

ted upon Laplace's theory, and thus it was never fairly brought to the test.

It is, perhaps, remarkable, considering all the experience which astronomy had furnished, that men should have expected to reach the completion of this branch of science by improving the mathematical theory, without, at the same time, ascertaining the laws of the facts. In all other departments of astronomy, as, for instance, in the cases of the moon and the planets, the leading features of the phenomena had been made out empirically, before the theory explained them. The course which analogy would have recommended for the cultivation of our knowledge of the tides, would have been, to ascertain, by an analysis of long series of observations, the effect of changes in the time of transit, parallax, and declination of the moon, and thus to obtain the laws of phenomena; and then proceed to investigate the laws of causation.

Though this was not the course followed by mathematical theorists, it was really pursued by those who practically calculated Tide-tables; and the application of knowledge to the useful purposes of life being thus separated from the promotion of the theory, was naturally treated as a gainful property, and preserved by secrecy. Art, in this instance, having cast off her legitimate subordination to Science, or rather, being deprived of the guidance which it was the duty of Science to afford, resumed her ancient practices of exclusiveness and mystery. Liverpool, London, and other places, had their Tide-tables, constructed by undivulged methods, which methods, in some instances at least, were handed down from father to son for several generations as a family possession; and the publication of new Tables, accompanied by a statement of the mode of calculation, was resented as an infringement of the rights of property.

The mode in which these secret methods were invented, was that which we have pointed out;—the analysis of a considerable series of observations. Probably the best example of this was afforded by the Liverpool Tide-tables. These were deduced by a clergyman named Holden, from observations made at that port by a harbor-master of the name of Hutchinson; who was led, by a love of such pursuits, to observe the tides carefully for above twenty years, day and night. Holden's Tables, founded on four years of these observations, were remarkably accurate.

At length men of science began to perceive that such calculations were part of their business; and that they were called upon, as the