

section is exhibited in the cliffs of St. Bees near Whitehaven, where the strata being inclined to the south, the coal is seen sinking beneath superstrata of magnesian limestone, and these in their turn beneath beds of red marle, containing gypsum.

(i) INDICATIONS OF COAL AT FOOT OF THE WESTERN ESCARPMENT OF CROSS FELL.

Returning to the Penine chain at the great escarpment over which Cross Fell dominates, we find the horizontal strata of the newer red sandstone extending closely in many points to the very foot of that escarpment, and thus brought into contact with the older sandstone on which the whole escarpment is based. Between Melmerby and Merton Pike, however, a long and narrow stripe of transition rocks (greenstone and slate) intervenes, extending almost 12 miles: and on the north-west of this tract, beds of carboniferous limestone and coal occur in their regular order of succession, dipping west beneath the newer sandstone of the plain under an angle so rapid as to be nearly vertical. The beds are, however, thin, and greatly shattered and deranged. There are pits at Melmerby Lane Head, Hay Gate, Gale Hall, and Ourby Town Head.

We have thus brought to a conclusion our survey of the coal-districts connected with the Penine chain. Had it been our object to extend our enquiries into the adjacent portion of Scotland, we should have found that in Dumfries similar relations prevail. The coal-fields of that county occurring in small basins surrounded by mountain limestone, which finally rest against the transition rocks of the Lead Hill mountains: and the whole being partially covered by the newer red sandstone containing beds of a calcareous conglomerate, probably magnesian.

Section II.

Formation of Millstone-Grit and Shale throughout the Penine Chain.

Having thus completed our survey of the several Coal-fields connected with the Penine chain, the next object that demands our attention, is the tracing through the same tract, the disposition of the second series of beds into which we have divided the rocks associated in the carboniferous districts, namely, that in which the millstone-grit forms the prevailing feature; and this will be found to constitute the most elevated and extensive portion of the district under consideration.