newest-published text-books of the science is being bought by the public at the rate of a thousand copies a month. Under these circumstances it would be remarkable if all the works put before the public were of equal scientific merit, for such a demand cannot but tempt into the field the semi-scientific bookmaker who is ever ready to produce something to meet a popular taste. The work before us must, we fear, be classed with the semi-scientific. Its authors, so far as we are aware, are gentlemen who have yet to make their mark in the scientific world, and who, though not ill-informed in a general kind of way as to the applications of the science, cannot be said to have added by their present work to the scientific knowledge of the subject. The work opens with an account of the history of lighting in general from the days of Greece and Rome; and it devotes no inconsiderable part of its pages to the early history of electric lighting. We observe, by the way, that the authors fall into the error of putting Davy's discovery of the voltaic arc so late as the year 1813, when he experimented with his large battery of 200 cells. But he had discovered the arc at least nine years before that date. The manufacture of carbons for electric light claims half a dozen pages. Not too much when there is so much dependent on the quality of the carbon, and when carbons are as bad as they are. But we were not aware that those of M. Napoli were so superior to all others as to deserve a monopoly of description. The process of covering the exterior of the carbon-rods with an electrodeposited coating of copper is stated by the authors to have been first adopted in 1875 by M. Reynier, whose semi-incandescent lamp and modified Daniell's battery are described in effusive detail, though neither of these inventions can be said to be of capital importance. The chief feature in the book is that part which deals with the various systems of electric incandescent lamps. These are described very fully and with copious illustrations. The authors appear to prefer the system of Edison, for whom they have a great admiration, of whom they give a portrait (an honour shared by M. Gramme only), and concerning whom they narrate very naïvely several gossipy tales—how he and his assistants were nearly poisoned by mercury vapour when they first tried to work Sprengel pumps, and how he sent an expedition south for the metal thorium. The section devoted to dynamo-electric machines is also well illustrated, and fairly descriptive, though the style of exposition is of the "popular" order. The work concludes with a notice of the application of electric light to lighthouses, to naval and military warfare, and to the stage. With respect to the first of these applications, the authors attribute to Fresnel the application of dioptric lenses to lighthouses. Is it ignorance, or is it patriotic bigotry that is to blame for their obliviousness of the fact that Brewster suggested this very application in 1812, ten years before Fresnel, and that in 1820 he had already taken steps to urge the matter upon the notice of a too deliberate officialism? Many excellent woodcuts adorn the pages of the work of MM. Alglave and Boulard, which will doubtless make it a welcome book for many a library table where popular science is in request.

*An Elementary Treatise on the Tides based upon that of the Late Sir J. W. Lubbock, Bart., F.R.S.;* to which is added a newly-devised Method of Computation of the Heights of High Water at Liverpool, with Factors for other Ports, and Tables adopted by the Admiralty. By James Pearson, M.A., F.R.A.S. (London: J. D. Potter; Fleetwood: W. Porter and Son, 1881.)

THIS Treatise on the Tides, by the Rev. J. Pearson, M.A., F.R.A.S., contains an interesting historical sketch of tidal theories, extending from an early period to the present time; and while referring to the slow progress made in our knowledge of tidal phenomena, assures the inquirer of the interest attending the investigation. The researches of Newton, Bernouilli, La Place, and others, had gradually established a theory which, from the discussion of many observations made at ports in the United Kingdom by Sir J. Lubbock, brought into practical use a series of tables by which the times and the heights of high water at certain places, mainly on the shores of the United Kingdom, could be computed with an accuracy sufficient for the requirements of seamen, and others interested, especially the proprietors of docks. Based on the general results of Sir J. Lubbock's labours, the author, from observations extending over several years, has introduced tables auxiliary to those heretofore employed, for computing the heights of high water at Liverpool, where the tides have occasionally the great range of thirty-three feet. The results of these predictions (as compared with observation) show that the course of the "diurnal inequality"—previously disregarded—has by their aid been successfully traced. On the coasts of Great Britain generally, the diurnal inequality is not so important a factor as it is at Liverpool, at which place it amounts at times to one foot or more. The treatise cannot fail to be received with interest and to encourage attention to the subject.

## LETTERS TO THE EDITOR

*[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*

*[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]*

### The Movements of Jupiter's Atmosphere

The reference to the belts of Jupiter contained in my article on the geological activity of the tides (NATURE, vol. xxv. p. 213), was perhaps superfluous, for the subject is only collaterally connected with the points there under discussion; but as Mr. Mattieu Williams has commented on what I said, I should like to make a few remarks on his letter. Notwithstanding what he says I am still inclined to hold that the time-honoured explanation of the belts of Jupiter is the true one. In that explanation the terms trade and anti-trade winds are, I conceive, used in a somewhat extended sense as a consequence of thermal causes, and without reference to the existence of a solid nucleus, a current is supposed to set upwards in equatorial regions and then to spread out into higher latitudes; here the fluid has more moment of momentum than is adapted for the latitude in which it finds itself, and accordingly moves relatively to the subjacent matter in the direction of the planet's rotation, and forms an anti-trade wind. Conversely the trade winds arise from fluid moving into lower latitudes, when it has a deficiency of moment of momentum. Such an explanation seems to serve equally to explain the unequal rotation of the surface of the sun in different latitudes, and the Jovian belts.

The trade and anti-trade winds are essentially a thermodynamic effect, and in my paper I expressed an opinion that they might be partly due to the heat of the Jovian nucleus. It seems to be generally assumed that the great rapidity of that planet's rotation is a sufficient cause for the great violence of the supposed trade-winds which produce the belts. But my chief object in referring to the matter was because rapidity of rotation is not a sufficient explanation, without a statement as to the mode of reinforcement of the thermodynamic causes. Now the great distance of Jupiter from the sun largely weakens those causes, and it seems to me that there are only two ways in which they can be strengthened, viz. first by the large amount of gas on which the solar radiation has to work, and secondly, by the heat of the nucleus.

With regard to the deductions to be drawn from the low specific gravity of Jupiter, I may mention that in 1876 I pointed out that the observed ellipticity of the planet's figure can only be explained on the assumption of great density of the central portions of the planet. Taking indeed the best data attainable, I showed that the mean density of Jupiter must be about 70 times as great as the superficial density, if we follow Laplace