

he did not require these new planets for his solar system founded upon the properties of the regular solids; it was only necessary to modify the distances of the old planets a little arbitrarily. ("Non reperies novos et incognitos planetas, ut paulo antea, interpositos, non ea mihi probatur audacia; sed illos veteres *parum admodum luxatos.*"*—*Myst. Cosmogr.*, p. 10.) The ideal tendencies of Kepler were so analogous to those of the Pythagorean school, and still more to those of Plato expressed in the *Timæus*,† that in the same way as Plato (*Cratyl.*, p. 409) assumed, in addition to the differences of tone in the planetary spheres, those of color, Kepler likewise instituted some experiments (*Astron. Opt.*, cap. 6, p. 261) for the purpose of detecting the colors of the planets. Even the great Newton, always so precise in his conclusions, was inclined, as Prevost has already remarked (*Mém. de l'Acad. de Berlin* for 1802, p. 77 and 93), to reduce the di-

Mercurium, quos duos forte ob exilitatem non videamus, iisque sua tempora periodica ascripsi. Sic enim existimabam me aliquam æqualitatem proportionum effecturum, quæ proportiones inter binos versus Solem ordine minuerentur, versus fixas augescerent; ut propior est Terra Veneri quantitate orbis terrestris, quam Mars Terræ, in quantitate orbis Martis. Verum hoc pacto neque unius planetæ interpositio sufficiebat ingenti hiatu, Jovem inter et Martem: manebat enim major Jovis ad illum novum proportio, quam est Saturni ad Jovem. Rursus alio modo exploravi." "When this plan therefore failed, I tried to reach my aim in another way, of, I must confess, singular boldness. Between Jupiter and Mars I interposed a new planet, and another also between Venus and Mercury, both which it is possible are not visible on account of their minuteness, and I assigned to them their respective periods. For in this way I thought that I might in some degree equalize their ratios, which ratios regularly diminished toward the Sun, and enlarged toward the fixed stars, as the Earth is nearer to Venus than Mars is to the Earth. But even in this way the interposition of one planet did not supply the great chasm between Jupiter and Mars, for the ratio between Jupiter and the supposed new planet still remained greater than between Saturn and Jupiter. Again I tried in another way." Kepler was twenty-five years of age when he wrote this. It may be seen how his restless mind formed hypotheses, and again quickly forsook them, to deceive himself with others. He always retained a hopeful faith in being able to discover numerical laws where matter had aggregated under the manifold disturbances of attractive forces (disturbances whose combinations are incalculable, as are so many past events and formations on account of our ignorance of the accompanying conditions), aggregated into globes, revolving in orbits, sometimes simple and almost parallel, sometimes grouped together and surprisingly complicated.

* ["You will not find new and unknown planets, as I said before; that boldness I do not approve of; but you will find the old ones a little altered in position."]

† [*Plato's Works translated*, vol. ii., Bohn's Classical Library.]