

Staffordshire the thickness is 8000 feet. But to the northward, in Derbyshire, the thickness is about 2500 feet, and in Northumberland and Durham, and in Scotland 2000 feet. The coal-beds, as elsewhere, usually rest on a bed of *fire clay* containing rootlets. In the Newcastle region, the Coal-measures are about 2000 feet thick, and include about 60 feet of coal: the beds afford about a fourth of the coal of England.

The Lancashire area and the Cumberland farther north lie on the *west* side of an anticlinal ridge, mostly of Subcarboniferous and Lower Carboniferous rocks, called the Pennine chain, in some points 2000 feet high, which extends north to the Cheviot Hills, between England and Scotland. The Derbyshire and Newcastle areas are to the *east* of this anticlinal.

Prestwich observes, with regard to a parallelism in the several coal-beds, between the different British coal-fields, and between these and European coal-fields, that, while this is not to be looked for, some general relations may be made out. The great dividing mass of rock, 2000 to 3000 feet thick, called *Pennant*, exists in both the Welsh and Bristol coal-fields; and the total thickness is not very different in the two — about 10,500 feet in one and 8500 in the other, with 76 coal-beds in Wales, and 55 in Somerset. In the Hainault (or Mons and Charleroi) basin, the measures are 9400 feet thick, with 100 beds of coal; in the Liège basin, 7600 feet, with 85 beds; in Westphalia, 7200 feet, with 117 beds.

In Belgium, in the region of the Meuse, the Carboniferous limestone has a thickness of nearly 2500', and includes at top the "Limestone of Visé"; 800' below the top, the "Dolomite of Namur"; and 2000' below the top, the "Limestone of Dinant."

The wide-spread Subcarboniferous formation in Russia is chiefly limestone. To the eastward, at the west base of the Urals, there is one wide north-and-south belt, and another to the westward extending from the Arctic Sea, in  $66\frac{1}{2}^{\circ}$  N., to  $54^{\circ}$  N. Near Moscow the formation was reached by boring through the Jurassic and underlying beds.

The Carboniferous limestone has been found by Richthofen to underlie a large coal region in China, and to be marked by *Fusulina* and other fossils of the European Subcarboniferous beds.

The Belgian Coal-measures of Liège and Mons extend 80 miles along the northern flanks of the Ardennes, and have numerous coal-beds, the thickest 3'. The principal coal basin of Germany is that of Saarbrück in the Rhenish provinces, 900 square miles in area. In a thickness of Coal-measures of nearly 20,000', it contains 82 workable beds, included mainly in the lower 9000'. Another area is that of Westphalia. Silesia, in a coal region 16 miles square, has one coal-bed 50' thick. Some anthracite-bearing beds occur in the western Alps among schistose crystalline rocks, but none of economical value. The chief Austrian basin is in Bohemia at Pilsen. Russia has valuable coal-beds at Donetz on the north shore of the Azof. In China, plants of Carboniferous age have been obtained, to the north in the peninsula of Manchuria, where coal-beds are worked, and also in the provinces of Shansi, Hunan, Pe-chi-li, and others (*Richthofen's China*, vols. ii. and iv.). Carboniferous Coal-measures occur also in Japan and Borneo.

In the Arctic seas, Spitzbergen has a coal formation well developed, but no beds of coal. The Coal-measures are 1000' to 2000' thick in Robert's valley, with many coal plants in the shales; and the Subcarboniferous limestone and other rocks (which probably pass down into Devonian), and afford fossil Corals, Crinoids, and Brachiopods related to European and American species, besides plants; and the chert has been reported by Hinde to be full of Sponge-spicules.