

once *physical* and *chemical* actions. In addition to gravitation, which must be considered as a primitive force in nature, we observe that attractions of another kind are at work around us, both in the interior of our planet and on its surface. These forces, to which we apply the term *chemical affinity*, act upon molecules in contact, or at infinitely minute distances from one another,\* and which, being differently modified by electricity, heat, condensation in porous bodies, or by the contact of an intermediate substance, animate equally the inorganic world and animal and vegetable tissues. If we except the small asteroids, which appear to us under the forms of aërolites and shooting stars, the regions of space have hitherto presented to our direct observation physical phenomena alone; and in the case of these, we know only with certainty the effects depending upon the quantitative relations of matter or the distribution of masses. The phenomena of the regions of space may consequently be considered as influenced by simple dynamical laws—the laws of motion.

The effects that may arise from the specific difference and the heterogeneous nature of matter have not hitherto entered into our calculations of the mechanism of the heavens. The only means by which the inhabitants of our planet can enter into relation with the matter contained within the regions of space, whether existing in scattered forms or united into large spheroids, is by the phenomena of light, the propagation of luminous waves, and by the influence universally exercised by the force of gravitation or the attraction of masses. The existence of a periodical action of the sun and moon on the variations of terrestrial magnetism is even at the present day extremely problematical. We have no direct experimental knowledge regarding the properties and specific qualities of the masses circulating in space, or of the matter of which they are probably composed, if we except what may be derived from the fall of aërolites or meteoric stones, which, as we have already observed, enter within the limits of our terrestrial sphere. It will be sufficient here to remark, that the direction and the excessive velocity of projection (a velocity wholly planetary) manifested by these masses, render it more than probable that

\* On the question already discussed by Newton, regarding the difference existing between the attraction of masses and molecular attraction, see Laplace, *Exposition du Système du Monde*, p. 384, and supplement to book x. of the *Mécanique Céleste*, p. 3, 4; Kant, *Metaph. Anfangsgründe der Naturwissenschaft*, *Säm. Werke*, 1839, bd. v., s. 309 (*Metaphysical Principles of the Natural Sciences*); Pectet, *Physique*, 1838, vol. i., p. 59–63.