affinities) have not been reproduced to any great extent since the beginning of paleozoic time.

3*d*. The eruptive rocks, or at least a large part of them, are softened and displaced portions of these ancient neptunean rocks, of which they retain many of the mineralogical and lithological characters.

II. The History of pre-Cambrian Rocks in America.

Coming now to the history of our knowledge of American crystalline rocks, we find that the lithological characters of the Primary gneissic formation of northern New York were known to Maclure in 1817, and were clearly defined in 1832 by Eaton, who, under the name of the Macomb Mountains, described what have since been called the Adirondacks, and moreover distinguished them from the Primary rocks of New England. Emmons, in 1842, added much to our lithological knowledge of the crystalline rocks of northern New York, but regarded the gneisses, with their associated limestones, serpentines and iron-ores as all of plutonic origin. Nuttall, who had previously studied the similar rocks in the Highlands of southern New York and New Jersey, had however maintained, as early as 1822, that these had resulted from an alteration of the adjacent paleozoic graywackes and limestones, into which he supposed them to graduate. This view was, at the time, opposed by Vanuxem and Keating, but was again set forth in 1843, by Mather, who while admitting the existence of an older or Primary series of crystalline rocks, conceived a great part of these rocks in southern New York to be altered paleozoic, and distinguished them as Metamorphic rocks. To this latter class he referred all the crystalline stratified rocks of New England, and ended by doubting whether a great part of what he had described as Primary was not to be included in his Metamorphic class. The subsequent labors of Kitchell and of Cooke have however clearly established the views of Vanuxem and Keating as to the Primary age alike of the gneisses and the crystalline limestones of the Highlands.

The similar gneissic series in Canada, which was known to Bigsby and to Eaton as an extension of that of northern New York, was noticed by Murray in 1843, and by Logan in 1847, as pre-paleozoic, though apparently of sedimentary origin, and hence, according to them, entitled to be called Metamorphic rather than Primary. It was described by Logan in 1847, as