greatly deranged. The whole gradation may be moſt diſtinctly obſerved in a piece of glaſs or hard ſealing wax. In the ordinary form glass is perhaps the moſt completely elaſtic body that we know, and may be bent till juſt ready to ſnap, and yet completely recovers its firſt form, and takes no ſet whatever ; but when heated to ſuch a degree as juſt to be viſible in the dark, it loſes its brittleneſs, and becomes ſo tough that it cannot be broken by any blow ; but it is no longer elaſtic, takes any ſet, and keeps it. When more heated, it becomes as plaſtic as clay : but in this ſtate is re­markably diſtinguiſhed from clay by a quality which we may call VISCIDITY, which is ſomething like elaſticity, of which clay and other bodies purely plaſtic exhibit no appearance. This is the joint operation of ſtrong adheſion and ſoftneſs. When a rod of perfectly soft glaſs is ſuddenly ſtretched a little, it does not at once take the ſhape which it acquires after ſome little time. It is owing to this, that in taking the impreſſion of a ſeal, if we take off the ſeal while the wax is yet very hot, the ſharpneſs of the impreſſion is destroyed immediately. Each part drawing its neighbour, and each part yielding, the prominent parts are pulled down and blunted, and the ſharp hollows are pulled upwards and alſo blunted. The ſeal muſt be kept on till all has become not only ſtiſſ but hard.

This viſcidity is to be obſerved in all plaſtic bodies which are homogeneous. It is not obſerved in clay, becauſe it is not homogeneous, but conſiſts of hard particles of the ar­gillaceous earth flicking together by their attraction for water. Something like it might be made of finely pow­dered glaſs and a clammy fluid ſuch as turpentine. Viscidſty has all degrees of ſoftneſs till it degenerates to ropy fluidity like that of olive oil. Perhaps ſomething of it may be found even in the moſt perfect fluid that we are acquaint­ed with, as we obſerved in the experiments for aſcertaining ſpecific gravity.

There is in a late volume of the Philoſophical Tranſactions a narration of experiments, by which it appears that the thread of the ſpider is an exception to our firſt general law, and that it is perfectly ductile. It is there aſſerted, that a long thread of goſſamer, furniſhed with an index, takes any poſition whatever ; and that though the index be turned round any number of times (even many hundreds), it has no tendency to recover its firſt form. The thread takes completely any ſet whatever. We have not had an opportunity of repeating this experiment, but we have distinctly obſerved a phenomenon totally inconſistent with it. If a fibre of goſſamer about an inch long be held by the end horizontally, it bends downward in a curve like a ſlender slip of whalebone or a hair. If totally devoid of elaſti­city, and perfectly indifferent to any ſet, it would hang down perpendicularly without any curvature.

When ductility and elaſticity are combined in different proportions, an immenſe variety of ſenſible modes of aggre­gation may be produced. Some degree of both are pro­bably to be obſerved in all bodies of complex conſtitution ; that is, which conſiſt of particles made up of many different kinds of atoms. Such a conſtitution of a body muſt afford many situations permanent, but eaſily deranged.

In all theſe changes of disposition which take place among the particles of a ductile body, the particles are at ſuch diſtance that they ſtill cohere. The body may be ſtretched a little ; and on removing the extending force, the body shrinks into its firſt form. It alſo reſiſts moderate compreſſions ; and when the compreſſing force is removed, the body ſwells out again. Now the corpuſcular fact here is, that the particles are acted on by attractions and repulſions, which balance each other when no external force is acting on the body, and which augment as the particles are made, by any external cauſe, to recede from this ſituation of mutu­al inactivity ; for since force is requiſite to produce either the dilatation or the compreſſion, and to maintain it, we are obliged, by the conſtitution of our minds, to infer that it is oppoſed by a force accompanying or inherent in every particle of dilatable or compreſſible matter ; and as this neceſſity of employing force to produce a change indicates the agency of theſe corpuſcular forces, and marks their kind, according as the tendencies of the particles appear to be toward each other in dilatation, or from each other in com­preſſion ; ſo it alſo meaſures the degrees of their intensity. Should it require three times the force to produce a double compreſſion, we muſt reckon the mutual repulſions triple when the compreſſion is doubled ; and ſo in other inſtances. We ſee from all this that the phenomena of coheſion indicate ſome relation between the intenſity of the force of coheſion and the diſtance between the centres of the particles. To diſcover this relation is the great problem in corpuſcular mechaniſm, as it was in the Newtonian inveſtigation of the force of gravitation. Could we diſcover this law of action between the corpuſclcs with the ſame certainty and diſtinctneſs, we might with equal confidence say what will be the reſult of any poſition which we give to the particles of bodies ; but this is beyond our hopes. The law of gra­vitation is ſo simple that the diſcovery or detection of it amid the variety of celeſtial phenomena required but one ſtep ; and in its own nature its poſſible combinations ſtill do not greatly exceed the powers of human reſearch. One is almoſt diſpoſed to ſay that the Supreme Being has exhibited it to our reaſoning powers as sufficient to employ with ſucceſs our utmoſt efforts, but not ſo abſtruſe as to diſcourage us from the noble attempt. It ſeems to be otherwiſe with reſpect to coheſion. Mathematics informs us, that if it de­viates ſenſibly from the law of gravitation, the ſimpleſt com­binations will make the joint action of ſeveral particles an almoſt impenetrable myſtery. We muſt therefore content ourſelves, for a long while to come, with a careful obſervation of the ſimpleſt cafes that we can propoſe, and with the diſ­covery of ſecondary laws of action, in which many parti­cles combine their influence. In pursuance of this plan, we observe,

3dly, That whatever is the ſituation of the particles of a body with reſpect to each other, when in a quieſcent ſtate, they are kept in theſe ſituations by the balance of oppoſite forces. This cannot be refuſed, nor can we form to ourſelves any other notion of the ſtate of the particles of a body. Whether we suppoſe the ultimate particles to be of certain magnitudes and ſhapes, touching each other in single points of coheſion ; or whether we (with Boſcovich) conſider them as at a diſtance from each other, and acting on each other by attractions and repulſions—we muſt acknow­ledge, in the firſt place, that the centres of the particles (by whoſe mutual diſtances we muſt eſtimate the diſtance of the particles) may and do vary their diſtances from each other. What else can we say when we obſerve a body increaſe in length, in breadth, and in thickneſs, by heating it, or when we ſee it diminiſh in all theſe dimenſions by an ex­ternal compreſſion ? A particle, therefore, ſituated in the midſt of many others, and remaining in that ſituation, muſt be conceived as maintained in it by the mutual balancing of all the forces which connect it with its neighbours. It is like a ball kept in its place by the oppoſite action of two ſprings. This illuſtration merits a more particular applica­tion. Suppoſe a number of balls ranged on the table in the angles of equilateral triangles, and that each ball is connected with the six which lie around it by means of an elaſtic wire curled like a cork-screw ; ſuppoſe ſuch another ſtratum of balls above this, and parallel to it, and ſo placed that