

only by divesting the mind of all metaphysical vagaries, and approaching the discussion in a spirit of strict loyalty to the established principles of evolution. The universe is not "a mental phenomenon," as Schopenhauer would call it, nor is speech the deliberate product of conscious will. It is an organism which, like all other organisms, had its origin in a germ, and its slow growth and silent development in suitable surroundings, independently of all conscious action. Yet in dealing with a subject of this sort one still feels how much easier it is to refute error than to establish truth. "*Utinam tam facile vera invenire possim quam falsa convincere.*" A. H. KEANE

OUR BOOK SHELF

Easy Lessons in Science. Edited by Prof. F. W. Barrett. I. *Easy Lessons in Heat.* By C. A. Martineau. II. *Easy Lessons in Light.* By Mrs. W. Awdry. (London: Macmillan and Co., 1880.)

THESE excellent little lesson books deserve a wide circulation. Well and clearly written, they are at the same time strictly of the "scientific" rather than of the so-called "popular" style of exposition; there being none of the objectionable sensational element with which certain French works in light science have too greatly familiarised us. The cuts with which the volumes before us are illustrated are numerous, appropriate, and many of them original. In each case the reader is instructed in the simple apparatus needed to repeat the experiments described; so that a teacher who desires to give to young pupils a few elementary lessons in the sciences of heat and light will find here the very text-books most suited to his requirements. Miss C. A. Martineau's "*Lessons in Heat*" follows the usual order of text-books in that science. The first lesson deals with expansions, the second with notions of temperature, the third tells "how heat spreads," and so forth, and in the concluding chapters some of the fundamental facts of the relation between heat and mechanical work are made known. One experiment which we do not remember meeting with before in the shape in which it is given deserves to be cited. It is a variation on Davy's old experiment with flame and gauze. "Put a bit of camphor on the wire gauze, and hold a light under it. The vapour of the camphor passes freely through the gauze, catches fire, and burns with a blue flame till the whole of the camphor has been turned into vapour and burned. But the flame does not pass through the gauze to set fire to the solid camphor."

Mrs. Awdry's "*Lessons on Light*" are no less felicitous in their treatment of the subject. The usual popular text-book on Optics abounds in descriptions of different optical instruments, telescopes, microscopes, kaleidoscopes, and the like, without much trouble being expended upon first principles. But in these lessons first principles claim the prominent place: the first point explained is the law of inverse squares, and the second the geometrical laws of refraction and reflection—and the explanations are admirably yet quite simply done. A most interesting feature is that the latter half of these easy lessons is devoted to physical optics. One chapter on the wave-theory, and two entitled "*Measurements*" prepare the way for a capital lesson on Diffraction. A lesson on the Spectrum and one on the Rainbow close the series.

We do not say that there is no room for criticism in judging these little volumes. A professed teacher of Natural Philosophy might grumble at the omission of certain things that claim prominence in all the older text-books and in many of the syllabuses of contemporary examinations. Yet we would challenge such critics to produce a more useful, or suggestive, or accurate set of

lessons, or one more entirely free from the two besetting faults of sensational popularisation and educational cram. It is to be hoped that Prof. Barrett will continue his labours in adding to the series he has so ably edited.

Outline of a Course of Natural Philosophy, with Specimen Examination Papers. By Gerald Molloy, D.D. (London: Simpkin, Marshall, and Co., 1880.)

THIS work of 114 pages contains a syllabus-outline of the course of lectures in Natural Philosophy by Dr. Molloy, at the Catholic University of Ireland, and is reprinted chiefly to meet the wants of teachers in intermediate schools. To the syllabus, which is remarkably full and complete, is appended an extensive series of examination papers on all branches of physics except light, electricity, and magnetism, which are promised to follow. These questions, though chiefly elementary, have been carefully prepared, and are a valuable part of the work. In an appendix Dr. Molloy reprints a paper giving an account of his particular form of bichromate battery, which appears to be peculiarly suited to the needs of schools and colleges, where a powerful battery of convenient form is required to be in readiness for occasional use.

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.]

Sir Wyville Thomson and Natural Selection

I AM sorry to find that Sir Wyville Thomson does not understand the principle of natural selection, as explained by Mr. Wallace and myself. If he had done so, he could not have written the following sentence in the Introduction to the *Voyage of the Challenger*:—"The character of the abyssal fauna refuses to give the least support to the theory which refers the evolution of species to extreme variation guided only by natural selection." This is a standard of criticism not uncommonly reached by theologians and metaphysicians, when they write on scientific subjects, but is something new as coming from a naturalist. Prof. Huxley demurs to it in the last number of *NATURE*; but he does not touch on the expression of *extreme variation*, nor on that of evolution being guided *only* by natural selection. Can Sir Wyville Thomson name any one who has said that the evolution of species depends only on natural selection? As far as concerns myself, I believe that no one has brought forward so many observations on the effects of the use and disuse of parts, as I have done in my "*Variation of Animals and Plants under Domestication*"; and these observations were made for this special object. I have likewise there adduced a considerable body of facts, showing the direct action of external conditions on organisms; though no doubt since my books were published much has been learnt on this head. If Sir Wyville Thomson were to visit the yard of a breeder, and saw all his cattle or sheep almost absolutely true, that is, closely similar, he would exclaim: "Sir, I see here no extreme variation; nor can I find any support to the belief that you have followed the principle of selection in the breeding of your animals." From what I formerly saw of breeders, I have no doubt that the man thus rebuked would have smiled and said not a word. If he had afterwards told the story to other breeders, I greatly fear that they would have used emphatic but irreverent language about naturalists. CHARLES DARWIN

Down, Beckenham, Kent, November 5