

three theories proposed to explain these phenomena, which we will state briefly, and endeavor to combine them into a fourth.

*The Iceberg Theory.*—This theory imputes most of the phenomena of drift to icebergs carried southerly by the currents of the ocean, while the continents where drift occurs were yet beneath the ocean. As they were gradually raised from the deep, the mountains, which would form islands, would send down glaciers to their shores, and thus masses of ice would be broken off to be floated away, loaded with detritus. As the icebergs melted, the detritus would fall to the bottom, and under various circumstances would form all the deposits of unmodified drift. By the stranding of icebergs, the moraine terraces, ridges, escars and osars would be formed. After the ocean had retired, large bodies of water would remain in many places, and by gradual drainage produce the beaches, terraces, sea bottoms, etc.

*Theory of Elevations and Earthquake Waves*—This theory supposes the phenomena of drift to have resulted from the rise of large areas beneath the Arctic and Antarctic oceans, whereby their waters have been driven southward over a considerable part of Europe and America, bearing along masses of ice loaded with detritus. And further, that there may have been a succession of vertical movements, which produced successive waves; so that the waters may have repeatedly fallen and risen again, and while at their ebb they may have been frozen to the surface, so that as they subsequently rose, vast masses of ice may have been driven along, loaded with detritus, which may have been forced up declivities considerably steep, and thus the surface have been powerfully and rapidly abraded, and the rocks scoured and furrowed. This theory, somewhat modified, has been sustained with great ability by Professors H. D. and W. B. Rogers.

*The Glacier Theory.*—This theory supposes that at the close of the tertiary period there was a sudden reduction of the temperature of the surface of the earth, whereby all organic life was destroyed; and in high latitudes, at least, glaciers were formed on mountains of moderate altitude; indeed, that vast sheets of ice were spread over almost the entire surface, extending south as far as the phenomena of drift have been observed. The northern regions, especially around the poles, are supposed to have formed one vast Mer de Glace, which sent out its enormous glaciers in a