

France. In the central plateau they are found most fully developed, resting upon and passing down into the higher parts of the Carboniferous system. They have been carefully studied in the district of Autun, where the lower part of the Permian system is represented by a mass 900 to 1000 metres thick of alternations of sandstone and shale more or less rich in hydrocarbons, with thin bands of magnesian limestone. No marine fossils occur in these strata, even the magnesian limestone containing only fresh-water organisms. From the distribution of the fossils a threefold stratigraphical subdivision of the whole series has been made. 1st, A lower group at least 150 to 200 metres thick, lying conformably upon the Coal-measures, and containing numerous ferns (*Pecopteris*, abundant), *Sigillariæ*, *Syringodendra*, *Cordaites*, a profusion of *Walchia*, large numbers of seeds or fruits, cyprids crowded in some layers of shale, an amphipod (*Nectotelson*), a number of fishes (*Palæoniscus*, *Amblypterus*, *Acanthodes*, *Pleuracanthus*), and the amphibians and reptiles already referred to (*Actinodon*, *Euchirosaurus*, *Stereorhachis*). 2d, A middle group about 300 metres thick, showing a cessation of the characteristically Carboniferous species of plants, and an increasing prominence of typically Permian forms. Numerous species of *Pecopteris* still occur, but *Callipteris* makes its appearance (*C. conferta*, *C. gigantea*). *Walchia* (*W. piniformis*, *W. hypnoides*), *Calamites*, *Sphenophyllum*, *Calamodendron*, and fruits abound. The animal remains resemble those of the lower group, but with the addition of *Protriton* and *Pleuroneura*. 3d, An upper group locally known as that of the "Boghead," from a workable band of bituminous shale or coal.<sup>258</sup> The thickness of this group is about 500 metres, the upper portion consisting of red sandstones without fossils. The flora is now markedly Permian. *Pecopterid* ferns are rare, and are specifically distinct from those in the group below. There is an abundance and variety of *Callipteris*, together with *Sigillaria*, abundant *Walchia* and *Asterophyllites*, *Piceites*, *Sphenophyllum*, *Carpolithes*, etc. The fauna is generally similar to that in the middle group, but less varied.<sup>259</sup>

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<sup>258</sup> "Boghead," so named from a place in Linlithgowshire, Scotland, where the substance was first worked for making gas and oil. The so-called "Boghead" of Autun has been ascertained to contain a large quantity of the remains of gelatinous fresh-water algæ mingled with the pollen of *Cordaites*; B. Renault and E. Bertrand, Soc. Hist. Nat. Autun, 1892.

<sup>259</sup> E. Roche, Bull. Soc. Geol. France, ser. 3, ix. 1880, p. 78. See also the