

instead, inserted a few engravings, he would have made the book more entertaining and less trying to readers of only average patience. If he had spent more time on the solid parts, and less on its affected adornments, he would have produced a valuable and interesting book.

OUR BOOK SHELF

The Student's Guide to Systematic Botany. By Robert Bentley, F.L.S., M.R.C.S. Engl., &c. (London: J. and A. Churchill, 1884.)

THIS little book, which aims chiefly at supplying the wants of medical and pharmaceutical students, represents fairly what was the state of systematic botany in England twenty years ago. The bulk of the book is occupied with a detailed description of the natural orders of Phanerogams, while the Cryptogams are dismissed in fourteen pages. But it is not only by the very cursory way in which these plants are treated that the student is led to underrate the importance of the morphological differences by which the various groups of Cryptogams are distinguished; the heterogeneous series of Algæ and Fungi are described as "orders" comparable, as regards the terms used in the classification, with the orders of the Angiosperms. Again, in the text, signs of antiquity are numerous: for instance, in distinguishing the Cryptogamia from the Phanerogamia (p. 14) we find that the former "are reproduced by spores, and are therefore acotyledonous," a sentence which implies that the spore is the homologue of the seed! In describing the ferns no mention is made of the prothallus, antheridia, or archegonia, though the latter are described as occurring in the mosses, and resulting in the formation of a "sporangium." These examples are sufficient to show that this book does not meet the present requirements even of medical students, who now have access to other text-books, treating of the principles of systematic botany in a manner more in accordance with the present state of the science than the "Student's Guide" of Prof. Bentley.

The Electrician's Pocket-Book. The English Edition of Hospitalier's "Formulaire Pratique de l'Électricien." Translated, with additions, by Gordon Wigan, M.A., Barrister-at-Law. (London, Paris, and New York: Cassell and Co., Limited, 1884.)

M. HOSPITALIER'S "Formulaire Pratique de l'Électricien," of which the work before us is a translation, has become well known in this country as a useful compendium of data and rules for electrical work, and Mr. Wigan has done good service in putting an English version within the reach of the numerous class of practical men whose knowledge of French is, to say the least, limited. He has executed his task very creditably, as the book, so far as we can tell without a minute examination of the numerical and other data, seems fairly accurate and trustworthy. The least satisfactory part of this work, as of all others of the same kind which we have seen, is, we think, the synopsis of theory which is given along with the data and other practical information. In these days of excellent elementary and advanced text-books of theoretical and to some extent also of applied electricity, the necessarily detached and somewhat scrappy statements of theory which partly fill the "pocket-books," are little called for, and the space occupied by them could be used to better advantage for other matter, or the book lightened by their omission.

In looking over the book we have found some slight faults in descriptions of instruments, &c., which might be mended in a new edition. For instance, in p. 75, the author (? translator) has entirely misapprehended the use of the V-groove in Sir W. Thomson's "hole, slot, and plane" arrangement for insuring that an electrometer or

other instrument is replaced, after being moved, in exactly the same position. The "hole" is not simply a hole, but a conical hollow, and the primary object of having a V-groove is to obviate the infinitely perfect fitting which a second hollow would render necessary. Again, the description of the quadrant electrometer (p. 107) does not seem likely to convey any clear idea of the construction of the instrument.

The subject of the testing and laying of submarine and land telegraphs is not very fully treated, and the data in this department is also comparatively meagre. On the other hand, descriptions of a large number of dynamo-machines and statements of experimental results regarding their behaviour in electric lighting and transmission of power form a marked feature of the book, and we need not say that even roughly approximate information of this kind in a collected form is very valuable.

On the whole, we feel sure that the work will form a valuable pocket companion to the electrical engineer.

A. GRAY

Science Note-Book. By C. H. Hinton. (London: John Haddon and Co., 1884.)

THE constitutive elements of Euclidean geometry are the straight line and the circle—two continuous curves, which stand to one another in a certain relation of reciprocity, and the actual production of which, as Newton has already remarked, demands certain mechanical appliances—the ruler and the compass. If we add to the above that Euclid's method is the synthetical, then his system of geometry is defined without ambiguity. The principal lack of this geometry, which was not clearly brought to light until the second half of this century, consists in this, that it is limited to considerations of quantity, and only treats secondarily of the relations of position.

Poncelet has recognised this defect, and has laid the foundations of the so-called modern geometry, which, during the last few decades has so greatly enriched the science of space as well in positive results as in new methods.

Euclid's system, however, has not been uprooted, but only completed on a side on which it was wanting. In schools the "Elements" of the Alexandrian geometer are generally taught, while descriptive geometry and the theory of higher curves (as taught in the University course) are chiefly based on modern methods.

In a handy introductory publication Mr. C. H. Hinton, Science Master at Uppingham School, has brought forward points of view which form a third method of geometrical investigation, fundamentally different from both those mentioned above. It is not opposed to either, but appears as a welcome complement of both. The author does not presuppose continuous elements as has been generally done, but only sets of points equally distributed in two dimensions, which, merely for the sake of convenience, are connected by straight lines. As in Euclid's geometry an infinite pencil of rays can be drawn from every point, so the conic sections may be determined by a method of counting discrete points. The problem of division of a given line into parts, and of the construction of parallels can be generally solved.

The practical advantages of this new method in the form in which it is now published are purely educational, though it is wholly based on the principles just mentioned. The author has succeeded in bringing new ideas into simple and attractive form, which enables the youthful and inexperienced mind in a very short time to acquire a mathematical knowledge of space which is of much value in facilitating a subsequent thorough understanding of Euclid and of modern geometry. The work has an encouraging appearance, inasmuch as it does not contain any hypercritical transformation of the system of our old Euclid (in which respect so many authors have recently