

there in remains of land-plants and fishes. (2) A middle group of felspathic sandstones, conglomerates, and micaceous shales, with vast numbers of silicified tree-stems (*Araucarites*, *Psaronius*). (3) An upper group of red clays and sandstones, with bituminous shales. Eruptive rocks (melaphyre, porphyrite, etc.) are associated with the whole formation. The Zechstein is here absent. In place of the marine shells, crinoids and corals so characteristic of that formation, the Bohemian Permian strata have yielded the remarkable series of amphibian remains already alluded to, together with abundant traces of the land of the period, such as remains of orthopterous insects, scorpions, millipeds, and a rich terrestrial flora (*Sphenopteris*, *Neuropteris*, *Odontopteris*, *Pecopteris*, *Alethopteris*, *Callipteris conferta*, *Schizopteris*, *Calamites*, *Asterophyllites*, *Sphenophyllum*, *Lepidodendron*, *Sigillaria*, *Walchia*, *Araucaryoxylon*).

Vosges.—In this region the following succession of strata has been assigned to the Permian system:

4. Kohlbachel group of red arkoses, felspathic sandstones, shales, conglomerates, breccias, and dolomite, 500 to 600 feet, with intercalated sheets of melaphyres and tuffs.
3. Variegated tuffs and marls of Meisenbuckel.
2. Dark shales, limestones, and dolomites of Heisenstein.
1. Arkose and shale (*Callipteris conferta*), with conglomerate (sometimes 150 feet thick), containing blocks of porphyry, gneiss, quartz, etc., filling up hollows of the crystalline schists on which they lie unconformably.

The existence of volcanic action during Permian time in this region is shown by the presence of interstratified basic lavas, and by the great quantity of fragments of quartz-porphyry in the conglomerates, which have been compared to volcanic agglomerates.²⁵⁷

France.—Permian rocks occur in many detached areas in

²⁵⁷ Benecke and Van Wervecke, *Mitth. Geol. Landesanst. Elsass-Loth.* vol. iii. 1890, p. 45; Velain, *Bull. Soc. Geol. France*, ser. 3, xiii.; Eck, "Geogn. Karte d. Ung. von Lahr." 1884; "Geogn. Karte v. Schwarzwald." 1887. A full bibliography for Alsace and Lorraine will be found in *Abth. Geol. Spezialkart. v. Elsass-Lothringen*, vol. i. 1875 and vol. for 1887.