

into a series of shales and sandstones, which, as already remarked, represent proximity to shore, like the similar strata in the north of England and Scotland. In Silesia, and still much further eastward, in central and southern Russia, representatives of the Carboniferous Limestone or Culm appear, but interstratified, as in Scotland, with coal-bearing strata. Traces of the same blending of marine and terrestrial conditions are found also in the north of Spain. But over central France, and eastward through Bohemia and Moravia into the region of the Carpathians, the Coal-measures rest directly upon older Palæozoic groups, most commonly upon gneiss and other crystalline rocks. These tracts had no doubt remained above water during the time of the Carboniferous Limestone, but were gradually depressed during that of the Coal-measures.

France and Belgium.—In Belgium and the north of France the British type of the Carboniferous system is well developed.²²¹ It comprises the following subdivisions:

Coal-measures—Système (Étage) Houiller.

- Zone of the gas-coals (*Charbons à gaz*, rich bituminous coals, with 28 to 40 per cent of volatile matter), containing 47 seams of coal. *Pecopteris nervosa*, *P. dentata*, *P. abbreviata*, *Alethopteris Serlii*, *Neuropteris heterophylla*, *Sphenopteris irregularis*, *S. macilenta*, *S. coraloides*, *S. herbacea*, *S. furcata*, *Calamites Suckowii*, *Annularia radiata*, *Sphenophyllum erosum*, *Sigillaria tessellata*, *S. mamillaris*, *S. rimosa*, *S. laticosta*, *Dorycordaites*.
- Zone of the "Charbons gras" (18 to 28 per cent volatile matter), soft caking coal (21 seams), well suited for making coke. *Sphenopteris nummularia*, *S. macilenta*, *S. chærophyloides*, *S. artemisifolia*, *S. herbacea*, *S. irregularis*, *Neuropteris gigantea*, *Alethopteris Serlii*, *A. valida*, *Calamites Suckowii*, *Sphenophyllum emarginatum*, *Sigillaria polyploca*, *S. rimosa*, *S. laticosta*, *Trigonocarpus Nöggerathii*.
- Zone of the "Charbons demi-gras" (12 to 18 per cent volatile matter), 29 seams of coal, chiefly fitted for smithy and iron-work purposes. *Sphenopteris convexifolia*, *S. Hœninghausi*, *S. trichomanoides*, *S. furcata*, *S. Schillingsii*, *S. irregularis*, *Lonchopteris rugosa*, *Calamites Suckowii*, *Annularia radiata*, *Sigillaria mamillaris*, *S. elegans*, *S. piriiformis*, *S. elliptica*, *S. scutellata*, *S. Groeseri*, *S. lævigata*, *S. rugosa*, *Halongia tortuosa*.
- Zone of the "Charbons maigres." Lean or poor coals (20 to 25 seams), only fit for making bricks or burning lime (9 to 12 per cent volatile matter). *Pecopteris Loshii*, *P. pennæformis*, *Neuropteris heterophylla*, *Alethopteris lonchitica*, *Sphenophyllum saxifragæfolium*, *Annularia radiata*, *Sigillaria conferta*, *S. Candolli*, *S. Voltzii*, *Calamites Suckowii*, *Lepidodendron rhodeanum*, *L. pustulatum*, *Lepidophloicus laricinus*.

²²¹ On the Carboniferous rocks of this area see De Koninck, "Descriptions des Animaux Fossiles du Terrain Carbonifère de la Belgique," 1842-67. Gosselet's "Esquisse," already cited, and his "L'Ardenne," 1888, chaps. xxii. and xxiii. Mourlon's "Geologie." Boulay, "Terrain Houiller du Nord de la France et ses Vegetaux fossiles," Lille, 1876. Dupont, Bull. Soc. Roy. Belg. 1883.