

of accuracy and means of attaining them with sufficient rapidity to keep them in their place of subserviency to the theory of the experiments. Another excellent point is the treatment of vibration and waves in general.

Prof. Hahn has a firm and broad grip of what has been accomplished on his own subject, not only by his fellow-countrymen, but by students of other nations. A bibliography at the head of each section contains almost all the well-known names among English, French, and American physicists. On p. 3, at the head of Section 2, we find Prof. Perry's excellent book on "Practical Mathematics" noted, and this fact is a significant specimen of the method in which the subject has been approached. A full bibliography at the end of the book contains even such references as the Board of Education syllabuses.

H. C. O'N.

#### OUR BOOK SHELF.

*School Algebra.* By W. E. Paterson. Part i., pp. 328+xxxix. Part ii., pp. 333-604+xli-lxxvii. (Oxford: Clarendon Press, 1909.) Price 3s. each with answers; 2s. 6d. each without.

PART I. is, except as regards one or two things, sufficient for students who are not going to specialise in mathematics, and part ii. contains the higher portions which are usually read by scholarship pupils. The author has, however, reserved the ordinary methods of finding the H.C.F. of two expressions and of extracting square roots until part ii., whereas in many cases these methods are taught in preparatory schools. In part i. he has shown the student how to obtain square roots by means of indeterminate coefficients, so that the postponement of the formal method is not a very serious drawback; moreover, the teacher can introduce it if he likes without difficulty, as boys readily learn it. But with regard to H.C.F. the case is different. If the author had, in part i., shown pupils that the H.C.F. is contained in the sum or difference of any multiples of the two given expressions, he would have put a powerful weapon into their hands, quite sufficient for all ordinary cases; but practically all he says is that both expressions must be factorised, the remainder theorem being used for cubic and higher expressions. Graphs are well treated, except that in the diagrams the author omits the minus signs on the negative side of the axes. There are a great many misprints and other inaccuracies, chiefly in part i., some of which are serious; for example, the rule given in Art. 80 (p. 113) is quite wrong as it stands, and even if corrected would be difficult to understand, and would be, moreover, of only partial application.

On the other hand, some of the hints are excellent, as, for example, that it is no use to try to factorise  $ax^2+bx+c$  by inspection if  $b^2-4ac$  is not a square number (p. 212), a good foreshadowing of the value of the theory.

Part ii. is well done, though in some instances explanations are too condensed; the distinction between permutations and combinations, for instance, is not well explained. But, as a rule, proofs are clear as well as concise, and many important examples are worked out in a very instructive manner.

There is a good index to each part, and a large number of examination papers, including questions in French and German. In the hands of a good teacher the book would be an excellent concise introduction

to all the parts of algebra required for scholarship work; but it would have to be supplemented in places, and it is most desirable that a careful table of errata should be provided as early as possible.

*Eliza Brightwen: the Life and Thoughts of a Naturalist.* Edited by W. H. Chesson, with introduction and epilogue by E. Gosse. Pp. xxxii+215; plates. (London: T. Fisher Unwin, 1909.) Price 5s. net.

ALTHOUGH in no sense a scientific naturalist—and, indeed, to a great extent ignoring the work of others—Mrs. Brightwen did good service in publishing first-hand accounts of the habits of animals—both in captivity and in the wild state—and thus helping to stay the flood of rubbishy works, compiled by those who had no real knowledge of their subject, which were only too common some twenty years ago. Perhaps the most remarkable feature in her career is the fact that her first, and apparently most successful, work, "Wild Nature Won by Kindness," was not presented to the public until its author had attained her sixtieth year. Throughout her life she had, however, devoted all her spare time to learning all that was possible about every kind of animal that came in her way, whether home or foreign, and this volume was, therefore, the result of long and close observation, and this, too, in a thorough and exhaustive manner. When it is added that this, as well as the five other volumes bearing her name, was written in a bright and attractive manner, it is little wonder that it leapt at once into popularity, and also obtained the honour of being translated into Swedish.

Mrs. Brightwen, who was a daughter of Mr. George Elder, a brother of one of the founders of the firm of Smith, Elder and Co., was born at Banff in 1820, and in the early 'seventies her husband purchased The Grove at Stanmore, where she was soon after left a widow. It was here that all her published works were written, and also much of the MS. of the volume now before us, mainly in the form of a diary, although the earlier portion dates from so far back as 1855. At her death the MS. was left to Mr. Edmund Gosse, with a free hand as to its ultimate disposal.

That he did well in deciding on its publication, under the careful editorship of Mr. Chooson, will, we venture to think, be the verdict of all those who read this charming volume, which, in addition to numberless observations on natural history, gives an instructive insight into the inner life of a striking personality. R. L.

*The Grammar of Life.* By G. T. Wrench. Pp. xii +237. (London: William Heinemann, 1908.) Price 6s. net.

PHILOSOPHY is to some a liberation from the positive and dogmatic habit of mind, to others a new field for its exercise. As the title of his book indicates, Mr. Wrench belongs to the latter class. He does, indeed, profess at the beginning a philosophical phenomenalism: "We know only our own perceptions. Consciousness itself depends on previous perceptions; for without memorised perceptions with which to compare our present perceptions, consciousness would not exist." From this quotation it is evident that the infinite series, that nightmare of so many philosophies, has no terrors for Mr. Wrench. But, though without apparent misgiving on this head, he is only verbally constant to his sceptical presupposition. His "relativity" gives us such cardinal propositions as these:—"Man has no ultimate purpose"; "life is a special form of matter in motion"; "the universe is an eternal series of cycles." It is legitimate for a philo-