vin regarding the slight difference between the precession of a fluid and a rigid spheroid.[56]

The assumption of a comparatively thin crust requires that the crust shall have such perfect rigidity as is possessed by no known substance. The tide-producing force of the moon and sun exerts such a strain upon the substance of the globe, that it seems in the highest degree improbable that the planet could maintain its shape as it does unless the supposed crust were at least 2000 or 2500 miles in thickness.[57] That the solid mass of the earth must yield to this strain is certain, though the amount of deformation is so slight as to have hitherto escaped all attempts to detect it.[58] Had the rigidity been even that of glass or of steel, the deformation would probably have been by this time detected, and the actual phenomena of precession and nutation, as well as of the tides, would then have been very sensibly diminished.[59] The conclusion is thus reached that the mass of the earth "is on the whole more rigid certainly than a continuous solid globe of glass of the same diameter."[60]

(*b.*) Argument from the tides.—The phenomena of the oceanic tides show that the earth acts as a rigid body either solid to the centre, or possessing so thick a crust (2500 miles or more) as to give to the planet practical solidity. Lord Kelvin remarks that "were the crust of continuous steel and 500 kilometres thick, it would yield very nearly as much as if it were India-rubber to the deforming influences of centrifugal force, and of the sun's and moon's attractions." It would yield, indeed, so freely to these attractions "that it

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[56] Phil. Trans. 1879, Part 2, p. 464.
[57] Lord Kelvin, Proc. Roy. Soc. April, 1862.
[58] See Association Française pour l'Avancement des Sciences, v. p. 281.
[59] Lord Kelvin, loc. cit.
[60] Ibid. Trans. Roy. Soc. Edin. xxiii. p. 157.