

may be traced branching off from the transition chain of mountains which traverses the south of Scotland, but does not attain any considerable elevation until it reaches Gelts-dale Forest in Northumberland, near which is Cross Fell, the highest summit of the chain, rising 2901 feet above the sea; it proceeds thence to the south by Stainmoor Forest, to form the western moorlands of Yorkshire, where it exhibits the summits of Whernside, Ingleborough, and Penygent; between Stainmore and Ingleborough it abuts against, and joins the group of transition mountains comprising the English Lake district (which we shall call the Cumbrian group;) these, in fact, form a sort of excrescence swelling out on the western side from the Penine chain, and surpassing it in height; but as they belong to older formations, and deviate from the general line of the Penine chain, they must be treated of in a subsequent article. After throwing off this Cumbrian branch, the Penine chain proceeds still to the south, following the boundary between the counties of Lancaster and York. Pendle hill and the range of Blackstone Edge are in this tract. Further south it enters Derbyshire and Staffordshire, forming the "High Peak" of the one (a Saxon translation of the British name Pen) and the moorlands of the other; and here the chain finally expires on the banks of the Trent.

The whole of the Penine chain is composed of the four series of rocks above described as associated in our coal districts. In the central ranges, the second series, or millstone-grit and shale, predominates, composing all the most elevated summits. The third series, that of the carboniferous limestone, also occurs extensively towards the northern parts of the chain; occupying the middle region of the hills, especially on their western escarpment. A zone of this rock is here detached from the Penine chain, and completely encircles the transition mountains of the Cumbrian group, wrapping round them in what the Wernerians call mantle-shaped stratification. Hence, through the middle regions of the chain, the carboniferous limestone is entirely concealed by the super-strata of millstone-grit; it re-appears however at the southern extremity, where it forms an extensive and elevated district in Derbyshire. The old red sandstone has been only ascertained to exist in the northern parts of this chain, where it forms the fundamental rock beneath the western escarpment of the Cross Fell range, as is also the case near Ingleborough.

The three lower formations then of the carboniferous suite occupy the central mass of the chain; and may all be studied together in the single mountain of Cross Fell. The upper series, or great coal-formation, constitutes the exterior and