by driving across the fault, but was prevented from carrying out my intention by the amount of water.

Three-quarters of a mile north of the Denison Colliery, a shaft was sunk by Mr. Williams in the bed of one of the creeks running from the northern end of Bonny's Tier. It was carried to the depth of about forty feet, crossing at twenty feet down a fault with a downthrow to the north-east.

A bore was continued from the bottom of the pit through sandstone and marl, and Coal struck at a further depth of about fifteen feet.

Fossiliferous sandy clays crop out on the upthrow side of the fault, containing *Spiriferæ*, *Orthonotæ*, &c. &c., of similar species to those occurring in the Denison Colliery.

Succeeding these in ascending order are sandy clays, sandstones, conglomerates, marls, clays, conglomerates, sandstones, and near the summit of the hill, a considerable thickness of dark blue marl.

Marls and clay extend for some distance below the shaft, and are then brought against conglomerates alternating with clay, by a second fault, of which I was unable to determine definitely the direction, that of the one passing through the shaft was from S. E. to N. W. Mr. Williams informs me that, in order to satisfy himself that the fossiliferous beds overlay the Coal, he drove for some distance up the creek, from the bottom of the shaft, sufficiently far to make certain that no other fault existed by which their apparent position could be otherwise accounted for.

Mr. Dean's or the Don Colliery lies on the west of Tarleton, within about a mile of the Don: it is in a break of the north and south range which divides the Mersey from that river. The Coal has been proved over a small area by means of three bore holes, placed in the points of a triangle; in all of these the seam was struck at the respective depths of 70, 90, and 100 feet, and the area they included was supposed to be free from faults. Upon opening the Works, however, two faults were discovered, which are laid down upon the map; the one a downthrow of about twenty feet on the south, the other of fourteen on the east. The Coal is of the average thickness, and the seam evidently identical with that worked in the other Collieries. Blue sandy clays containing *Spiriferæ* and other marine Palæozoic fossils were passed through in the upper part of one of these bore holes, the one forming the northern apex of the triangle.

### THE MERSEY COAL COMPANY.

THESE works are now abandoned, and I consequently obtained but little information to supplement that already given by Mr. Selwyn in his report published in 1855. The Coal appears to dip to the north or east of north in the immediate vicinity of the River Don, cropping out at several distant points in the bed of the river, where the thickness of the seam was rather in excess of the average in the other Collieries. In the workings upon Mr. Dean and Denny's land, the Coal was found to be much broken by faults, and it was cut off upon the north by one running south of west and north of east, the downthrow on the north, fossiliferous marls were thus brought up against the Coal, a smaller fault dropping into the first one and crossing the river a little below it, and in this the downthrow, Mr. Ainsworth informs me, was in the opposite direction or to the south, and in consequence marls containing *Orthonotæ* *Spiriferæ*, &c. &c., exhibit themselves in the river close to the shaft.

Several shafts were sunk at some distance from the main workings reaching the Coal in eighteen or twenty feet, and one commenced at a short distance from the eastern bank above the river, and carried to a depth of fifty feet through marls and shaly impure limestones; below this and close to the river a bore hole was carried down nearly two hundred and fifty feet below the Coal (which was passed through in the first seven feet) without any other seam being met with.

By tracing the river up to about the middle of the Company's frontage, the Coal will be again met with dipping at a high angle and cropping for a short distance between two faults, above this the course of the river is for a considerable distance through an intensely hard conglomerate; consisting chiefly of quartz pebbles. The Coal formation recommences near the junction of Coal Creek, which is about a mile and a half above the Company's workings.

In Coal Creek the seam crops out just where the stream makes a bend from the southward, and here again, within a very short distance of the Coal, *blue sandy clays and marls containing Spiriferæ are met with*, similar to those which appear to be associated with it in nearly every instance in the district. The sequence of the Section from the fossiliferous marls to the Coal, (a distance of no more than forty yards) is unfortunately interrupted, so that it is impossible to ascertain whether a fault intervenes in this instance also between the two points. Ascending the creek, sandy clays, sandstones, and conglomerates are met with. The deep shaft of the Company, which is at a distance of one mile from the river, was entirely sunk through fossiliferous beds.

In Red Water Creek, a tributary of the Mersey, the same seam crops at a distance of about six miles from Tarleton, it shows at intervals for several hundred yards, and dips in the direction of north and east.

In reviewing the instances above described, I feel little hesitation in concluding, that the seam worked in the Mersey District belongs to the formation containing the Spiriferæ and other marine fossils, and that it is consequently of earlier origin than those existing in the Mount Nicholas Coal Field, for, independant of the proximity of the fossiliferous bed to the Coal in nearly every instance, direct and positive evidence of their association is afforded by the testimony of Mr. Williams with regard to the faults in the Denison Colliery, and upon Mr. Higgins' land, and by Mr. Ainsworth as to those in the Mersey Coal Company's Works on the Don, and the existence of the seam in the bore hole at Mr. Dean's Colliery. In the last instance I satisfied myself, by sinking, of the existence of fossils in the upper part of the bore hole, and a reversed fault alone, a thing of very unusual occurrence, could otherwise account for the relative positions of the fossiliferous beds and the seam. The excessive faulty condition of the strata in this Coal Field, render any attempt to estimate the depth of the seam, in an unexplored situation a matter of great uncertainty. The extensive area lying north and west of Tarleton has been only partially proved by boring, but the result so far has been confirmatory of the opinion that, in consequence of the general dip of the strata toward the coast, the seam in the northern portion of the field lays generally at a considerable and increasing depth from the surface, and although it may be, and probably is, brought closer at some points by faults, the formation is ordinarily so completely covered by drift, without the exhibition of natural sections, that any such occurrence can only be inferred from evidence obtained by direct experimental trial.

A bore hole put down upon Mr. Button's land, near the south side line, was completed one hundred feet without success, and another executed recently upon the same property by Mr. Crompton was carried to a depth of one hundred and thirty-five feet with the same result. The following is a copy of the Section:—

*COPY of the Borings of a Hole put down on Land belonging to W. S. BUTTON, Esq., situate at the River Mersey, 20th, June 1861.*

	Feet.	Inches.
Gravel. ....	2	0
Clay, of a superior quality .....	4	0
Indurated Clay, strongly resembling sandstone .....	12	0
Fine Sandy Marl, or blue binds .....	14	0
Fine grey sandstone .....	18	0
Bed, or parting darkish cream color .....	0	6
Fine dark-colored sandstone .....	10	6
Fine light-colored and rather strong .....	5	6
Very fine ditto, and very strong .....	3	0
Very coarse grey sandstone, soft .....	2	0
White soap stone .....	4	3
Very coarse grey sandstone, rather soft and free cutting .....	16	7
Very strong sandstone rock .....	1	8
Coarse sandstone, soft .....	4	0
Light-colored clod or soap stone .....	2	0
Coarse grey sandstone, in thin layers, good stone to cut. At this point all our water left the hole. In 5 minutes' time the water in the hole dropped 130 feet	31	6
Strong dark grey sandstone, almost as heavy as lead, very difficult to collect the borings in consequence .....	3	6
TOTAL .....	135	0

It will be observed that the strata passed through here differ considerably from those met with

in the two hundred and fifty feet bore at the Alfred Colliery. Taking this fact into consideration, together with the general character of the portion of the formation below the Coal developed in the neighbourhood of the great bend of the Mersey, I have little doubt as to the seam underlying this spot. It is questionable, however, whether, even at that depth, a seam of such limited thickness could be worked profitably, especially as there is no certainty of its remaining unbroken for any considerable distance.

Two small shafts have been sunk south of this, one on either side of Swan Bay, but only carried to a depth so inconsiderable as to fail to afford any positive evidence. But Mr. Williams informs me that in one sunk by himself upon his own land, near the northern side line of the township of Tarleton, he reached what he recognized as the *rough sandstone*, at a depth of forty feet. If so the seam would probably be struck in ten or twelve more. It is probable that the same seam underlies, at a moderate depth, most of the country between Tarleton and Swan Bay; but, as I have before said, the number of the faults existing in the district must always render its position uncertain.

Much unexplored and likely ground still remains in the neighborhood of the Alfred and Sherwood Collieries, and the numerous points of outcrop of the Coal throughout the district show that the seam occupies a very extensive area. Some of these points are so far removed from water-carriage, that it is unlikely they will be worked while the Coal can be obtained in more accessible positions, but in the probable event of the Mersey Coal acquiring the reputation to which several of its qualities entitle it, it may be found remunerative to explore there also.

With regard to the existence of a second and thicker seam, I can say but little. The result of borings show that none such exists within two hundred and fifty feet of the present one, nor is there any evidence in either of the natural sections to indicate one.

Having given a detailed account of the occurrence of the Resiniferous Shales or Dysodile near the great bend of the Mersey in a special report previously published, it will only be necessary for me at present to refer to its general distribution. I may here remark, that erroneous impressions as to the existence of Dysodile in several localities has been entertained in consequence of persons mistaking for it, fissile, laminated, micaceous schists, which are not very dissimilar in appearance. Such, for instance, has been the case near the bend of the Mersey, and in the Ford, on the old road across Deep Creek.

In addition to the section of land previously reported on, I may mention that the Dysodile crops out upon that immediately joining it on the east, appearing in the bed of a small creek upon the northern side of the main road. The full thickness is not exposed, no more than three or four feet showing in any situation, consisting, as in the adjoining land, of alternate layers of clay, sandy clay, Dysodile &c. &c. It may be traced for some little distance down the creek, the amount of dip, which is southerly, appearing to coincide nearly with the fall of the ground.

Indurated blue clays, similar to those succeeding the Dysodile, show at various points in the river bed below the Bend, and coarse conglomerates resembling those above it form hills of moderate elevation on the eastern side of the main road. It is probable, therefore, that the Dysodile crops out upon the land intervening between these and the river, and underlays the country north of the Bend. It may also be anticipated to occur over a large portion of the barren district between the Mersey and Rubicon, north of the township of Paramatta.

Dysodile has been found in water-worn fragments in a tributary of Caroline Creek, but the outcrop has not yet been discovered.

This formation here, as in other parts of the Island, is richly abundant in fossils, the more ordinary species being identical with those most commonly met with in other localities.

From the arenaceous beds, casts only are obtained, but in the marls and clays perfect specimens are preserved; these, however, although hard when first extracted, wither and crumble to pieces quickly on exposure. In some beds, as in those passed through in an uncompleted shaft upon the Mersey Coal Company's land near the Don, which contain a large proportion of calcareous matter, much more durable specimens are obtained. The most perfect and readily determined fossils obtained from this district were—

Pecten.  
 Orthonota costata.  
 Orthonota, sp :  
 Theca, sp :  
 Pachydomus, sp :  
 Fenestellæ, several sp :  
 Spirifer, several sp :  
 Terebratula.



The base of this formation rests unconformably upon clay slates, sandstones, and conglomerates of silurian age, upon highly metamorphosed mica schists and clay slates, and upon limestone.

The best sections of the first are on the banks of the Don, near the limeworks; where a thickness of about one hundred feet of sandstones and hard quartz-ore conglomerates are overlaid by clay stones, slates, and grits. The conglomerate is near the top, closely compacted by a siliceous cement, and traversed in every direction by thin strings of crystallized quartz, it passes down into ferruginous sandstone.

About two miles higher up the river there is exposed a great thickness of intensely hard quartz-ore conglomerate belonging to the same formation, passing occasionally into a jasperoid rock. The road from Tarleton to the Kentish Plains passes, after the first few miles, over a barren country, characterized by the abundance of native hop, and principally occupied by coarse quartz conglomerate similar to that upon the Don. Associated with this in Caroline Creek are beds of hard, compact, bluish grits, clay stone, clay slates, coarse grits and sandstones, containing a few fossils, among which I discovered a small Trilobite, of which I have not yet determined the species. It appears to be new. I shall therefore defer its description, together with that of the few other fossils obtained at the same spot.

Limestone crops out at three several points in the district, the largest exposure being upon the River Don, where it occupies a sub-triangular area of nearly a mile in length. It appears to be inferior to the silurian beds adjoining. It occurs in rather regular beds dipping at considerable angles. It is hard, compact, of a bluish colour streaked with white, and occasionally mottled with dull red. I was unable to detect any traces of fossils in it. It is probably identical with the limestone occupying the large extent of country in the neighborhood of Chudleigh. The other points of occurrence are, one on the White Water Creek near its junction with the Caroline Creek, the other on the east of the Kentish Plains Road.\* Its relations are not quite obvious, and their determination must probably await the study of the Chudleigh District.

A narrow strip of country adjoining the River Mersey, southwards from the Great Bend, is occupied by grits, mica schists, and splendid steel grey and blue clay slates, foliated and contorted. In these a few quartz veins exist, of inconsiderable width. The strike is ordinarily to the west of north, in which respect they differ from the unmetamorphosed silurian beds, which have on the whole a northerly dip corresponding with that of the upper Palæozoic deposits adjoining.

\* Since writing the above, I have had an opportunity of visiting the Gordon District, and examining the limestone developed in the Gordon Plains and the Florentine Valley. I am inclined to consider it identical with that at Chudleigh and on the Don; if so, the latter is rather higher in the series than I was formerly disposed to regard it.