

of the land. These features of the earth's surface are of old standing. There seems, indeed, to be no geological evidence in favor of any such geographical changes as could have produced even the comparatively small displacement of the axis considered possible by Professor Darwin.

In an ingenious suggestion, Sir John Evans contended that, even without any sensible change in the position of the axis of rotation of the nucleus of the globe, there might be very considerable changes of latitude due to disturbance of the equilibrium of the outer portion or shell by the upheaval or removal of masses of land between the equator and the poles, and to the consequent sliding of the shell over the nucleus until the equilibrium was restored.²² Subsequently he precisely formulated his hypothesis as a question to be determined mathematically;²³ and the solution of the problem was worked out by the Rev. J. F. Twisden, who arrived at the conclusion that even the large amount of geographical change postulated by Dr. Evans could only displace the earth's axis of figure to the extent of less than 10' of angle, that a displacement of as much as 10° or 15° could be effected only if the heights and depths of the areas elevated and depressed exceeded by many times the heights of the highest mountains, that under no circumstances could a displacement of 20° be effected by a transfer of matter of less amount than about a sixth part of the whole equatorial bulge, and that even this extreme amount would not necessarily alter the position of the axis of figure.²⁴

²² Proc. Roy. Soc. xv. (1867), p. 46. ²³ Q. J. Geol. Soc. xxxii. (1876), p. 62.

²⁴ Q. J. Geol. Soc. xxxiv. (1878), p. 41. See also E. Hill, *Geol. Mag.* v. (2d ser.) pp. 262, 479. O. Fisher, *op. cit.* pp. 291, 551.