

creation of fresh branches of science more and more remote from common observation.

(175.) Physical astronomy affords numerous and splendid instances of this. The law, for example, which asserts that the planets are retained in their orbits about the sun, and satellites about their primaries, by an attractive force, decreasing as the square of the distances increases, comes to be verified in each particular case by deducing from it the exact motions which, under the circumstances, ought to take place, and comparing them with fact. This comparison, while it verifies in general the existence of the law of gravitation as supposed, and its adequacy to explain all the principal motions of every body in the system, yet leaves some small deviations in those of the planets, and some very considerable ones in that of the moon and other satellites, still unaccounted for; residual phenomena, which still remain to be traced up to causes. By further examining these, their causes have at length been ascertained, and found to consist in the mutual actions of the planets on each other, and the disturbing influence of the sun on the motions of the satellites.

(176.) But a law of nature has not that degree of generality which fits it for a stepping-stone to greater inductions, unless it be *universal* in its application. We cannot rely on its enabling us to extend our views beyond the circle of instances from which it was obtained, unless we have already had experience of its power to do so; unless it actually *has* enabled us, before trial, to say what will take place in cases analogous to those originally contemplated; unless, in short, we have studiously placed ourselves in the situation of its antagonists, and even perversely endeavored to find exceptions to it without success. It is in the precise proportion that a law once obtained endures this extreme severity of trial, that its value and importance are to be estimated; and our next step in the verification of an induction must therefore consist in *extending* its application to cases not originally contemplated; in studiously varying the circumstances under which our causes act, with a view to