all the rest. Thus through the whole extent of the hypo­thetical body the springs arc brought into action in a way and in a degree which mathematics can easily investigate. We need not do this : it is enough for our purpose that our imagination readily discovers that some springs are stretch­ed, others are compressed, and that a pressure is excited on the middle point of support, and the support exerts a re­action which precisely balances it ; and the other weight is, in like manner, in immediate equilibrio with the equi­valent of the actions of all the springs which connect the last ball with its neighbours. Now take the analogical or resembling case, an oblong piece of solid matter, resting on a fulcrum, and loaded with two weights in equilibrio ; for the actions of the connecting springs substitute the corpuscular forces ; and the result will resemble that of the hypothesis.

Now, as there is something that is at least analogous to a change of distance of the particles, and a concomitant change of the intensity of the connecting forces, we may express this in the same way that we arc accustomed to do in similar cases. Let A and B (fig. 1) represent the cen­tres of two parti­cles of a coherent elastic body in their quiescent inactive state, and let us consi­der only the me­chanical condi­tion of B. The body may be stretched. In this case the distance AB of the particles may become AC. In this state there is something which makes it necessary to employ a force to keep the particles at this dis­tance. C has a tendency towards A, or we may say that A attracts C. We may represent the magnitude of this tendency of C *towards* A, or this attraction of A, by a line C*c* perpen­dicular to AC. Again, the body may be compressed, and the distance AB may become AD. Something obliges us to employ force to continue this compression, and D tends *from* A, or A appears to *repel* D. The intensity of this tendency or repulsion may be represented by another per­pendicular D*d ;* and, to represent the different directions of these tendencies, or the different nature of these ac­tions, we may set D*d* on the opposite side of AB. It is in this manner that Boscovich has represented the ac­tions of corpuscular forces in his celebrated Theory of Natural Philosophy. Newton had said, that as the great movements of the solar system were regulated by forces operating at a distance, and varying with the distance, so he strongly suspected *(valde suspicor)* that all the pheno­mena of cohesion, with all its modifications in the different sensible forms of aggregation, and in the phenomena of chemistry and physiology, resulted from the similar agency of forces varying with the distance of the particles. The learned Jesuit pursued this thought ; and has shown, that if we suppose an ultimate atom of matter endowed with powers of attraction and repulsion, varying, both in kind and degree, with the distance, and if this force be the same in every atom, it may be regulated by such a relation to the distance from the neighbouring atom, that a collection of such may have all the sensible appearance of bodies in their different forms of solids, liquids, and vapours, elastic or un­elastic, and endowed with all the properties which we per­ceive, by whose immediate operation the phenomena of mo­tion by impulse, and all the phenomena of chemistry, and of animal and vegetable economy, may be produced. He shows, that notwithstanding a perfect sameness, and even a great simplicity, in this atomical constitution, there will result from this union all that unspeakable variety of form and property which diversifies and embellishes the face of nature. We shall take another opportunity of giving such an account of this celebrated work as it deserves. We mention it only by the by, as far as a general notion of it will be of some service on the present occasion. For this purpose, we just observe that Boscovich conceives a par­ticle of any individual species of matter to consist of an un­known number of particles of simpler constitution; each of which particles, in their turn, is compounded of particles still more simply constituted, and so on through an unknown number of orders, till we arrive at the simplest possible con­stitution of a particle of tangible matter, susceptible of length, breadth, and thickness, and necessarily consisting of four atoms of matter. And he shows that the more com­plex we suppose the constitution of a particle, the more must the sensible qualities of the aggregate resemble the observed qualities of tangible bodies. In particular, he shows how a particle may be so constituted, that although it act on one other particle of the same kind through a con­siderable interval, the interposition of a third particle of the same kind may render it totally, or almost totally, in­active ; and therefore an assemblage of such particles would form such a fluid as air. All these curious inferences are made with uncontrovertible evidence ; and the greatest en­couragement is thus given to the mathematical philosopher to hope, that by cautious and patient proceeding in this way, we may gradually approach to a knowledge of the laws of cohesion, that will not shun a comparison even with the Principia of Newton. No step can be made in this investigation, but by observing with care, and generalizing with judgment, the phenomena, which are abundantly nu­merous, and much more at our command than those of the great and sensible motions of bodies. Following this plan, we observe,

4. It is a matter of fact, that every body has some degree of compressibility and dilatability ; and when the changes of dimension are so moderate that the body completely re­covers its original dimensions on the cessation of the chang­ing force, the extensions or compressions are sensibly pro­portional to the extending of compressing forces ; and there­fore *the connecting forces are proportional to the distances of the particles from their quiescent, neutral, or inactive posi­tions.* This seems to have been first viewed as a law of nature by the penetrating eye of Dr Robert Hooke, one of the most eminent philosophers of the last century. He pub­lished a cipher, which he said contained the theory of springi­ness and of the motions of bodies by the action of springs. It was this, *c e i i i n o s s s t t u u.* When explained in his dissertation, published some years after, it was *ut tensio sic vis.* This is precisely the proposition now asserted as a general fact, a law of nature. This dissertation is full of curious observations of facts in support of his assertion. In his application to the motion of bodies, he gives his noble discovery of the balance-spring of a watch, which is found­ed on this law. The spring, as it is more and more coiled up, or unwound, by the motion of the balance, acts on it with a force proportional to the distance of the balance from its quiescent position. The balance, therefore, is acted on by an accelerating force, which varies in the same manner as the force of gravity acting on a pendulum swinging in a cycloid. Its vibrations therefore must be performed in equal time, whether they are wide or narrow. In the same dissertation Hooke mentions all the facts which John Ber­noulli afterwards adduced in support of Leibnitz’s whimsical doctrine of the force of bodies in motion, as the doctrine of the *vires viva ;* a doctrine which Hooke might justly have claimed as his own, had he not seen its futility.

Experiments made since the time of Hooke show that this law is strictly true in the extent to which we have li­mited it, viz. in all the changes of form which will be com­pletely undone by the elasticity of the body. It is nearly true to a much greater extent. James Bernoulli, in his dis­