XI. *An Account of the Coalfield at Bradford, near Manchester.*

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Communicated to the Geological Society by Dr. Roget, M.G.S.

THE Coalfield which I have undertaken to describe is of very limited dimensions, extending little more than two miles in length, and about 2000 yards in breadth. (See Pl. ii. fig. 2.) The form of its area is oval. The greatest depth to which the workings have been carried is 140 yards. Ten seams of coal rise to the surface, some of which are greatly deteriorated by an intermixture of pyrites. The river Medlock flows nearly at right angles with the line of bearing of the strata and a section is exposed on its banks to a considerable distance.

The strata which alternate with the beds of coal are the same that are usually found under similar circumstances in Lancashire, Cheshire, and the west of Derbyshire, viz. argillaceous and bituminous shale with vegetable impressions, and ironstone sometimes in beds sometimes in nodules. There occurs also over the first coal what is more uncommon, limestone not containing I believe any organic remains; it lies in three several strata from 2 to 6 feet in thickness. It is of a reddish brown colour, and resembles the magnesian variety of Derbyshire in appearance, though it differs from it in its component parts.

The coalfield is bounded (except at its eastern extremity) by red

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siliceous sandstone, similar to that on which the town of Manchester stands, and it is remarkable that within 15 or 16 yards of its contact with that rock, the coal is soft and hardly worth working. This rock stretches through the south of Lancashire into Cheshire and Shropshire, and appears to agree in some respects with the old red sandstone of Werner. I have been told by a considerable proprietor of coal-mines in these counties, and I believe it is an opinion very generally entertained, that this sandstone always cuts off the coal-measures, and that it is useless to search for coal beyond or beneath it.

The Bradford coalfield appears at first sight to offer an exception to this rule; but upon more attentive examination it will be found, that what covers the coal-measures there is not the rock itself, but only a portion of it, washed down from the higher lands, and spread over the surface.

The coal-measures dip to the south at an angle of about 30° , and wherever they have been proved, on the southern side of the field, abut against the sandstone; but on the northern side, at the distance of ten yards from the red rock, a most striking change in the position of the strata is discovered. A bed of coal, four feet in thickness, here rises up to the surface perpendicularly, and terminates the coal-measures, the intermediate space between this bed and the red rock being filled with broken stones or rubble without any appearance of stratification. This perpendicular bed has been worked to the depth of forty feet, and is of the same quality and general appearance as a four-feet bed which rises near the middle of the field. The stone that lies over the one agrees with that adjoining to the other, which the proprietor does not doubt is a portion of the inclined bed broken off, and thrown into its present position. The distance of the perpendicular bed of coal from the rise of the last bed, that preserves its inclination of 30° , is 325 yards, and between these no fracture or fault has been found to explain the difference in their angles of ele-

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vation. There is indeed a dyke in one part of the field, filled with a stone nearly similar to the red rock, but it does not affect the position of the strata on either side of it.

Fourteen hundred yards to the north of the Bradford coalfield, and separated from it by the red sandstone, is the coalfield of Droylsden. The first coal that rises there at the distance of 60 yards from the red rock, is similar to the bed which rises at the distance of 350 yards from the perpendicular coal in the Bradford field.

In the middle figure of Pl. 2.

A A represents the length of the Bradford coalfield.

B B its breadth.

C C C C C. different beds of coal which rise to the surface, and would be visible along their line of bearing parallel to AA, but are concealed by soil and gravel, except on the banks of the river Medlock.

P P the perpendicular bed of coal.

LL the limestone.

R R R the red sand rock.

S S two beds of coal 20 inches thick, one of them situated in Droylsden coalfield.

The lower figure of Pl. 2. represents a section of the same strata on a vertical plane perpendicular to A A.

It appears probable that the strata in these two fields were once united, and have been separated by some convulsion of nature; in consequence of which the red rock has been interposed like a wedge between them, a sliding motion being given to the strata by lateral pressure; for a force acting in a direct line from above or beneath could not produce the bending or folding of the four-feet coal.

The red sandstone has not, I believe, been sunk through in any part of our island, so that its immediate substratum is yet unknown.

If it should prove to be the metalliferous limestone, it will occupy the same geognostic situation as the red shale of Derbyshire and

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Yorkshire. There is, generally speaking, a considerable difference in the external characters of these two beds; but at Alderley edge* some parts of the red rock, containing mica, bear a greater resemblance to the shale than I have found in any other situation where I have examined it.

Mr. Whitehurst observed that a species of grit-stone, which he denominates the Mill-stone grit, is found under the coal, but never over it. This bed of rock, which in some situations is not less than 140 yards in thickness, varies in quality from a coarse-grained grit, approaching to a breccia, to a fine-grained siliceous sandstone. Some varieties of it are red, and bear a greater resemblance to the sand-rock of Lancashire and Cheshire than the red shale, which lies beneath the mill-stone grit.

It is not improbable that in distant places the same stratum may assume different characters, particularly when it belongs to that class of rocks which have been considered by geologists as mechanically deposited by the action of the tides. Strata thus formed may reasonably be supposed to alter with the materials of which they were made; materials that have been washed from the different parts of extensive ranges of mountains variously composed. I am not aware that this view of the subject has before been taken by geologists, although we may thus account for the gradual transition of rocks into one another, and may often give a more natural solution of the sudden changes we observe, than by the supposition of faults, of whose existence some evidence should always be given, independent of the difficulties which their admission would explain.

In thus comparing the geognostic position of the Red sandstone with that of the Mill-stone grit, I do not wish to advance any opinion of my own as to their identity, but merely to direct the attention of future enquirers to this subject.

* For the account of Cobalt ore contained in the Red rock at this place vide Monthly Magazine, February, 1811.

Plan of the vitrified fort on Dun Mac Iniochan

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Plan of the Bradford Coal field, near Manchester.

Section of the Strata at Bradford near Manchester