

answers this question only as regards physical science, and his answer is "contained in that to another question, What is the object of the physical sciences?" The whole concludes with words of the late Prof. H. Smith on the function of mathematics in education.

ACOUSTICS

Hand-book of Acoustics. By T. E. Harris, B.Sc., Lecturer on Acoustics at the Tonic Sol-fa College. (London: J. Curwen and Sons.)

A FEW years ago some wiseacre had the temerity to propound the idea that the scientific and historical data on which music is founded have no bearing on music itself, and need form no part of the knowledge to be acquired by a musician. It is quite true that a man may get through life very comfortably as a singer, a fiddler, or a pianoforte-player, without ever having heard of sound-waves or of the Greek modes; but as regards a knowledge of music in a higher sense the idea is absurdly untrue. The moment we approach the *theory* of music we find the scientific and historical elements confront us at every step, and all attempts to form an intelligible explanation of musical structure without reference to them have been, and must be, failures. In fact, no rational theory of music can exist unless founded on such a basis. This fact is now pretty generally acknowledged by those who have to do with musical education. All examining bodies of any weight require an acquaintance with the data referred to, and all well-constituted courses of teaching include them.

The book now before us is a remarkable instance of this. The Tonic Sol-fa movement is what we may call ultra-practical: its supporters aim at teaching music to the great masses of the people, and their system is purposely contrived to facilitate its practical acquirement, and to bring it down to the proverbial "meanest capacity." Yet the Tonic Sol-fa authorities think it right to have a Lecturer on Acoustics, and to publish a hand-book of the science for the use of their millions of pupils. This is certainly about the severest reproof that could be given to the foolish "practical" notion that would exclude intellectual topics from musical study.

There is not much to say about the book itself. It is an unpretending compilation of the most important facts of the science, gathered from various authentic sources, intelligently stated, and without any crotchetiness or affectation of originality. The peculiar feature, of course, is that the musical illustrations are, wherever possible, given in the Tonic Sol-fa notation. Perhaps, in the 286 closely-printed pages, there is more elaboration of detail than the students may care for; but this is to a certain extent counterbalanced by a condensed summary being added at the end of each chapter.

It would have been an advantage if more copious and complete references had been given to other and more original works, from which the matter has been taken. It is, or should be, one of the most important objects of a "hand"-book to enable students, if they desire it, to put more complete treatises on their study-table. There is no date either on the title or in the preface—a very bad habit of music publishers.

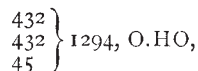
OUR BOOK SHELF

Old or New Chemistry: Which is Fittest for Survival?
By Samuel Phillips, F.C.S. (London: Wertheimer, Lea, & Co., 1886.)

THIS small book is a collection of essays more or less bearing on the subject indicated by the title, and may perhaps be also described as a sort of protest against a grievance. The elevating and spurring effect of the possession of a grievance is well known, and it must be admitted that in this case it has, apparently at least, contributed to the production of a very entertaining little book, which will no doubt, as it is intended, "wake up" chemists generally to a clear perception of their absurd and useless theories of chemical constitution.

It is, however, doubtful whether the book will really do anything to forward the science of which the author professes to be such an ardent lover. As to Avogadro's law and the laws known as Dulong and Pettit's, however scanty a basis they may have in experimental facts, they have been useful, and will be until they are supplanted by wider-reaching theories. It is exactly here that the author seems to be too conservative. We not only want more facts—as many facts as we can get—but we want theories as well, if they will only again lead to new facts. And, moreover, what is wanted in this country is for chemists to *work*. There is no lack of problems waiting to be solved.

What we do not want is any further multiplication of "fads." Nothing is gained by writing "Ph" for C_6H_5 , and the "equivalent symbol" for "etholo-aceto-acetic acid," viz.,



at page 19, is no advance but retrogression.

Lectures and Essays. By the late W. K. Clifford, F.R.S. Edited by Leslie Stephen and Frederick Pollock. With an Introduction by F. Pollock. Second Edition. (London: Macmillan and Co., 1886.)

THIS collection of lectures and essays is already so well known that it is now necessary only to note the fact that a second edition has appeared. Two essays have been omitted as being rather mathematical than philosophical, namely, those on "Types of Compound Statement" and on "Instruments used in Measurement." They have found a more fitting place in the volume of "Mathematical Papers" published in 1882. The admirable biographical Introduction by Mr. Pollock has been revised, and some additions and omissions have been made in the extracts there given.

Lives of the Electricians. By William T. Jeans. (London: Whitaker and Co., 1886.)

AN extremely well-compiled and interesting book; but why did the author commence with the life of a living professor, who is not an electrician? Faraday, as the brightest electrical light of this or any other age, should have headed the series. The author has a rich store of names to draw upon—Gilbert, Coulomb, Arago, Snow Harris, Franklin, Cavendish, Galvani, Volta, Henry Davy, Ronalds, Oersted, Ampère, De la Rive, Ohm, Schilling, Gauss, Weber, Daniell, Crosse, Steinheil—without trenching on living celebrities. The work is very impartially written. The life of Morse might have been written by an enthusiastic American, while Wheatstone's friends cannot complain of the eulogy of their hero.

Some statements want revision. The inauguration of the cable system can scarcely be fairly narrated without mention of Messrs. Crampton and Wollaston. Varley's long artificial cable and great experiment shown at the Royal Institution are accredited to Prof. Tyndall (p. 95). The statement attributed to Sir Robert Inglis (p. 285)