

where the difficulties of communication are most severely felt, and from that point its extension will only be a matter of time. It appears that there are not supposed to be any great engineering difficulties on any part of the projected line, at least none but such as modern skill is fully competent to deal with. The most recent information about Siberia places it beyond doubt that the agricultural and mining resources of the country are capable of great development, and that the conditions of life are not nearly as hard as have been supposed; there is no lack of natural wealth, and it has only been the almost entire absence of facilities for transport which has rendered the name of Siberia a synonym for sterility and desolation. If this report be only half true there is a good prospect for the future railway.

However, if it takes a long time to make this road a success, in a commercial point of view, there is no doubt of its importance, politically. We may judge to some extent of its value in this respect to Russia from the importance to Britain and Canada of the Canadian Pacific Railway and the recent establishment of lines of steam ships on the Pacific Ocean in connection with it, and there seems to be no reason why on the completion of this Northern European and Asiatic route a line of fast steamships should not be established to Canadian and United States ports from Vladivostock, which would doubtless influence directly the trade of both China and Japan.

THE ROTATION OF THE EARTH.—

An important and anxious question of the modern astronomer is, whether the earth's rotation is uniform and if not, in what way and to what extent does it vary. The importance, of course, lies in the fact that this rota-

tion furnishes our fundamental measure and unit of time. Up to a comparatively recent date there has not been reason to suspect this unit of any variation sufficient to be detected by human observation. It has long been perceived, of course, that any changes in the earth's form or dimensions must alter the length of the day. The displacement of the surface or strata by earthquakes or by more gradual elevation and subsidence, the transportation of matter toward or from the equator by rivers or ocean currents, the accumulation or removal of ice in the polar regions or on mountain tops—any such causes must necessarily produce a real effect. So also must the friction of tides and trade winds.

But it has been supposed that these effects were so minute, and to such an extent mutually compensatory, as to be quite beyond the reach of observation; nor is it yet certain that they are not. All that can be said is that it is now beginning to be questionable whether they are or not. The reason for suspecting perceptible variation in the earth's revolution lies mainly in certain unexplained irregularities in the apparent motions of the moon. She alone, of all the heavenly bodies, changes her place in the sky so rapidly that the minute inaccuracies of a second or two in the time of observation would lead to sensible discrepancies in the observed position, an error of one second in the time corresponding to about half a second in her place—a quantity minute, certainly, but perfectly observable. No other heavenly body has an apparent movement anywhere nearly as rapid, excepting only the inner satellite of Mars; and this body is so minute that an accurate observation is impracticable, except with the largest telescopes and at the times when Mars is unusually near the earth.—*Prof. Young.*