

MR. J. MC MURTRIE, of Radstock, read a paper on

The Coal Fields of Somersetshire.

He stated that the Somersetshire coal field, so far as at present known, extends from Bristol to the neighbourhood of Frome on the one hand, and from Bath to the Mendip Hills on the other, and comprises in all an area of 150 square miles. I must not be understood to affirm that workable veins of coal are available over the whole of the territory included within the limits referred to, for unfortunately, owing to the great depth at which some of the veins lie, and various other circumstances, much of the area may be set down as practically unproductive. Nor on the other hand am I to be understood to limit the coal measures of Somersetshire to that portion of the county to the east of the Mendip range in which coal has hitherto been exclusively worked, for there are grounds for supposing that west of the Mendip coal measures may one day be found. A remarkable feature of this coal field is the number of more recent formations by which it is overlaid. In most of the great coal fields of this country the coal strata are to be met with on the surface, and I believe I am correct in stating that in none of the other districts now worked, are coal measures overlaid by anything more recent than the new red sandstone. But in the greater part of Somersetshire they are buried beneath three distinct formations, viz., the oolite, the lias, and the new red sandstone, through one or more of which most of the shafts have had to be sunk. Of course coal may be met

with under any formation more recent than itself, and it may ultimately be worked beneath even later formations than the oolite, but at present Somersetshire has taken the lead in this department of exploration, and in this particular, so far as this country is concerned, she may be said to stand alone. The Somersetshire coal field takes the form of an irregularly-shaped basin, the deepest point of which appears to be within the parish of Radstock. The section from Braysdown towards Shepton Mallet, like that from Farmborough to Leigh-on-Mendip, shows a steady rise in the coal measures on each side of Radstock, so that beneath Radstock they probably attain their greatest depth. Vertically they may be separated into two great divisions, each of which may be in turn subdivided into two distinct series of veins. The upper division comprises all the coal strata above the Pennant rock. The lower division includes all that intervenes between the Pennant and the millstone grit. First, the upper division. This, as already stated, consists of two distinct series of veins, called the first or Radstock, and the second or Farringdon series. They are separated from each other by about 790 feet of stratification, near the middle of which there occur certain well-defined beds of red shale, about 250 feet in thickness, which form a well-marked line of division between the two series. The Radstock series consists of a series of seven veins, six of which, varying from fourteen to thirty inches in thickness, are commonly workable. The Farringdon series includes five veins of from twelve to twenty-eight inches in thickness, one or more of which are generally unworkable. Second, the lower division. This, like the upper division, is I think clearly separ-

able into two distinct series of veins, which may be called a new rock, and the fourth or Vobster series. Hitherto they have been classed together, but when we consider that at least 400 feet of unproductive strata separate the lowest workable vein of the one from the highest workable vein of the other, that the two are probably not conformable, and that the character of the coal obtained from each in an industrial point of view is totally different, we are, I think, warranted in regarding them as distinct members of one great division. The new rock series consist of twelve or fourteen veins of from one to six feet in thickness, which is greater than that of all the other three series put together, but owing to its great inclination it soon passes below the depth to which mining enterprise has hitherto penetrated, so that much of its mineral wealth is being left for future generations. In the Vobster series only five veins have hitherto been found sufficiently continuous to acquire general recognition, but numbers of fragmentary veins are associated with them, and as the strata recede from the disturbance and contortion of the Mendip Hills, many of these may be found to exist in a workable state. The coal obtainable from the three upper series is best adapted for household purposes, and it furnishes a large proportion of the supply for the southern counties. That raised from the lower series on the contrary is admirably adapted for the manufacture of iron, and it is likely to lead to the developement of a new source of local industry. Having thus briefly described the general features of the Somersetshire coal measures, I will endeavour to give a general idea of the depths at which the different strata referred to probably occur.

Thickness of overlying formations as proved at	FEET.
Old Pit, Radstock	141
Depth from new red sandstone to first series ..	411
Thickness of stratification containing first series	351
Depth from first to second series	765
Thickness of stratification containing second series	282
Depth from second to third series	4026
Thickness of stratification containing third series	1248
Depth from third to fourth series	402
Thickness of stratification containing fourth series	195
Depth from fourth series to millstone grit ..	1140
	<hr/>
Total	8961
From which if we deduct the thickness of the overlying formations	141
	<hr/>
There remains ..	8820

or one and three quarter miles nearly as the thickness of the coal measures alone, which is probably greater than that of any other district in this country. With regard to the great thickness of unexplored strata separating the upper from the lower division, I may explain that this part of the field being overlaid by a thick covering of lias and new red sandstone, surface explorations are impracticable, and I believe none of the adjoining pits have penetrated far into it, but I am strongly inclined to think that coal may one day be found there. It has been surmised that it may contain veins corresponding with those of the Bristol coal field. Much has been said of late years as to the probable duration of our coal fields, and it will be satisfactory for those present to know, that in Somersetshire at least their exhaustion is still far distant. Mr. Greenwell, formerly of Radstock, has estimated the quantity of coal remaining in the county within reasonable depth at about

twelve hundred millions of tons. This at the present rate of consumption would last for 2000 years, and even allowing for a considerable increase in the rate of consumption, there is enough left to serve for a period useless for us to estimate. The coal measures of Somersetshire contain an immense variety of well-preserved fossils, chiefly vegetable. As we descend in the strata they become less plentiful, and in the lower measures good specimens are rare. Hitherto I have been unable to detect at Radstock any trace of animal remains, but a more careful search might lead to their discovery. At Camerton, two specimens of what I believe to have been a species of trilobite have been discovered. For several years the tendency of scientific opinion has been against that creed of the earlier geologists which held, that in earlier geologic times more active agencies must have been at work than those which exist now. But the tide seems at last to have set in in the contrary direction, and I find Sir Roderick Murchison at the recent meeting of the British Association holding fast to the old theory that the early history of the earth must have been one of much disturbance. And no one can have spent much time amongst the coal measures of Somersetshire without coming irresistibly to the conclusion that the old theory is the correct one. The time of their deposition and the period which elapsed between their formation and the age of the new red sandstone must have been one of convulsion and disturbance. Innumerable faults of great size have broken up and distorted the strata to a degree utterly inconsistent with any theory which would reconcile the past with the present. The veins are nearly all level in some localities, in others they are highly inclined. At some points they are vertical, and in others they have even been turned upside down, as at Newbury

and Vobster. In the instance last mentioned the dislocation would appear to have occurred during the upheaval of the Mendip Hills, for not only have the coal measures been folded back upon themselves, but they have actually carried with them immense masses of mountain limestone, which are now to be found more than a mile from the parent rock. Scarcely a day's exploration passes without witnessing the discovery of some contortion, which cannot be accounted for by any thing in existing nature, and which even the principles of geology seem unable to explain. Surely no one can investigate these or similar phenomena without arriving at the decision that the early history of the earth, like the early history of nations, must have been one of much disturbance.
