is enriched by many examples of the experimental method, and by many illustrations of laboratory apparatus. Readers of Prof. Perry's "Practical Mechanics," of which this book may be regarded as an extension, do not need to be told that in the development of the mechanical laboratory he has done pioneer work of the most important kind. In his preface he refers very properly to the initiative taken by Sir Robert Ball in the teaching of mechanics by quantitative experiments, and he also speaks in altogether too generous terms of work in this direction recently done in the Engineering Laboratory at Cambridge. But it is to Prof. Perry himself that we owe in great measure the idea of a laboratory in which the students themselves carry out such experiments in applied mechanics, and the idea is one for which students, if not teachers, cannot be sufficiently grateful. Nothing contributes so much toward giving men a real and useful grasp of a mechanical principle than they should themselves make quantitative experiments with a piece of apparatus designed to exemplify the principle. But there must of course be some preliminary training in theory, and the work of the laboratory must be in close touch with that of the lecture-room.

In the history of Nicholas Nickleby we are told how Mr. Squeers claimed to "go upon the practical mode of teaching, the regular education system." He taught his boys to spell "winder" and then go and clean it, to spell "bottiney" and then weed the garden. This early and crude example of the laboratory method had two grave defects. The book-work was badly done; and there was no sufficient connection between it and the practical work, for it must be admitted that weeding does not help to spell, nor spelling to clean windows. Add to this that Mr. Squeers quarrelled with his demonstrator, which was impolitic, and that his boys were, in Prof. Perry's words, "too much spoon-fed," and it is not strange that the laboratory method did not commend itself in his hands.

We have changed all that, and as things are now there is perhaps a little danger of the practical work receiving even more than its due share of attention. Valuable as it undoubtedly is, the value of lectures and reading and "paper" work generally is not to be underrated. Prof. Perry does well to insist that the student shall "work many numerical and graphical exercises," as well as "make a great many quantitative laboratory experiments."

By the publication of his "Applied Mechanics" Prof. Perry has made a large addition to the debt which teachers and students of the subject already owe him.

J. A. EWING.

CHARLES CARDALE BABINGTON.

Memorials, Journal, and Botanical Correspondence of Charles Cardale Babington. Pp. xciv + 475. (Cambridge: Macmillan and Bowes, 1897.)

CHAPTERS in the history of the teaching of botany have now been written in the biographies of four Cambridge professors. In 1830 was published Gorham's "Memoirs of John and of Thomas Martyn," a book of small size; and in 1862 Jenyn's "Memoir of the Rev. J. S. Henslow," containing 278 pages. The last of this series, the volume under review, far exceeds the others in size, and contains 570 pages.

The plan of the book divides it sharply into three sections. The first of these sections is occupied by notices from various sources, mostly reprinted from other publications, and diverse in the points from which the views of the different writers are taken. We find Prof. Babington in the light of a college friend from the pen of Prof. J. E. B. Mayor, as a fellow-teacher of science from that of Prof. G. D. Liveing, as a fellow-botanist by Mr. James Britten, as an archæologist, and as a philanthropist. The second section (270 pages) consists of the journal kept by him throughout his long life, and the third section of letters written by him to various botanists. The book closes with a list of his publications, and a very complete index in two parts.

Undoubtedly the greatest interest in the volume lies in the scattered sentences, which refer to the struggle for the recognition of science as an educational subject, in which struggle Babington played no small part. From 1826 until his death in 1895 he resided in Cambridge; and one may remind the reader what an immense change has taken place since the first date, when the Elizabethan statutes were still in force. The early teaching of botany in Cambridge was intermittent. Richard Bradley, professor from 1724 to 1733, seems never to have lectured; John Martyn, his successor, lectured from 1727 to 1734, and Thomas Martyn, who became professor in 1762, lectured for thirty years. In 1825 J. S. Henslow's teaching commenced, and we are told that for seven years his class numbered sixty to eighty. The clearness and charm of Henslow's lectures attracted many of the older members of the University to listen to him, and among these sat for six nearly consecutive years young Babington. After this we learn that the numbers attending the class fell. In 1861 there were no lectures. Babington, meanwhile being elected professor, begins to lecture in 1862, and in 1864 (p. 359) has a class of thirty-five to forty-five students, in 1865 (p. 362) of forty, in 1866 (p. 205) of about forty-five. Such references as these, scattered sometimes in letters, sometimes in his journal, will serve as grist to the mill of a historian wishing to write an account of science in England. The story of Babington's influence for the promotion of natural history, especially in the years before he became professor, is admirably told in Prof. Liveing's memoir on p. lvii.

A regular attendant at the meetings of the British Association, he was one of the founders of the Red Lion Club, a club formed by a little knot of kindred spirits who dined together during the meeting. On p. 85, the founding is thus noticed: "1839. Aug. 29. Yesterday and to-day we formed a private dinner-party at the 'Red Lion' inn (Birmingham), with Dr. Macartney in the chair." Frequent mention of the "Red Lions" occurs in the following pages.

In his letters to J. H. Balfour, A. G. More, and others upon scientific publications, we find him (p. 302) ill-satisfied with the *Phytologist*, and (pp. 288, 291, 306, 312, &c.) very solicitous for the good of Henfrey's *Botanical Gazette* and the *Transactions* of the Edinburgh Botanical Society.

So much for the purely historic side of the book. There occur in the first pages of the journal notes upon insects, and here and there throughout archæological jottings; but the greater part, as one would expect, concerns British plants. The letters are all botanical, and usually express his opinion upon some difficult plant; the journal contains accounts of his "finds" on the excursions which he made in all parts of the British Isles, in the Channel Isles, and in Iceland. Much, indeed, is matter of greater interest to the compiler of a local flora than to the general reader. Yet the history of the changes of opinion upon critical plants, and the notices of the discoveries of forms new to our islands, will appeal to many British field-botanists. To sift the synonymy it is necessary to turn to the first index, where, with the exception of the brambles, the nomenclature of the last edition of Babington's "Manual of British Plants" is followed. One could wish that this sifting of the names had been done in footnotes, in which way it would catch the reader's eye more readily. The index tells us that, on p. 169, *Potamogeton flabellatus* stands for *P. decipiens*, and that *Euphorbia pilosa* appears under five names. Such instances may be here quoted with the remark that reference to this index is very necessary in using the book.

Lastly, in spite of its many pages, the volume is light; the printing is excellent, and the portrait at the commencement a very true likeness. A second portrait, taken at the age of seventeen, occurs at the commencement of the second part, and a pedigree-table occupies a pocket at the end of the book. I. H. B.

DIAMONDS.

Papers and Notes on the Genesis and Matrix of the Diamond. By the late Prof. Henry Carvill Lewis, M.A., F.R.S. Edited from his unpublished MSS. by Prof. T. G. Bonney, D.Sc., LL.D., F.R.S. Pp. 69, with 2 plates and 35 woodcuts. (London: Longmans, Green, and Co., 1897.)

Diamonds. A Lecture delivered at the Royal Institution, Friday, June 11, 1897. By William Crookes, Esq., F.R.S., M.R.I. Pp. 25, with 39 photographs. (*Journal* of the Royal Institution of Great Britain, 1897.)

AMONG the subjects which attracted the attention of the able and versatile geologist of Philadelphia —whose early death was so deeply mourned both in this country and the United States—was that of the mode of occurrence and the origin of the diamond. At the meeting of the British Association at Birmingham in 1886, Prof. Carvill Lewis read a short paper "On a Diamond-bearing Peridotite and on the History of the Diamond"; and in the following year he communicated to the Association meeting at Manchester a much longer and more elaborate paper on the same subject, which was entitled "The Matrix of the Diamond." It was well known to Carvill Lewis's numerous scientific friends in this country that he had collected much valuable evidence concerning the association of diamonds with peridotite and serpentine in all parts of the world, and had arrived at certain very definite views concerning the constant association of the crystalline form of carbon with the ultrabasic rocks.

Geologists are indebted to Prof. Carvill Lewis's widow for the publication of the work, the title of which stands first at the head of this article, in which these two valuable papers have been printed in full, and to Profs. Bonney and Rosenbusch for the painstaking care and sound judgment with which they have been edited. In the opinion of neither the editor himself nor of Prof. Rosenbusch, were the fragmentary notes on the wider and more theoretical questions connected with the origin of the diamond in such a state as would warrant their publication; but Prof. Bonney has been able to add a memoir describing the occurrence of rocks similar to that found in the diamond mines of South Africa—to which Carvill Lewis gave the name of "Kimberlite"—from two localities in the United States. These descriptions are based on information supplied by Mr. J. S. Diller, of the United States Geological Survey, and by the late Prof. G. Huntingdon Williams, of Baltimore, in addition to the notes and specimens collected by the late Prof. Carvill Lewis himself. Geologists now possess, in the work before us, the most complete and satisfactory account of the curious rock in which the diamonds of South Africa are embedded; equal care being devoted to the microscopic structure of the rock, and to the identification of the various minerals present in it.

Turning our attention from the papers of Carvill Lewis to the lecture of Sir William Crookes, it is impossible to avoid being struck with the great advances which have been made, during the last ten years, in our knowledge of the properties and mode of occurrence of that most wonderful and interesting of all minerals—the diamond.

The first part of the lecture of Sir William Crookes is occupied with a popular account of the diamond mines of South Africa and the manner in which they are worked. The author having recently returned from the district, where special facilities had been afforded him for scientific observation, is able to supply a very lively description of the country and its inhabitants, as well as of the operations by which the diamonds are obtained. The reproduction of the photographs with which the lecture was illustrated adds greatly to the value of the pamphlet.

Concerning the properties of the gem, Sir William Crookes is able to supply much valuable information, recently obtained, concerning the intimate relations between diamond and graphite, and the conversion of one material into the other, and also on the action of the Röntgen rays upon the diamond. As a means of distinguishing true diamonds from all kinds of paste imitations, the Röntgen rays appear to be invaluable, for we have here a test which can be applied to cut and mounted materials without any risk of injury to them.

In the decade which has elapsed between the reading of the two scientific communications which we have placed at the head of this notice, the discoveries concerning the mode of occurrence and the artificial formation of the diamond have been of especial importance—and they are admirably summarised by Sir William Crookes in his lecture.

In 1884 Erofeyev and Lachinov showed that an iron meteorite contained diamonds, and this fact was more