

remark, namely, that no student, or even expert, not only in veterinary but also in medical and sanitary science, can afford to be without a copy of this excellent manual.

The type, paper, and binding, reflect great credit on the publishers. A. C. HOUSTON.

OUR BOOK SHELF.

Elementary Botany. By G. F. Atkinson, Ph.B. Professor of Botany in Cornell University. Pp. xxiii + 444. (New York: Henry Holt and Co., 1898.)

THIS is one of the best little books of its kind it has been our lot to look through for a long time. Pleasantly written, admirably printed and illustrated, it forms an excellent introduction to the study of the science of botany, and Prof. Atkinson is to be congratulated on the way which he has fulfilled the task he has set himself.

The book opens with a general account of a plant-cell and protoplasm, and the student is led through a simple course of vegetable physiology to investigate the ways in which plants live, move, and have their being. This method of beginning with physiology is novel, and there is a great deal to be said for it. It is calculated to arouse the interest which in the minds of all inquiring people, be they children or adults, always accompanies experiment. Prof. Atkinson has wisely limited his selection of experiments to those which require apparatus of only the simplest kind, but they are for the most part experiments which give an insight into the marvellous organisation and concomitant functional complexity which are characteristic of plant-life in general.

Then there follows an elementary account of the main groups of the vegetable kingdom, illustrated by well-chosen types. But the author by no means limits himself merely to these, and the connections and relationships of the different groups are clearly indicated. The chapters on Gymnosperms, which include a good account of the occurrence of antherozoids in Ginkgo and in the Cycads, are especially good.

The chapters on the general morphology of the flowering plant are perhaps rather advanced, and it might be questioned whether a little more attention to external morphology might not be desirable. The part of the book specially dealing with natural orders strikes us as the least attractive part of the book; but also it is far the most difficult, within narrow limits of space, to render either interesting or educationally valuable. Possibly in a future edition of the work the author may see fit to expand this part by the inclusion of more indications of the facies of, as well as of the trend of differentiation in, the different natural orders, even if the characters of biological interest have to be omitted.

The latter class of characters (biological) are, however, specially treated in the division on Ecology. In this part of the book the author has brought together, in addition to well-known examples, the fruits of his own observation in a country in which such research cannot but yield fruitful results. And the advanced, as well as the elementary, student will find much that is new and interesting in these last chapters. Of course the treatment is brief, but it is useful; the figures and many (not, however, all) of the illustrative photographs from nature are quite admirable.

From the above brief sketch it will be seen that the book is one which thoroughly deserves to be commended as calculated to attract instead of (as is too often the case) repelling the beginner. J. B. F.

Animals of To-day, their Life and Conversation. By C. J. Cornish. Pp. xii + 319. (London: Seeley and Co., Ltd., 1898.)

MR. CORNISH is such a bright and entertaining writer, and has also the art of looking at well-worn subjects from such new points of view, that the

republication of this series of articles from the *Spectator* may be welcomed by the zoologist as well as by the general reader. The author, it need scarcely be said, makes no pretence to study animals from a purely scientific or systematic standpoint; and regards the various domesticated breeds as meriting fully as much attention as their wild relatives. The adaptation of animals to their surroundings, the manner in which they exist under what appear to us unfavourable conditions, their speed, their antipathies, their susceptibility to human diseases, and their mental capacities and disabilities, form, indeed, some of his favourite subjects. But he also gives dissertations on the beauty and suitability to their uses of several domesticated breeds; while his chapters on acclimatisation, game-preservation, and, above all, on the terrible devastation inflicted on big game by "skin-hunters," are of almost absorbing interest.

In the commercial aspect of the subject, Mr. Cornish shows that while myriads of South African animals have been recklessly exterminated for the sake of their skins, yet that in Australia, where the marsupials are killed off in thousands from necessity, their valuable furs are for the most part wasted. And here it may be mentioned that, in referring to the commercial quotations of South African skins, the author makes merry at the inclusion of those of the "quagga," on the ground that the animal so-named is now extinct; but he ought to have known that at the Cape this title is universally applied to Burchell's zebra.

As beasts of burden for routes like that to the Klondike, the author speaks enthusiastically of the reindeer and Bactrian camel. Of the latter animal he observes that Englishmen have no practical experience; but if he had read the records of the second Yarkand expedition, he might have somewhat modified this statement. Wider reading might, indeed, in several cases have been an advantage to the author. For instance, in the chapter on "Thirsty Animals" he is very sceptical as to the power of any mammals to exist for a length of time without access to water; suggesting that the well-known instance of the giraffes in the Kalahari may be due to the presence of undiscovered sources of water in the interior of that desert. Had he been acquainted with Mr. W. T. Blanford's observations on the existence of certain Indian mammals in waterless districts, his scepticism might have been removed. Again, in another place, he is under the impression that wild dogs (*Cyon*) are nearer to domestic dogs than are wolves and jackals.

Such slight blemishes detract, however, but little from a very entertaining and instructive volume. Had we more writers of Mr. Cornish's stamp, the popularity of zoology, great as it undoubtedly is, would probably be largely augmented; and his present work can scarcely fail to increase his reputation as a successful writer.

R. L.

Text-book of Algebra. By G. E. Fisher, M.A., Ph.D. and I. J. Schwatt, Ph.D. Part I. Pp. xiv + 684. (Philadelphia: Fisher and Schwatt, 1898.)

ON the whole this is a sound and instructive book. In the chapters on first principles the distinction between signs of operation and signs of quality has been very properly emphasised by a special notation, instead of being ignored; the treatment of systems of equations is excellent; and that of surds is much better than usual, although exception might be taken to some of the notation, and the existence of $\sqrt{2}$ as a definite number cannot be proved (as the authors seem to think) by considering the diagonal of a unit square. The book is rather unequally written, and errors sometimes occur which contrast curiously with the accuracy which generally prevails. Thus in the proof of the remainder theorem the same symbol Q is used for two entirely different things; it is assumed without proof that if r is a proper fraction r^n be-

comes infinitesimal as n increases indefinitely; and it should have been stated explicitly that i is a *definite* symbol obeying the law $i^2 = -1$, together with the usual laws of operation, and that if a is positive $\sqrt{-a}$ is understood to mean $\sqrt{a} \odot i$. If these last precautions are not taken, it cannot be proved, for instance, that $\sqrt{-a} \times \sqrt{-b} = -\sqrt{ab}$, and, in fact, the authors' treatment of this identity is defective. Then such problems as "factor $a + b$ " are perfectly unmeaning, especially after chapters on surds and complex numbers; probably the answer intended is $(\sqrt{a + i\sqrt{b}})(\sqrt{a - i\sqrt{b}})$, but any number of others might be constructed, for instance $(\sqrt{a + \sqrt{b} + \sqrt[4]{4ab}})(\sqrt{a + \sqrt{b} - \sqrt[4]{4ab}})$, and so on. It ought to be unnecessary to say that all questions on factors should be put in a perfectly definite way.

It is a pity that the elementary theory of graphs has not been included; every teacher who has tried the experiment must have realised the value of plotting off the graphs of even the simplest functions such as x , x^2 , $x/(1-x)$, and so on. Another remarkable fact is that not a single word is said about partial fractions: this is a serious omission, and, in fact, a whole chapter on rational functions might be added with advantage.

This volume ends with a chapter on the binomial theorem for a positive integral exponent. The examples are very numerous, and appear to be well graded: they are intended to provide teachers with alternative sets for different years. The student should on no account try to work them out *seriatim*. G. B. M.

Distribution de l'énergie par courants polyphasés. By J. Rodet. Pp. 338. (Paris: Gauthier-Villars, 1898.)

THE present work is perhaps, in point of thoroughness of treatment, the best on this subject we have yet seen. It is written, not as an introduction to a hitherto unknown subject, but as an account of a well-established branch of engineering.

In this country, the comparative absence of water-power near our industrial centres, and the resulting small demand for long-distance power-transmission, has led to a relative indifference to this important subject. What limited field for such transmissions does exist, seems at present to arise rather from the vastness of our towns, than from the existence of available water-power.

The economy in electrical transmissions of energy, which accompanies the employment of high-pressure currents, has led to the use of the readily-transformed alternating current. And while, as M. Rodet remarks, electric lighting can be carried out equally well with single-phase currents as with polyphase, yet, for purposes of motive power, the absence of a good motor to run on single-phase circuits, and the excellence of the rotary field motor, necessitates the use of polyphase currents by which alone the rotary magnetic field can be produced.

Starting with an historical summary, M. Rodet deals successively with generator, line, and motor. While keeping the essentially practical aspect of his subject in view, and citing from time to time, by way of illustration, the conditions of actual installations, the author, nevertheless, does not hesitate to launch into ample theoretical investigations where he deems these called for. At the conclusion of the main part, a short but interesting chapter on meters for polyphase currents is given.

Of more general interest, however, are the descriptions of installations. These form a most interesting conclusion to the work. We observe that just one quarter of the examples selected by the author as types for description are two-phase transmissions; the rest are three-phase installations, and these include several of importance in south-west France.

The illustrations are for the most part simple and

clear. English readers will feel the lack of an alphabetical index, and would prefer to have titles to the illustrations. The work should, however, prove of great value to engineers who wish to make a special study of polyphase current machinery. D. K. M.

My Horse; My Love. By Sarah Buckman-Linard. Pp. xii + 227. (London: T. Fisher Unwin, 1898.)

It is a little difficult to classify Mrs. Buckman-Linard's book. It is not a treatise, nor a text-book, nor a story. It is written in a conversational style not always easily followed. Here is a sentence which demands exceptional powers of perception:—"In some the odour is perceptible to themselves only, while in others it is such a powerful means of defence as to make the pursuing victim wish he had never been born, which floods cannot drown nor fires quench, if any part escape, and only six feet of earth can extinguish" (p. 22). The book is divided into chapters, but the title of the chapter is little indication of its contents; e.g. Chapter ii. is headed "Facilities for Breeding in America," and after a few generalisations on the subject mentioned in the title the following questions are dealt with:—Is it possible that human beings have the same diseases as horses? Are the symptoms easily recognised (reference is made to the symptoms of glanders)? Is it possible to mend a broken leg? Chapters are also included on jockeys, the Derby day, and training. At the same time there is a quantity of information about the horse, scattered here and there in the volume; and if it had been systematically arranged in half the compass, it might have proved useful.

Matter, Energy, Force and Work. By Silas W. Holman. Pp. xiv + 257. (New York: The Macmillan Company, 1898.)

PROF. HOLMAN here addresses students and teachers of physics and chemistry on the concepts and definitions of physical science. Some knowledge of the experimental side of the subject and its phenomena and laws is assumed, and the logical expression and sequence of the ideas put forward should prove of great value to engineers, and others who have to apply physical and chemical knowledge, in enabling them to think clearly when dealing with the fundamental ideas on which all successful practice must be based. The book is divided into two parts: the first is concerned with a consideration of matter, motion, energy, force and work; the second with the kinetic theory of gases, Le Sage's theory of gravitation, the vortex-atom theory, and the nature of energy and matter. Prof. Holman describes the first part as "a sporadic attempt at clear, consecutive setting forth of individual thought," the second as intended "to give more concreteness to the concepts than could properly be introduced into the first part." The volume deserves to be widely read.

The Way the World Went Then. By Isabella Barclay. Pp. xiv + 153. (London: Edward Stanford, 1898.)

THE author of this volume did not live to see it through the press, and the MS. has been edited by two lady friends, who contribute the preface and a summary of three pages, in which they state what they think the author would have included in the second part of her work had she lived. It would be unkind to subject a volume produced under these conditions to severe criticism, and we will merely say that, although the book affords evidence of a fervent desire to present the earth's history in a simple and interesting manner, it is seriously misleading in many matters of fact, and unequal in treatment. The volume is daintily bound, and has some attractive illustrations.