

temperate flora to subsist in Greenland, and to bring all the present temperate regions of Europe and America into a condition of subtropical verdure.

It is only necessary to add that we actually know that changes not dissimilar from those above sketched have really occurred in comparatively recent geological times, to enable us to perceive that we can dispense with all other causes of change of climate, though admitting that some of them may have occupied a secondary place. This will give us, in dealing with the distribution of life, the great advantage of not being tied up to definite astronomical cycles of glaciation, which do not well agree with the geological facts, and of correlating elevation and subsidence of the land with changes of climate affecting living beings. It will, however, be necessary, as Wallace well insists, that we shall hold to a certain fixity of the continents in their position, notwithstanding the submergences and emergences which they have experienced.

Sir Charles Lyell, more than forty years ago, published in his "Principles of Geology" two imaginary maps, which illustrate the extreme effects of various distribution of land and water. In one, all the continental masses are grouped around the equator. In the other they are all placed around the poles, leaving an open equatorial ocean. In the one case the whole of the land and its inhabitants would enjoy a perpetual summer, and scarcely any ice could exist in the sea. In the other, the whole of the land would be subjected to an Arctic climate, and it would give off immense quantities of ice to cool the ocean. Sir Charles remarks on the present apparently capricious distribution of land and water, the greater part being in the northern hemisphere, and, in this, placed in a very unequal manner. But Lyell did not suppose that any such distribution as that represented in his maps had actually occurred, though this supposition has been sometimes attributed to him. He merely put what he regarded as an extreme case to illustrate what