

planets about the sun, and of the satellites round their primaries, &c., having led us to the general conception of an attractive force exerted by every particle of matter in the universe on every other, according to the law to which we attach the name of gravitation; when we would verify this induction, we must set out with assuming this law, considering the whole system as subjected to its influence, and implicitly obeying it, and nothing interfering with its action; we then, for the first time, perceive a train of modifying circumstances which had not occurred to us when reasoning upwards from particulars to obtain the fundamental law; we perceive that *all the planets* must attract *each other*, must therefore draw each other out of the orbits which they would have if acted on only by the sun; and as this was never contemplated in the inductive process, its validity becomes a question, which can only be determined by ascertaining precisely how great a deviation this new class of mutual actions will produce. To do this is no easy task, or rather it is the most difficult task which the genius of man has ever yet accomplished: still it *has* been accomplished by the mere application of the general laws of dynamics; and the result (undoubtedly a most beautiful and satisfactory one) is, that all those observed deviations in the motions of our system which stood out as exceptions (§ 154.), or were noticed as residual phenomena, and reserved for further inquiry (§ 158.), in that imperfect view of the subject which we got in the subordinate process by which we rose to our general conclusion, prove to be the immediate consequences of the above-mentioned mutual actions. As such, they are neither exceptions nor residual facts, but fulfilments of general rules, and essential features in the statement of the case, *without* which our induction would be invalid, and the law of gravitation positively untrue.

(214.) In the theory of gravitation, the law is all in all, applying itself at once to the materials, and directly producing the result (A). But in many other cases we have to consider not merely the laws which regulate the actions of our ultimate causes, but a system of mechan-