

uniformly maintained for an indefinitely long period. It may even be claimed that, in the case of Lake Baikal, of Reindeer Lake, and other lakes supplied from Archæan areas the proportions have obtained from pre-Cambrian times, and further, that the river discharge of that period, coming as it did from pre-Cambrian rock areas wholly, would contain the four elements in these or similar proportions. That would postulate that the primeval ocean was merely a gigantic body of fresh water, in which the sodium, potassium, calcium, and magnesium obtained in quantities and proportions as they now obtain in a lake situated in Archæan area. As already pointed out, these proportions gave place to others, and to-day, as in the past, the relative amounts of each element are changing, so that in a few million years hence the composition of ocean water will be appreciably different from what it is now.

One can, indeed, illustrate what changes have taken place in the ocean by reference to such a large body of fresh water as Lake Superior. If the latter were to lose its outlet no doubt its area would be larger than it is now, but when that had attained a certain extent the evaporation would balance the inflow as in the case of the Caspian Sea, and in consequence the salts held in solution would constantly increase in amount, but each at different rates up to a certain point, when the proportions would begin to approximate those in ocean water. One cannot of course say that this is what has happened in the case of either the Caspian or the Sea of Aral, for these bodies of water were connected with the ocean as late as the beginning of the Tertiary age, but it may be pointed out that if their composition was, to start with, the same as that of the ocean in Tertiary times, their present composition is strong evidence of the effect that the salts derived from leaching of the land areas have in modifying the proportions, for in that respect either is markedly different from the other and from the ocean.

The Great Salt Lake of Utah may be adduced as an instance of the change of a body of fresh water into one which presents a high degree of salinity and which in the proportions of its salts is remarkably not unlike the ocean. This lake, which is in part of the area covered by the glacial Lake Bonneville, is considered by G. K. Gilbert to have been a body of fresh water about 25,000 years ago. He arrived at this result by determining the discharge of chlorine into the lake by river water and comparing it with the quantity at present obtaining in the lake. Lake Bonneville had* an outlet delivering its waters into a tributary of the Columbia River and thus the lake was kept fresh. When, however, this outlet was lost, changes climatic and physical operated to reduce

* Monographs of the U. S. Geol. Survey, Vol. 1, Lake Bonneville, 1890, p. 254.