that the vegetation which succeeded that of the Carboniferous period spread far to the west, and that it has been entombed among marine sediments. The Permian deposits traced in that direction undergo a change somewhat similar to that shown by the Carboniferous system, though on a much feebler scale. In the so-called "Wichita beds" of Texas, consisting of red and mottled clays, sandstones and concretionary limestones resting on Coal-measures, a series of plant and animal remains has been discovered, which throws much light upon the extension of the Permian flora and fauna in North America. The plants are essentially the same as those found above the Coal-measures of Western Virginia. They include Sphenophyllum, Annularia, Walchia, Odontopteris, Callipteris conferta, Callipteridium (4 species), Pecopteris (8 species), and Goniopteris.[272] The animal-remains comprise some Carboniferous species, but also distinctively Permian types, especially some of the ammonoid cephalopods, which are now known to have so wide a range in the Old World. The cephalopods already obtained include species of Orthoceras, Nautilus, Waagenoceras, Medlicottia, Popanoceras, the gasteropods are represented by species of Euomphalus, Bellerophon, and Murchisonia, and other organisms have been detected.[273] There have also been obtained from those strata and the "Clepsydrops shales" of Illinois a number of fish, stegocephalous amphibia, and rhynchocephalous reptiles.[274]

Spitzbergen.—The Permian sea appears to have extended far within the Arctic Circle, for above the Carboniferous rocks of Spitzbergen there occurs a group of strata which contains Permian forms (Productus, Streptorhynchus, Retzia, Pseudomonotis, Bakevellia, etc.).[275]

[272] I. C. White, Bull. Amer. Geol. Soc. iii. 1892, p. 217.
[273] C. A. White, Amer. Nat. 1889, p. 109, Bull. U. S. Geol. Surv. No. 77, 1891.
[274] E. D. Cope, Proc. Amer. Phil. Soc. xvii. 1877–78, pp. 182, 505.
[275] B. Lundgren, Bihang. Svensk. Vet. Akad. Handl. xiii. 1887.

END OF THIRD PART OF "TEXT-BOOK OF GEOLOGY"