

streamlets, denuding, transporting, making alluvial deposits, and carrying sediments to the seashores; and the whole surface was well populated, beyond doubt, by Mammals, Birds, and inferior terrestrial life. The mountains of the Appalachian System and its bordering regions on the east, west, and south contributed material for the marine Tertiary beds of the Atlantic and Gulf borders; the weakly consolidated beds of the recently made Laramide mountain ranges afforded the same more abundantly for the thick deposits of the vast freshwater lakes about the summit of the Rocky Mountains and over its eastern slopes; and the Sierra Nevada and other ranges of the western slopes were a source of supply for other lakes and for the marine Tertiary of the Pacific border. But notwithstanding the work of rivers and other agencies, there have not been found, up to 1894, over the *eastern* half of the continent away from the sea border, any recognizable fossil-bearing, lacustrine Tertiary deposits, excepting over small spots near the center of the state of Vermont. In the western half of the continent, the only fluvial beds recognized as Tertiary, by means of fossils, are those of the auriferous gravels of the Sierra Nevada. Nothing of Tertiary origin has yet been identified in or about the basin of Hudson Bay, or those of the Great Lakes, or in limestone caverns of the Mississippi valley and elsewhere, to *prove* that these basins and caverns were in existence during Tertiary time. They may have existed, but the proof is wanting.

This work is indebted for the preceding Tertiary map of North America to G. D. Harris, who has prepared it from earlier maps and publications, from unpublished records of the U. S. Geological Survey, and to a considerable extent also from his own personal study of the marine Tertiary along the Atlantic and Gulf borders. Further, the subdivisions of the eastern Tertiary adopted beyond, and the remarks on the distribution of the beds, are partly from his manuscript notes. In addition, he has revised the pages on the Invertebrate paleontology, of the same region; and part of its illustrations are from his work on the Tertiary Paleontology of Texas. A list of earlier publications and a review of the facts and of the question of equivalency may be found in the *U. S. G. S. Bulletin*, No. 83, by W. B. Clarke, on the *Correlation of the Eocene Tertiary*, 1891, and in the *U. S. G. S. Bulletin*, No. 84, on the *Correlation of the Neocene*, by William H. Dall and G. D. Harris, 1892.

### SUBDIVISIONS.

The periods of the Tertiary era proposed by Lyell are the basis of the American subdivisions, namely: (1) EOCENE, (2) MIOCENE, (3) PLIOCENE. To these are added by some, OLIGOCENE, corresponding in age to the European Oligocene. NEOCENE is also sometimes used for the Miocene and Pliocene.

The marine and lacustrine formations are independent in fossils, and besides are nowhere interstratified, and hence it is not possible to make out their precise equivalents. As regards the lacustrine beds, even the division into periods is based largely on facts from Europe. Moreover, the species of the marine Tertiary of the Atlantic and Pacific borders are almost wholly