trary, the tide is much diminished at promontories under certain circumstances. Thus at the south-east point of Ire­land (at Arklow, Glynn, and Cahore) the greatest range is not more than three feet, while at a little distance along the coast each way it becomes twelve or thirteen feet; and this small amount of the tide on one side of the channel is the more remarkable, because it is just opposite the enor­mous range which occurs in the Bristol Channel, amount­ing at Chepstow to sixty feet The smallness of the tide in the middle of wide oceans, as at the islands of the Pacific, where it amounts only to two or three feet, affords no proof that this would be the amount on a globe entirely covered with water; for the interruption produced by the continents entirely modifies the direction, height, or other circum­stances of the general tide. This interruption will dimi­nish, and in some cases entirely obstruct, the original tide-wave; and when a derivative tide does enter the oceans in question, it is diffused over so wide a space that its height is greatly reduced ; so that in the same manner as the tides are augmented by convergence, they are diminished by diffu­sion.

Mr Lubbock and Mr Whewell seem to have adopted the most promising mode of advancing our knowledge of the tides. This is to examine the laws which can be collected from observations, taking so great a number of these that the effects of all accidental causes may disappear in the ave­rage results. The collection registered at the London docks, and first discussed by Mr Dession under the direction of Mr Lubbock, afforded an admirable opportunity for such an examination, since it included 13,073 observations, and a period of nineteen years, from January 1, 1808, to Decem­ber 31, 1826. But it is very unlikely that the discussion, however systematica], of observations at any one place, should exhibit clearly the true principles of the theory ; and, besides, with respect to the phenomena of the tides at Lon­don, they are in some measure masked by a curious com­bination of circumstances, namely, by the mouth of its river being in a sort of inland sea, and at a part of an island turn­ed away from the side against which the tide-wave impinges, and so situated, too, that the progress of the tide round the one end of this island occupies about half a day more than that round the other. These two tides, being thus of dif­ferent ages, and meeting near the mouth of the Thames, must affect the character of the tide at London. It will no doubt require the accumulation and discussion of many large collections of observations nt various places to put us in the certain possession even of the empirical laws of the phenomena; and whether or not this be the only practi­cable way of arriving at the true theory, it is at least that to which, founding our expectations on the past history of science, we may look with most hope. When we consider the enormous accumulation of observed phenomena and empirical laws which preceded the discovery of the true principles of the celestial motions, we may reasonably sup­pose that we are only at the outset of what is requisite to obtain the same success with regard to the tides. It is therefore to be wished that such additional observations may be made and discussed as may most speedily lead to a complete and scientific knowledge of the subject.

The object, in examining a large collection of observa­tions, being to ascertain the manner in which the positions and distances of the heavenly bodies affect the time and height of the tide, the mode of proceeding is to examine how these two quantities depend upon the right ascension, declination, and parallax of the sun and moon, and upon other astronomical elements, should such be required. The mean time of high water will be found to be affected by inequalities depending on the elements just mentioned ; and the law and amount of these inequalities for any particular place may be collected from observations made there, with­out any reference to theory, provided the observations be sufficiently numerous, and their circumstances sufficiently varied. For it was in this manner that the greater inequa­lities of the moon’s motion, the variation, the evection, and annual equation, were detected by observation, long before the celestial motions were referred to their true causes. Indeed, in the history of science, the instances seem to be comparatively few in which the general laws of the pheno­mena have been pointed out by the theory, before they had been gathered, at least approximately, from observation. The laws thus empirically obtained, besides serving for pre­dicting the tides, may be used either as tests of the exist­ing theories, or as suggestions for the improvements of those portions of mathematical hydraulics on which the true theory may be expected to depend. This, besides, is the way in which we are most likely to discover how the theory must be applied.

The best mode of obtaining from a considerable series of tide observations, at the same place, the establishment and age of the tide, which are the principal elements necessary for constructing tide-tables of the time for any particular place, appears to be that which was employed by Mr Lub­bock and Mr Whewell. The times of high water are ar­ranged according to the half-hour of the moon’s transit on the day of the tide. Thus, all those tides which took place when the moon passed the meridian between 0h∙ and 0h∙ 30m∙ apparent time, are put in one class ; all those when the moon passed between 0h∙ 30m∙ and 1h∙ in another class, and so on. The mean of all the times of transit in each class is taken, and the mean of the lunitidal intervale, or those between the times of transit and high water. We have thus a series of times of transit, with the corresponding lunitidal intervals. The interpolation for other times is most easily performed by means of a curve drawn on paper, ruled into small squares. The times of transit being laid down as abscissæ, the lunitidal intervals are erected as ordinates, and a curve is drawn approximating, as far as a regular form will allow, to the points thus found. This curve gives the intervals for any times of transit, and a table may be constructed by means of it. A similar course is followed for the heights; but for this and various particulars, we beg to refer to the Philosophical Transactions.

It has hitherto been usual, in discussing tide observa­tions for obtaining from them the laws of the phenomena, to proceed upon the supposition that a series of several successive years was requisite, in order that the accidental irregularities might be compensated in the *means of* the observations, and the effects of the lunar inequalities thus come clearly into view. But in the Phil. Trans. for 1838, p. 231, Mr Whewell has shown that the laws of the phe­nomena, and the effects of the inequalities, may be deduced with considerable exactness from shorter series of observa­tions; for example, from those of one year. He conceives that such an investigation will be of value in several ways. If the principal elements of tide-tables for each particular place can be obtained with moderate accuracy from short series properly discussed, the formation of such indepen­dent tide-tables for different places and times will become far less laborious, and may therefore be expected to be far more commonly practised. This will be a great advan­tage, not only because the tide-tables will thus become better, but also because several important questions may thus be settled ; for instance, whether and how far the laws of tide phenomena change from place to place, and from time to time. But it is besides desirable to compare the results of short series with those of long ones, in order to appreciate the *practical* accuracy of our tide-tables. If, for instance, the mean of nineteen years gave a very exact rule for the effect of lunar parallax, while each single year deviated widely from this rule, it would be clear that the individual observations must be commonly affected by casual irregularities considerably greater than the parallax