

The shale beds of this series present scarcely any characters which may serve to distinguish them from the slate-clay beds of the coal-measures.

Where the series is most completely developed, the millstone-grit beds predominate in its upper region, the shale beds in the lower: alternations, however, of each kind of rock may be observed throughout.

This series presents occasional beds both of limestone and of coal, particularly in those parts where the shale predominates. The coal-beds are few in number, usually very thin, and of a very indifferent quality. The limestone-beds resemble in many points the mountain limestone, which will be next described: they generally exhibit, however, a blacker colour, and contain more bitumen.

Considered in a general point of view, this series is intermediate in character and composition, as it is in position, between the main coal-measures which it supports and the mountain lime which it covers, forming the natural link between them.

(*b*) *Mineral contents.* Nodules of clay-iron-stone occur in beds similar to those in the coal series, in the shales of this series, sometimes assuming the forms of septaria. Iron pyrites also is abundant; and occasionally the metalliferous veins, whose principal seat is in the subjacent mountain limestone, extend upwards into this series of strata. In Derbyshire there are several instances of lead veins worked in the shale of this series, but they are usually thin. The celebrated copper mine of Ecton in Staffordshire, is represented by Farey as being situated in the limestone associated with this shale, and in Northumberland the lead veins are worked even in the millstone-grit; but since these veins are always most productive in the subjacent limestones, it seems most proper to enumerate their contents under that head. The variety of calcareous spar called *Satin spar*, appears to belong to the shales of this series. *Bitumen*, under most of the forms which it is capable of assuming, has been found in the rocks of this series, particularly in the shale. In diving a level through the shale in Derbyshire, springs of naphtha issued forth so plentifully as to cover the surface of the water in the level; and as inflammation took place on the approach of a candle, the spot attracted the notice of tourists under the title of a burning spring. *Petroleum*, elastic bitumen, and asphaltum are likewise found. It is probable that these substances are derived from the partial decomposition of the coal of the superior and accompanying strata, which may be affected perhaps by the heat arising from the decomposition of the associated pyrites.