

possibility of such changes. "We may not merely admit," he says, "but assert as highly probable, that the axis of maximum inertia and axis of rotation, always very near one another, may have been in ancient times very far from their present geographical position, and may have gradually shifted through 10, 20, 30, 40, or more degrees, without at any time any perceptible sudden disturbance of either land or water."¹⁹ But though, in the earlier ages of the planet's history, stupendous deformations may have occurred, and the axis of rotation may have often shifted, it is only the alterations which can possibly have occurred during the accumulation of the stratified rocks, that need to be taken into account in connection with the evidence of changes of climate during geological history. If it can be shown, therefore, that the geographical revolutions necessary to shift the axis are incredibly stupendous in amount, improbable in their distribution, and not really demanded by geological evidence, we may reasonably withhold our belief from this alleged cause of the changes of climate during the periods of time embraced by geological records.

It has been estimated by Lord Kelvin "that an elevation of 600 feet, over a tract of the earth's surface 1000 miles square and 10 miles in thickness, would only alter the position of the principal axis by one-third of a second, or 34 feet."²⁰ Professor George Darwin has shown that, on the supposition of the earth's complete rigidity, no redistribution of matter in new continents could ever shift the pole from its primitive position more than 3°, but that, if its degree of rigidity is consistent with a periodical readjust-

¹⁹ Brit. Assoc. Rep. (1876), Sections, p. 11.

²⁰ Trans. Geol. Soc. Glasgow, iv. p. 313. The situation of the supposed area of upheaval on the earth's surface is not stated.