

### ARTICLE III.

*Notice of a Vein of Bituminous Coal, recently explored in the vicinity of the Havana, in the Island of Cuba. By Richard Cowling Taylor, Esq., F. G. S., and Thomas G. Clemson, Esq. Read August 19, 1836.*

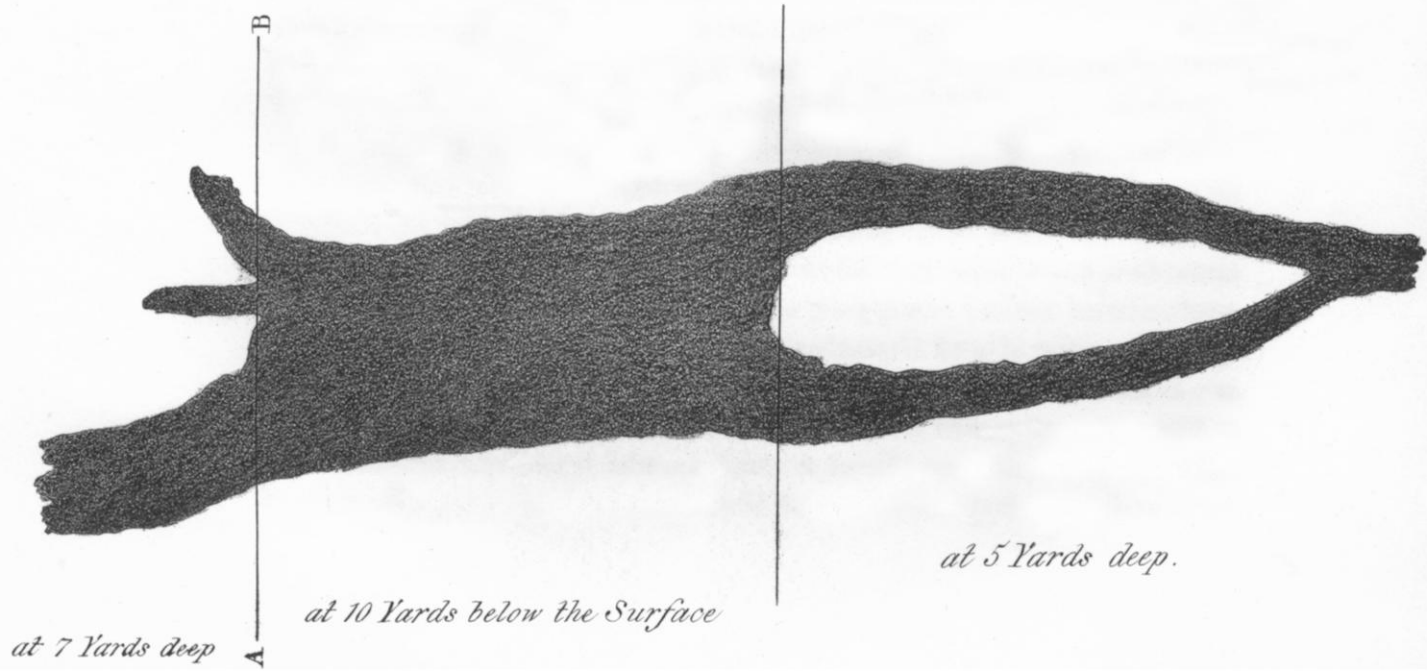
THE bituminous coal mine of Casualidad is situated about three leagues east of the city of Havana, and on a main road (Camina Real) leading to the city of Guanabacoa, from which place it is distant six miles, and from the sea at a place of embarkation, only two miles.

The surface of the country, from Guanabacoa eastward to the mining property above mentioned, is undulating, and partakes of those characters which are so marked elsewhere in this island, where the serpentine and the euphotides are the predominant rocks.

In leaving Regla, on the south side of the bay of Havana, the euphotides, which Monsieur de Humboldt has described here, and which we found also to exist, with similar characters, in the district of Halguin, towards the northeastern end of the island, are here evidently the most predominant rocks; occupying a breadth of about two leagues, within which area the city of Guanabacoa and the adjacent Petroleum springs are situated.

Having next passed a belt of about a mile in breadth of white rock, succeeded by a narrow slip of serpentine, and again by a similar white rock, which we had not sufficient leisure to examine closely, we arrived

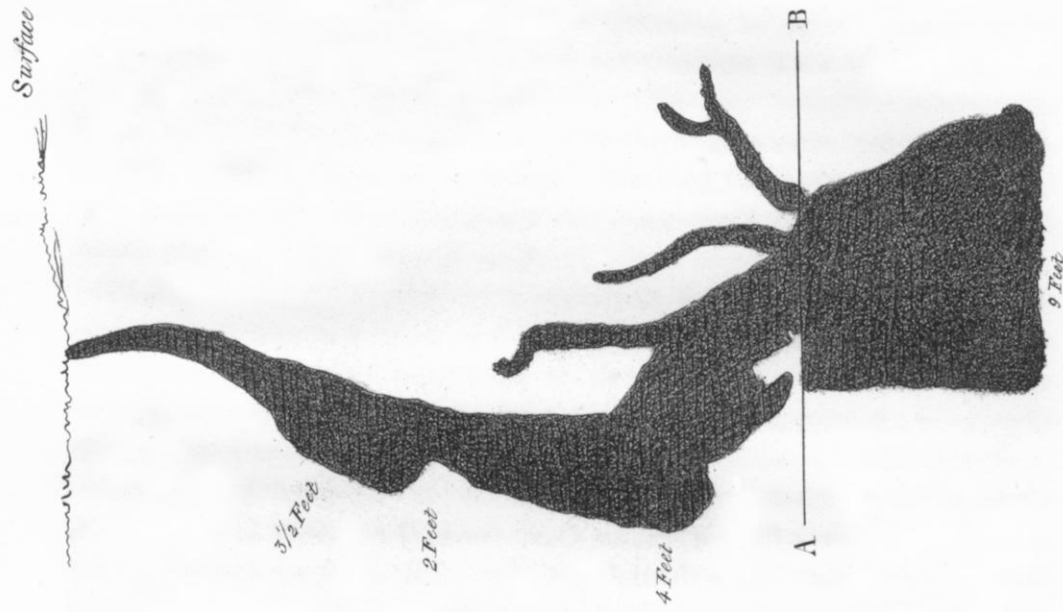
# GROUND PLAN.



at 5 Yards deep.

# SECTION

of the COAL VEIN to the depth of 50 Feet.



The Mine of CASUALIDAD,  
10 Miles East of Havana, E. of Cuba.

within half a mile of the coal vein in question, when a fragile, dirty-gray coloured argillaceous rock succeeds, which alternates with the euphotides.

Towards Guanabacoa, and indeed throughout a large portion of the island of Cuba, the prevailing course of the rocks is about east and west; but in the vicinity of the coal we unexpectedly found that the direction is changed to north and south.

The coal vein of Casualidad is visible at opposite extremities of an excavation thirty feet deep, of a quadrangular form, descending on one side by steps cut in the soft rock or clay, which bounds the coal on either side. This soft rock is fragile, incoherent, distorted; of a yellowish green colour, like the prevailing euphotides, of which it is a variety. A few feet to the eastward of the vein, there occurs a hard, blue, siliceous rock, containing small cavities, that are partially filled with a leek-green mineral, which we conceive is a variety of serpentine. In close connection with the above, a beautiful diorite occurs, the base of which is petrosiliceous, tinged with green; which colour is caused by a mixture of serpentine. This rock is very hard, and has a highly crystalline structure. It crops out at several points.

The siliceous, blue rock, the diorites, and the euphotides, alternate the one with the other. The two first mentioned are in much less proportion than is the third, which is by far the most predominant rock of the country.

All these are highly inclined, and frequently vertical: their direction, as before stated, being north and south in the neighbourhood of the mine.

### *Appearance of the Coal Vein.*

The vein commences, or crops out, immediately under the alluvial soil of the surface, and follows an irregular but nearly perpendicular direction downwards, as shown in the drawing.

It is visible to the depth of full thirty feet. The bottom of the excavation was covered with mud, washed in during the rainy season, so that we could not there readily define the breadth of the vein; but it was stated by the overseer to be nine feet. From this pit many tons of pure coal have been extracted.

On the north side of the excavation the vein is solid ; having a thickness gradually increasing to four feet.

The coal is formed in parallel layers of from one to four inches in thickness. Sometimes these layers, instead of being perfectly horizontal, are slightly curved, especially towards their extremities. This is particularly the case where an accidental derangement has taken place in the vein. On its sides, near the walls of the vein, the coal for a few inches in breadth is deflected, as if it had been pressed by the sides or walls. Here the structure becomes baccillary, and the coal, on the slightest effort, divides into irregular polyhedrons. The surface of this coal, when detached from the walls, instead of being smooth, or covered with any kind of bituminous shale, is rough, and presents a baccilo-fibrous appearance, similar to the structure observed in arragonites and other fibrous minerals. Two or three small branches, or filons, are seen passing from the main vein at about the depth of twenty feet, occupying smaller fissures in the rock.

On the south side of the opening, the coal, in rising towards the surface, parts off into two separate veins, and is apparently more disseminated through the rock than on the north side, as may be seen in the ground plan accompanying this article.

We have here, in the strictest sense of the word, *a coal vein*, and unlike any we have before witnessed in any part of the world ! It is distinguished from the ordinary deposits of coal, inasmuch as they occur in distinctly stratified beds, and almost invariably exhibit abundant traces of organic remains, for the most part of vegetable origin : whereas we have here before us what was evidently, originally, an irregular open fissure, terminating above in a wedgelike form, having various branches, all of which have been subsequently filled with carbonaceous matter, as if injected from below, and that not by slow degrees and by an infinite succession of depositions, but suddenly and at once.

This coal is wholly unaccompanied by traces of vegetable remains, or by the beds of bituminous or other shales, which almost invariably envelope or accompany ordinary coal seams, whether in secondary or transition formations. The layers, of which we have spoken, are for the most part horizontal ; that is to say, at right angles to the sides of

the vein ; and when otherwise are accidental, or are produced by an after cause. This fact, together with the bacillo-fibrous structure, observed where the coal is in contact with the walls, are among the reasons which lead us to lean towards the supposition that the fissure was charged or filled at once, and that these characteristics are the result of the carbonaceous matter having passed to a more solid state in its present position.

It would be rash to pronounce an opinion on the presumed extent of this deposite, as well as on the probable magnitude of the vein below the point at which it is visible, or the depth to which we have had access ; but if the vein continues to enlarge downwards, in the same proportion as it has augmented in the first thirty feet, or even if it holds the present breadth of nine feet, the quantity of this mineral must be very great, and will prove a highly acceptable discovery, so near a great city, and in a district from which nearly all the timber for fuel has been long ago removed.

### *Quality of the Coal.*

This coal is unusually light : its specific gravity being not more than 1·142 ; and two other experiments on heavier specimens gave 1·18, 1·19.

It is perfectly jet black ; having a resplendent lustre, which is much greater in one sense, or under one aspect, than in the other, and it divides in parallel layers in the mass. The surface of the divisions, or partings, in the coal, is brilliantly shining. Its cross fracture is rough, and has a glimmering, pitchy appearance.

We have now to advert to an external character, which is very common, and in fact is of constant and universal occurrence in this coal ; a feature which distinguishes it from all other coals which have come to our knowledge, in any quarter of the globe. Its horizontal fracture or surface is marked by numerous concentric, or rather eccentric, rings of various sizes, from a twentieth part of an inch to a foot in diameter. They are perfectly regular and uniform in shape, smooth, shining ; resembling the impressions made by a seal in black wax ; or, when first seen, appear like the casts of the flat valves of some shells.

This coal is exceedingly friable, breaking into small fragments under the hammer. Its powder is brown, and when pressed under the pestle,

takes a polish like certain resinous substances. It burns with much flame and smoke; melts, and gives a light voluminous cake, which, when incinerated, leaves comparatively a small proportion of cinders or ashes.

The following analysis, which was made by one of us, gave, per cent, as follows:

Volatile matter (gas, &c.),	.	.	.	.	.	63.00
Carbon,	.	.	.	.	.	34.97
Ashes,	.	.	.	.	.	2.03
						<hr/> 100.00 <hr/>

The foregoing examination of this bituminous coal, fixes definitively the respective proportions of its component parts; consequently, it determines the applications to which that combustible would be the best adapted. Its quality of burning with a long, licking flame, gives it many advantages for evaporating, heating surfaces, &c., over many combustibles which contain a smaller quantity of volatile matter.

For the generating of steam power, for the boiling or concentrating the juice of the sugar cane, or for the manufacture of gas, this coal is singularly well adapted. As it contains no sulphuret of iron, the gas manufactured would be free from that very deleterious portion or admixture, which it is so difficult to separate from those gases usually manufactured from bituminous coals containing sulphur. It might also be employed with advantage in manufacturing lamp black (*noir de fumée*).

### *Quantity.*

As we have no knowledge of coal being ever before found in formations similar to those in which the mine of Casualidad occurs, no opportunity is offered us of reasoning from analogy, and from the experience derived from similar deposits. It will therefore be admitted that, whatever observations we might be induced to hazard, concerning the extent of carbonaceous matter existing here, they would necessarily be founded more or less upon conjecture.

---

The outcrop of this singular vein was accidentally discovered where the public road winds down the point of a small ridge, and is worn down sufficiently deep to expose the coal and attract attention.

In whatever way we may account for the origin of this remarkable coal deposit, in a rock of this age, we must be led to view it, in some measure, in connection with the petroleum which is found in the rocks of this region. We observed it in a liquid form, filling cavities in a mass of chalcedony, a few yards only from this coal vein; and whilst breaking fragments of various rocks in this vicinity, during a hot day, we perceived a strong odour of pitch or tar arising after every blow of the hammer.

The Petroleum springs, which rise from the fissures in the serpentine at Guanabacoa, two leagues to the west, have long ago attracted attention.

Round the bay of Havana, petroleum is still collected at low water, under the name of *chapapote*, and is employed, in the manner of tar, for paying vessels.

It is matter of history that Havana was originally called, by the discoverers of the island, by the name of *Carine*, because there they careened their ships, and pitched them with the tar which they there found washed on the shores of this beautiful bay.

The position we have described is not the only one in the island of Cuba where this remarkable variety of coal exists. It has been observed between the cities of Havana and Matanzas, not far from the sea coast.

We are not aware that any other of the West India islands contain coal in sufficient quantity to be worked. In Jamaica it appears, on the authority of M. De la Beche, coal exists in veins of an inch or two in thickness, occurring stratified with the usual coal measures and carboniferous rocks: but these veins are too insignificant to be worth mining.

Of the geology of St Domingo we know very little, and shall probably remain ignorant for some time to come.

It were an interesting fact, if it be, as we conceive, that this is the first discovery within the tropics (in this part of the globe at least) of workable veins of remarkably pure coal.