

valley as old red sandstone. In 1833 the senior author of this work, in his Report on the Geology of Massachusetts, presented arguments to show that the upper beds were the equivalents of the new red sandstone; and that opinion was generally adopted in this country and in Europe after they had been examined by Sir Charles Lyell.

Professor W. B. Rogers subsequently maintained that the sandstone containing beds of workable coal near Richmond, Virginia, an isolated deposit, was of the age of the European Oolite. The fossils relied on to prove this are species of plants, viz., Zamites, Calamites, Equiseta, Tæniopteris, Pecopteris Whitbyensis, Posidonia—a species of mollusc—and several Fishes, as a Tetragonolepis. E. Hitchcock, Jr., has discovered a tree fern near the middle of the series in Massachusetts, the *Clathropteris rectiusculus*, some specimens of which can with difficulty be distinguished from the European species *C. meniscoides*—a characteristic fossil of the beds of passage between the Trias and Lias. Hence he argues that the ichniferous or upper beds of the series are Jurassic or Oolitic. Professor Emmons has discovered, in North Carolina, species of plants and Thecodont Saurians, which, with several European authorities, he regards as distinctly Permian. Professor Agassiz considers the ichthyolites of New England and New Jersey, occurring in these rocks in connection with the ichnites, as corresponding best, by their structure, with European specimens from the Upper Trias. The Messrs. Redfield find some traces of Oolitic structure among the fishes. The heteroclitic forms of the Lithichnozoa correspond best with the bizarre forms of the Oolite.

From these discoveries and opinions we regard one point as settled, and a second as rendered probable. 1. A belt of rock, occupying the middle portions of the Connecticut River sandstone, below which no tracks are found, is of Upper Triassic age. The ichniferous strata above are either Liassic or Oolitic. 2. Probably the whole series of rocks, from the Permian to the Oolite inclusive, are represented in these strata. The strata are at least 5,000 feet thick in Massachusetts, and this is adequate to embrace the whole, so far as they have been measured in other countries.

In connection with palæozoic and cretaceous rocks in Kansas and Nebraska certain rocks have been described, which, upon careful examination, may prove to be Triassic or Jurassic.

These different basins of older Mesozoic rock were probably formed in estuaries; or, as the Professors Rogers maintain, in some of the basins there may have been large rivers, depositing the materials in their beds, without any marine deposits. The physical features of the continent were being perfected while these deposits were forming. The lower layers have a higher inclination than the upper, amounting to absolute unconformability in some parts of the basin along the Connecticut River valley. If the lower be Permian or Palæozoic, and the upper Triassic or Oolitic, we should expect such a difference of dip.

CRETACEOUS SYSTEM.

The varieties of rocks composing this system, and the comparison of the different members in the different parts of the continent, are treated of in Section III. of Part I.

The Cretaceous system occupies more territory, perhaps, than any other system in North America. It probably commences as far east as Nantucket and Martha's Vineyard, and extends continuously from New Jersey along the Atlantic coast to Mexico, and then covers nearly one third of the width of the continent, from near the Gulf of Mexico to British America, with occasional interruptions of older or newer strata. Along the Atlantic seaboard