

teristic fossils are covered by a series of workable coals. Grand' Eury, from a consideration of the fossils, regards the coal-basins of the Roannais and lower part of the basin of the Loire, as belonging to the age of the "culm and upper graywacke," or of strata immediately underlying the true Coal-measures. But the numerous isolated coal-basins of the centre and south of France he refers to a much later age. He looks on these as containing the most complete development of the upper coal, properly so-called, inclosing a remarkably rich, and still little-known, flora, which serves to fill up the palæontological gap between the Carboniferous and Permian periods.²²⁴ Some of these small isolated coal-basins are remarkable for the extraordinary thickness of their coal-seams. In the most important of their number, that of St. Etienne, from 15 to 18 beds of coal occur, with a united thickness of 112 feet, in a total depth of 2500 feet of strata. In the basin near Chalons and Autun the main coal averages 40, but occasionally swells out to 130 feet, and the Coal-measures are covered, apparently conformably, by Permian rocks, from which a remarkable series of saurian remains has been obtained. Other Carboniferous areas appear in the northwest of France, where representatives of the Carboniferous Limestone and the coal-bearing series above it are found. The Carboniferous Limestone is also well developed westward in the Cantabrian mountains in the north of Spain, where it likewise is surmounted by coal-bearing strata.²²⁵

Germany.²²⁶—The Coal-measures extend in detached basins northeastward from central France into Germany. One of the most important of these, the basin of Pfalz-Saarbücken, lying unconformably on Devonian rocks, contains a mass of Coal-measures believed to reach a maximum thickness of not less than 20,000 feet, and divided into two groups:

²²⁴ Grand' Eury, "Flore Carbonifere." Bertrand, Bull. Soc. Geol. France, xvi. 1888, p. 517; Fayol, p. 968 *et seq.*, Memoirs cited ante, p. 1340; G. Mouret, "Bassin Houiller de Brive," 1891.

²²⁵ The coal-field of the Asturias is described by Barrois, "Recherches sur les Terrains anciens des Asturies," p. 551. Zeiller, Mem. Soc. Geol. Nord, i. 1882, refers the plants to the Middle and Upper Coal-measures of France.

²²⁶ Geinitz, "Die Steinkohlen Deutschlands," Munich, 1865; Von Dechen, "Erläuterungen zur Geol. Karte der Rheinprov." ii. 1884; C. E. Weiss, "Fossile Flora der jüngsten Steinkohlenformation und des Rothliegenden im Saar-Rhein Gebiete," 1869-72.