

mineral compounds known to us, go so far as to augment their density much more than is requisite for the fulfilment of the condition required by the calculation. According to Leslie (as quoted by Mrs. Somerville) water would be as heavy as mercury at 362 miles below the surface of the earth, and air as heavy as water at 84 miles. Calculations of this kind, however, involve suppositions as to the continuity of the law of the density of elastic bodies being proportional to the pressure upon them; they are thus in strictness liable to objection; but the error which might arise from this cause is quite unimportant for the argument in the text. We must therefore admit that either the interior substances are naturally lighter; that they are of so different a nature as to yield but little even to the immense pressure upon them; or that their inherent elasticity is aided by some principle of expansion, which balances a part of the pressure to the centre.

3. To aid us in choosing between these cases we may call in the aid of mathematical science and astronomical observations, from which it results, 1. That the figure of the earth is an oblate spheroid, such as would be produced by revolution on its axis, provided the constituent matter of the globe were in such a state as to be allowed freely to arrange itself in obedience to the central and tangential forces concerned. 2. It is ascertained as a consequence of the theory of the moon's motions, that the interior parts of the earth are not only more dense than the exterior, but that the inner surfaces of equal density are symmetrical to the same centre and axis as the external elliptical figure.\*

From these observations conjoined, there is no doubt that the matter of the globe, having free relative motion, was arranged under the double influence of central and tangential forces; and consequently, that the substances in the interior must be naturally at least as heavy as those near the surface under the same circumstances.

Free relative motion to the extent here required,

\* See Conybeare in Reports of the British Association, vol. i. p. 408.