He assumes the earth to be a homogeneous spheroid and to have possessed a certain small viscosity,[32] and he calculates the internal tidal friction in such a mass exposed to the attraction of moon and sun, and the consequences which these bodily tides have produced. He finds that the length of our day and month have greatly increased, that the moon's distance has likewise augmented, that the obliquity of the ecliptic has diminished, that a large amount of hypogene heat has been generated by the internal tidal friction, and that these changes may all have transpired within comparatively so short a period (57,000,000 years) as to place them quite probably within the limits of ordinary geological history. According to his estimate, 46,300,000 years ago the length of the sidereal day was fifteen and a half hours, the moon's distance in mean radii of the earth was 46·8 as compared with 60·4 at the present time. But 56,810,000 years back, the length of a day was only $6\frac{3}{4}$ hours, or less than a quarter of its present value, the moon's distance was only nine earth's radii, while the lunar month lasted not more than about a day and a half (1·58), or $\frac{1}{17}$ of its present duration. He arrives at the deduction that the energy lost by internal tidal friction in the earth's mass is converted into heat at such a rate that the amount lost during 57,000,000 years, if it were all applied at once, and if the earth had the specific heat of iron, would raise the temperature of the whole planet's mass 1,760° Fahrenheit, but that the distribution of this heat-generation has been such as not to interfere

[32] The degree of viscosity assumed is such that "thirteen and a half tons to the square inch acting for twenty-four hours on a slab an inch thick displaces the upper surface relatively to the lower through one-tenth of an inch. It is obvious," says Mr. Darwin, "that such a substance as this would be called a solid in ordinary parlance, and in the tidal problem this must be regarded as a very small viscosity." Op. cit. p. 531.