

or gain in the intervals, and the whole amount of the times of fall so repeated measured by a clock; and if, at the same time, the resistance of the air can be rendered *exactly alike* for all the bodies tried, we have here Galileo's trial in a much more refined state: and it is evident that almost unlimited exactness may be obtained. Now, all this Newton accomplished by the simple and elegant contrivance of enclosing in a hollow pendulum the same weights of a great number of substances the most different that could be found in all respects, as gold, glass, wood, water, wheat, &c.,\* and ascertaining the time required for the pendulum so charged to make a great number of oscillations; in each of which it is clear the weights had to fall, and be raised again successively, without loss of time, through the same *identical* spaces. Thus any difference, however inconsiderable, that might exist in the time of one such fall and rise, would be multiplied and accumulated till they became sensible. And none having been discovered by so delicate a process in any case, the law was considered verified both in respect of generality and exactness. This, however, is nothing to the verifications afforded by astronomical phenomena, where the deviations, if any, accumulate for thousands of years, instead of a few hours.

(180.) The surest and best characteristic of a well-founded and extensive induction, however, is when verifications of it spring up, as it were, spontaneously, into notice, from quarters where they might be least expected, or even among instances of that very kind which were at first considered hostile to them. Evidence of this kind is irresistible, and compels assent with a weight which scarcely any other possesses. To give an example: M. Mitscherlich had announced a law to this effect—*that* the chemical elements of which all bodies consist are susceptible of being classified in distinct groups, which he termed *isomorphous* groups; and *that* these groups are so related, that when similar combinations are formed of individuals belonging to two, three or

\* Principia, book iii. prop. 6.