not under sufficient pressure to be rendered solid, and is sufficiently hot to be fluid, being probably more viscous in its lower portion through pressure and likewise passing into a viscous state in its upper parts through cooling, until it joins the crust."[67] The contraction and consolidation of this substratum are assumed as the explanation of the plication which the crust has certainly undergone.

It must be admitted that the widespread proofs of great crumpling of the rocks of the crust present a difficulty, for they indicate a capability of yielding to strain such as has been supposed impossible in a globe possessing on the whole the rigidity of steel or glass. But this difficulty may be more formidable in appearance than in reality. The earth must certainly possess such a degree of rigidity as to resist tidal deformation. Prof. Darwin has calculated the limiting rigidity in the materials of the earth which is necessary to prevent the weight of mountains and continents from reducing them to the fluid condition or else cracking, and has found that these materials must be as strong as granite 1000 miles below the surface, or else much stronger than granite near the surface.[68] But high rigidity, that is, elasticity of form, is not contradictory of plasticity. Even bodies like steel may, under suitable stress, be made to flow like butter (see *postea*, Book III. Part I. Sect. iv. § 3). While, therefore, the earth may possess as a whole the rigidity of steel, there seems no reason why, under sufficient strain, the outer portions may not be plicated or even reduced to the fluid condition. It is important "to distinguish viscosity, in which flow is caused by infinitesimal forces, from plasticity, in which permanent distor-

[67] Fisher, "Physics of Earth's Crust," 1st edit. p. 269.
[68] Proc. Roy. Soc. 1881, p. 432.