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FRIDAY, MAY 24, 1895.

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## VARIATION OF LATITUDE.\*

THE question is frequently asked, "How can latitude change?" There are two ways obviously. First, we may imagine that a portion of the earth slips on the surface of the globe, due say to earthquake shock.

\* From a lecture before the New York Academy of Sciences, April 29, 1895.

Then if the movement of the mass has been toward the equator the latitude of that place is decreased; if toward the pole of the earth the latitude is increased. But suppose that some forces at work on the earth cause it to revolve about a new axis, then we have at once a new equator, and the latitudes of *all* points on the earth's surface change except at those places where the old and new equator intersect.

If, for example, the earth's axis of revolution should be changed so as to pass through this hall, the latitude would be changed from a little over 40 degrees, as it now is, to 90 degrees. There are changes no doubt produced by the slipping of portions of the earth's strata, but we know that these causes are insignificant and local. The only way that latitudes could be made to change *throughout the world* would be by changes in the axis of rotation of the earth, thus changing the position of the equator.

Are there any undisputed evidences of a variation in the latitude of a place and is it large?

To-day the evidence is overwhelming, but the amount is small, so small, in fact, that only the refined instruments of the present day have been able to discover it; though now, that it is discovered, older observations show it.

La Place, in his *Mécanique Céleste* (Tome V., p. 22), says "All astronomy depends upon the invariability of the earth's