

ledge of chemistry to comprehend such a list of names and formulæ as is contained in the foregoing quotation. A book constructed on educational lines should not so readily run into details, and should never do so without sufficient explanatory text.

Taking the book generally, it is better than many others of its class, but little more can be said for it. Every geologist will, however, endorse the prefatory remark that "no text-book, however large, can impart an adequate knowledge of geology unless supplemented and controlled by actual contact with the facts of nature."

Annual Report of the Geological Survey of Canada. New series. Vol. vii. 1894. (Ottawa: S. E. Dawson, 1896.)

THIS large volume of over 1200 pages contains, in addition to the Summary Reports of the operations of the Survey for 1894, seven detailed reports on certain portions of the Dominion, and is accompanied by eleven geological maps.

The Summary Report shows that geological work is being carried on by the large staff of the Survey in every part of the Dominion. Especial mention is made of the trial borings now being put down at Athabasca Landing in the North-west Territories, where there is good reason to believe large supplies of oil will be obtained from the Devonian rocks at a depth of about 1500 feet. An account is also given of the recent advances in the development of the mining industry of British Columbia, where of late years such extensive mineral deposits have been discovered, as well as of the explorations in the Labrador peninsula carried out by Mr. Low, who has discovered in this inhospitable region deposits of iron ore which are believed to surpass in size any that have hitherto been discovered in North America.

Of the special reports, two deal with British Columbia: one, by Dr. G. M. Dawson, containing a description of a portion of the interior plateau of that province in the Kamloops district; and the other, by Mr. R. G. McConnell, giving an account of the explorations of the Finlay and Omineca Rivers. These are followed by a report on the country about Red Lake, in Keewatin, by Mr. Dowling. The fourth report is by Dr. R. H. Ells and Dr. F. D. Adams, on a portion of the province of Quebec, comprising the island of Montreal and a part of the eastern townships to the south and east. Mr. Chalmers then describes the superficial geology of the provinces of New Brunswick, Nova Scotia, and Prince Edward Island; while, in the concluding reports, Dr. Hoffmann and Mr. Ingall treat of the chemical work of the Survey and the mineral statistics of the Dominion respectively. Dr. Dawson's report contains an excellent description of the interior plateau of British Columbia from a geological and geographical standpoint. The very extensive development of the Cambrian in this part of the Dominion is noted, as well as the continued volcanic activity from Cambrian to recent times, the volcanic materials, at a very modest computation, having a thickness of 20,000 feet.

Poems of George John Romanes. Pp. xvi + 108. (London: Longmans, Green, and Co., 1896.)

THIS small volume consists of a selection from the poems of the late Mr. George John Romanes. It contains two long poems entitled "A Memorial Poem to Charles Darwin," and "A Tale of the Sea." Both are fine and of a striking quality. Sonnets form the rest of the book, and in many of these the naturalist, as well as the poet, is revealed to us by the accurate descriptions of nature, and the many references to objects and phenomena connected with science. We may add that Mr. T. Herbert Warren, President of Magdalen College, Oxford, has written the introduction, in which he gives a short biographical sketch of the author.

NO. 1415, VOL. 55]

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 intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

The Pound as a Force, and the Expression of Concrete Quantities generally.

WHAT is Prof. John Perry tilting at in his educational tirade on page 50 of your issue for November 19? To judge from a friendly post-card asking me to reply, he seems to imagine that he is attacking physicists; but apart from this private information I should have imagined that he had in his mind a nearly extinct type of Cambridge text-book, and some—I do not know how many—belated schoolmasters.

Let me assure him, speaking no doubt for others but of most knowledge for myself, that if any student of mine could only express force in pounds and energy in foot-pounds I should be as disgusted as he himself.

One of the first things a student of physics has to learn is that no numerical exercise is fully worked out until it is expressed in units to which he and others are accustomed, and of which they can "feel" the magnitude. As an intermediate step such an expression as 10^7 F.P.S. or C.G.S. units is legitimate enough, but the final answer should be expressed in hours, or days, or other appropriate unit, if time is the subject; in miles, or millimetres, or inches, if it be a length; in hundredweights, or tons, or grammes, or pounds weight, if it be a force; and in ergs, or foot-pounds, or kilogramme-metres, or Joules, or even in kilowatt-hours, if energy be the quantity under consideration.

An educated student speaking to a workman should use the colloquial unit of the shire in which the works are situated; in addressing a foreign correspondent (if orders ever reach this country now from Germany, for instance), he should employ a less insular and more international system; he should, in fact, have no difficulty in making a specification in any conventional system of units to which he has the key.

Prof. Perry asks us to limit ourselves to the C.G.S. system on the one hand, and to the British gravitational system on the other; with those he thinks we can jog along, but with any others we are liable to make mistakes. Does he call that education? If this is the type of "finished engineering student" he is accustomed to, no wonder they "cannot get into works without paying high premiums." (Parenthetically I wonder what premium the Hopkinsons paid in order to be taken into works.) Surely he would not say to a youth training as a banker, "despise all *thalers* and *marks* as trumpery, let us have nothing but good English pounds, and then we shall know where we are, and make no mistakes."

Ah, but, he will say, these units are appropriate to different countries, and you must be able to adapt yourself to the coinage in travelling. Even so! Yet he would seek to limit the physicist, whose range of travel is as wide as the universe. Has he forgotten the variety of subjects with which physical science is concerned? Sometimes there is astronomical energy to be expressed, sometimes thermal, sometimes chemical energy, and sometimes electrical. Would he be content that his educated engineer should be able to express these in nothing but a unit appropriate to the pumping of water out of a mine? When an engineer sees the expression $\frac{1}{2}mv^2$ (which, by the way, he seldom does see; it is generally $wv^2/2g$ in his books, as if gravity were concerned in every transaction of the universe), he is not to think of it straight as momentum multiplied by velocity, or even as inertia multiplied by the square of a velocity, or as energy in any of its protean forms; he is to think of it as a number of foot-pounds. He cannot receive the data in any units whatever and bring out the answer in any other units whatever, one set for the French motor car driver, and another set for the owner, and another for the electrician; no, but he is to say, I must first have the mass given me in pounds, or I may make a mistake; then I must divide the number of pounds by a mystic number, viz. 32.18, in order to bring them to the particular kind of practical unit of inertia which my revered instructor so highly prized; and then I must be told the number of feet per second contained in the velocity (I should be confused by a specification in telegraph posts per minute or kilometres an hour); after that I can do the arithmetic quite nicely, and I remember that the answer always comes out in foot-pounds, which gives no trouble to any one; thus shall my employer not suspect me of being college-