

changes of climate. He finds, however, that though the effect of this change on the mean temperature of the year may be small, the effect on the extreme temperature of the seasons will be much more considerable; "so as to produce alternately, in the same latitude of either hemisphere, a perpetual spring, or the extreme vicissitudes of a burning summer and a rigorous winter."¹⁴

Mr. Lyell has traced the consequences of another hypothesis on this subject, which appears at first sight to promise no very striking results, but which yet is found, upon examination, to involve adequate causes of very great changes: I refer to the supposed various distribution of land and water at different periods of the earth's history. If the land were all gathered into the neighborhood of the poles, it would become the seat of constant ice and snow, and would thus very greatly reduce the temperature of the whole surface of the globe. If, on the other hand, the polar regions were principally water, while the tropics were occupied with a belt of land, there would be no part of the earth's surface on which the frost could fasten a firm hold, while the torrid zone would act like a furnace to heat the whole. And, supposing a cycle of terrestrial changes in which these conditions should succeed each other, the winter and summer of this "great year" might differ much more than the elevated temperature which we are led to ascribe to former periods of the globe, can be judged to have differed from the present state of things.

The ingenuity and plausibility of this theory cannot be doubted: and perhaps its results may hereafter be found not quite out of the reach of calculation. Some progress has already been made in calculating the movement of heat into, through, and out of the earth; but when we add to this the effects of the currents of the ocean and the atmosphere, the problem, thus involving so many thermotical and atmological laws, operating under complex conditions, is undoubtedly one of extreme difficulty. Still, it is something, in this as in all cases, to have the problem even stated; and none of the elements of the solution appears to be of such a nature that we need allow ourselves to yield to despair, respecting the possibility of dealing with it in a useful manner, as our knowledge becomes more complete and definite.

¹⁴ *Geol. Trans.* vol. iii. p. 298.