

2. PERMIAN PERIOD.

On the map of England (Fig. 1126) a border of Permian is represented along the east side of the Newcastle Carboniferous area, and also adjoining other coal areas excepting that of South Wales. (The areas are marked with dots on a white ground, and numbered 5.) A small area occurs in Ireland, about the Lough of Belfast. The rocks are red sandstone and marlytes, along with Magnesian limestone. Before their relations were correctly made out, they were included, along with part of the Triassic, under the name "New Red Sandstone."

In Durham, northeastern England, there is (1) a Lower Red sandstone, 200 feet thick; then (2) *a*, 60 feet of marl-slate; *b*, two strata of Magnesian limestone, the lower 500, and the upper 100 feet thick, separated by 200 feet of gypseous marlyte, and overlaid by 100 feet of the same. The Magnesian and other limestones disappear to the south, near Nottingham. In northwestern England, the Lower Permian includes 3000 feet of marlytes and sandstones; the Middle, only 10 to 30 feet of Magnesian limestone; the Upper, 600 feet, similar to the Lower. There are detached Permian areas in Dumfriesshire, Ayrshire, etc., in Scotland.

In European Russia, Permian strata cover a region more than twice as large as all France; it includes the greater part of the governments of Perm, Orenburg, Kazan, Nizhni Novgorod, Yaroslavl, Kostroma, Viatka, and Vologda. The beds are sandstones, shales, marlytes, and dolomitic limestone, and contain an occasional thin seam of coal. The deposits are flanked and underlaid on nearly all sides by different members of the Carboniferous formation containing comparatively little coal.

In central Germany small areas occur, from southern Saxony along the Erzgebirge, over the adjoining small German states, west to Hesse Cassel, and north to the Harz Mountains and Hanover. Within this area, Mansfeld is one noted locality, situated in Prussian Saxony, not far from Eisleben; another is on the southwest borders of the Thuringian forest (Thüringerwald) in Saxe-Gotha, a line which is continued to the northwest, by Eisenach, toward Münden in southern Germany. In Thuringia and Saxony, the subdivisions of the rocks, beginning below, are (1) the *Rothliegende*, or Red beds, consisting of red sandstone, and barren of copper ores; near the town of Eisenach, about 4000 feet thick; (2) The *Zechstein* formation, or Magnesian limestone, consisting of (*a*) the *Lower Zechstein*, a gray, earthy limestone, overlying the *Kupferschiefer*, or copper-bearing shales, and the still lower *Weissliegende* or *Grauliegende*, or white or gray beds; (*b*) the *Middle Zechstein*, Magnesian limestone, called the *Rauchwacke* and *Rauhkalk*; (*c*) the *Upper Zechstein*, or the *Plattendolomit*, and including the impure fetid limestone called *Stinkstein*.

The lower part of the Lower Permian of England includes, in some places, beds of coarse conglomerate, containing angular masses of rock of great size.