

culated. Can any reason be assigned why the law which we find in operation *must* obtain? Can any be assigned why it *should* obtain?

The answer to this is, that no reason, at all satisfactory, can be given why such a law must, of necessity, be what it is; but that very strong reasons can be pointed out why, for the beauty and advantage of the system, the present one is better than others. We will point out some of these reasons.

1. In the first place, the system could not have subsisted, if the force had followed a *direct* instead of an inverse law, with respect to the distance; that is, if it had increased when the distance increased. It has been sometimes said, that "all direct laws of force are excluded on account of the danger from perturbing forces;"* that if the planets had pulled at this earth, the harder the further off they were, they would have dragged it entirely out of its course. This is not an exact statement of what would happen: if the force were to be simply in the direct ratio of the distance, any number of planets might revolve in the most regular and orderly manner. Their mutual effects, which we may call perturbations if we please, would be considerable; but these perturbations would be so combined with the unperturbed motion, as to produce a new motion not less regular than the other. This curious result would follow, that every body in the system would describe, or seem to describe, about every other, an exact elliptical orbit; and that the times of the revolution of every body in its orbit would be all equal. This is proved by Newton, in the sixty-fourth proposition of the Principia. There would be nothing to prevent all the planets, on this supposition, from moving round the sun in orbits exactly circular, or nearly circular, according to the mode in which they were set in motion.

But though the perturbations of the system would

* Paley.