

years old, the huge iron girders at Puri, the iron-roofed temple porch at Kanurac, and other relics which show the ancient familiarity of the Hindus with this metal. In the fourteenth century brass and bell-metal were stated to be alloys, and zinc, copper and tin to be metals. The manufacture of gold jewellery is also of great antiquity in India.

Dr. Rāy has ably carried out his task of proving that the ancient lore of the Hindus was far in advance of that of the rest of the world, China excepted. The reader who is unversed in Sanskrit may perhaps be pardoned if he sometimes loses himself for a moment in the maze of Hindu names, and it will be well if his "discerning faculty is nimble and agile, and can suddenly surround a proposition." A glossary would be useful, but could scarcely add to the interest of the volume. The second volume, promised when Dr. Rāy has examined further manuscripts, will be welcome.

T. K. R.

OUR BOOK SHELF.

The Soil: an Introduction to the Scientific Study of the Growth of Crops. By A. D. Hall, M.A. Pp. xiii + 286. (London: J. Murray, 1903.) Price 3s. 6d.

WHEN one who has been for many years both a teacher and an investigator commits to paper the facts and ideas which have formed the substance of his later courses of instruction, we expect a very useful book, and in the present instance we are certainly not disappointed. The book before us takes a wide scope; it deals with the origin of soils, their physical properties, their chemical properties and composition, methods of analysis, the living organisms within the soil, the causes of fertility and sterility, soil types and the natural flora belonging to each. The book is primarily intended for college students. Owing to its wide scope it does not attempt to treat any part of the subject in an exhaustive manner; it possesses, however, the great merits of originality and suggestiveness, virtues which are not always to be found in the formal text-book. A prominent feature of the work is the introduction of the results of investigations carried on by the author while principal of the Agricultural College at Wye. English books on scientific agriculture have hitherto been so necessarily filled with descriptions of foreign researches that any results obtained under English conditions have an exceptional value, and appeal to the farmer in a special manner.

In a work dealing with so many subjects, there are naturally some points open to criticism. The author seems to hesitate in attributing some of the physical properties of soil constituents to their colloid nature, and thus leaves unexplained the enormous amount of hygroscopic water held by humic matter. The indigo method of determining nitrates is mentioned as one that may be used for determining nitrates in soil extracts; the method is, in fact, unsuitable for this purpose, as it gives results much below the truth owing to the presence of organic matter. Nitrification is occasionally spoken of as a kind of "fermentation"; objection may surely be taken to this description. Fermentation is a word of wide meaning, but it surely should not include the oxidation of inorganic matter by a living organism. The chapter dealing with the power of soils to retain various bases and acids is full of interest, yet the theory is incompletely stated, the results of the German, French, and some English

investigations on the subject being unnoticed. The laws governing the diffusion of salts, and the results of their molecular diffusion in a moist soil, are also not noticed. The cause of the sterility of alkali lands, and their proper treatment, are, however, well discussed, and many excellent illustrations of the subject are introduced from the experience gained in Egypt.

In a book dealing with many details some slips will inevitably occur; the most important one in the present case is that King's determinations of nitrates in fallow soil appear as determinations of nitrogen as nitrates; the quantity of nitrates present is thus unintentionally much exaggerated.

The concluding chapters on fertility and soil types exhibit most fully the thoroughly practical character of the author's teaching, and will be much valued by many readers. The book is sure to meet with a favourable reception.

R. W.

Electrical Problems for Engineering Students. By W. L. Hooper, Ph.D., and R. T. Wells, M.S. Pp. v + 170. (Boston and London: Ginn and Co., 1902.) Price 6s.

THIS is a collection of numerical and mathematical exercises in electrical engineering, starting from the most elementary beginning and ending in the more difficult problems presented by the design and working of direct and alternating current dynamos and motors. The exercises have been tested by the practical experience of the authors at Tuft's College, Mass., and are such as would form a useful accompaniment to a two or three years' lecture and practical course. A distinctly good feature of the book is the number of examples requiring graphical solutions, which cannot fail to impress upon the student the advantages gained by plotting curves. It is always an objection to exercises of this sort that they tend too much to the purely arithmetical and academic side of the subject; thus, many of the problems on subjects which are treated only in an elementary manner in this book are little better than arithmetic sums. For example, in the twelfth chapter, on electrochemistry, there are eleven problems, which are all practically simple proportion sums, and we doubt if the student would gain much more by solving them than he would by solving an equal number of problems on, say, the number of able-bodied men and boys required to till a field. But, if the book be used with discretion, these drawbacks will be lessened, and provided the student is taught in other ways to think about and really understand his subject, these exercises will serve to give him a facility in attacking numerical problems as they arise. The book should prove a useful aid to students and teachers of electrical engineering.

M. S.

Open-Air Studies in Bird Life; Sketches of British Birds in their Haunts. By C. Dixon. Pp. xii + 280; illustrated. (London: Griffin and Co., Ltd., 1903.) Price 7s. 6d.

MR. DIXON appears to consider that the appetite of the British public for books on the birds of their own islands is insatiable, and as he seems to find a publisher for all his works on this subject, he is perhaps justified in this opinion. In the present instance the subject is treated from a standpoint somewhat different from the one usually adopted, the birds being described in connection with their environment or "station," instead of systematically. Although this mode of treatment necessarily involves a certain amount of repetition (as in the case of the sparrow and the lapwing), it permits the descriptive side of the subject to be relegated somewhat to the background,