

necessarily brief, but many facts are conveyed in short paragraphs—thanks to a plain and effective style—while references are given to special memoirs. As might have been expected, the literature quoted is entirely American, though not a few of the insects described are common European pests on which some useful observations have been made on this side of the Atlantic. European workers, however, will be glad to have the American experience with regard to these species, and to others which are near allies of common “old-world” kinds. The few pages of “general considerations” on the structure of insects are the weak part of the book; it is disappointing to see the cuticle called a “shell” on p. 2 and a “skin” on p. 5. The concluding chapter deals with the practical use of insecticides. Illustrations comprise nearly four hundred figures, some of which are reproductions of excellent drawings, while the rest are photographs of somewhat unequal value. Indeed, examples of extremes of merit and demerit in natural history photography might be drawn from this volume.

(2) Mr. E. P. Stebbing, who not long ago left the Indian Forest Service to become head of the Forestry Department of Edinburgh University, has provided in this handsome volume a worthy monument of his work in the East. His “Manual of Elementary Forest Zoology for India,” published in 1908, was noteworthy for many original observations on the life-history of Indian forest beetles. The present work—a large royal octavo of more than 600 pages, with 63 plates and 400 text-figures—is entirely devoted to those Coleoptera which are known to be of economic importance in Indian forests. The arrangement is systematic, the large series of beetles described being set forth by their families; it is to be regretted that the grouping of the families is that given by Dr. D. Sharp in the “Cambridge Natural History,” a grouping the convenience of which does not atone for its artificiality. In the details of his systematic work Mr. Stebbing has wisely sought help from a number of specialists, for no one man can nowadays deal effectively with all the members of a great insect order from an extensive tropical region. Messrs. C. J. Gahan and G. Arrow of the British Museum, Mr. G. Lewis, Col. F. W. Sampson, Mr. G. A. K. Marshall of our Imperial Bureau, M. P. Lesne of the Paris Museum, and M. G. Severin of the Brussels Museum are among those who have identified, and where necessary described, specimens of their favourite families. The classificatory work may therefore be relied on, and with Mr. Stebbing’s accounts of life-histories, habits, effects of the insects on

trees, and relation of the insect fauna to the forests in a wide sense, a mass of valuable information is here gathered for the Indian student of the present and the future. As to the illustrations, most of the photographic reproductions are beautiful, and, with the exception of a few rough sketches, the drawings may be highly praised.

(3) A volume consisting of a number of leaflets, briefly describing common crop pests of Behar, Orissa, and Western Bengal is introduced by a preface by Mr. E. J. Woodhouse; he tells us that the work has been compiled by Mr. S. K. Busu, who is responsible for the few fungi that are included, and Mr. H. L. Dutt, who deals with the insects. Among the latter the presence of *Pieris brassicae*, *Aphis brassicae*, and other well-known British crop-pests is interesting. The leaflets are of quarto size, each being illustrated by an admirably printed coloured plate. These plates, which, we are told, “have not been previously published, but are intended for use in memoirs in course of preparation by the Imperial Entomologist,” will doubtless make it easy for the Indian farmer to identify his insect enemies. They will also prove of no little service to the working entomologist.

G. H. C.

TEXT-BOOKS OF CHEMISTRY.

- (1) *Chimie Physique Elementaire*. By E. Aries. Tome Premier. Les Principes Generaux de la Statique Chimique. Pp. xxx+212. (Paris: A. Hermann et Fils, 1914.) Price 4 francs.
- (2) *A Manual of Practical Physical Chemistry*. By Dr. F. W. Gray. Pp. xvi+211. (London: Macmillan and Co., Ltd., 1914.) Price 4s. 6d.
- (3) *Notes on Elementary Inorganic Chemistry*. By F. H. Jeffery. Pp. iv+55. (Cambridge University Press.) Price 2s. 6d. net.
- (4) *The Elements of Chemistry*. By H. L. Bassett, with an introduction by Prof. W. J. Pope. Pp. xii+368. (London: Crosby Lockwood and Son.) Price 4s. 6d.
- (5) *Chemical Calculations*. Pp. vi+136. *Chemical Calculations (Advanced Course)*. Pp. vi+48. By H. W. Bausor. (London: University Tutorial Press, Ltd., 1914.) Price 2s. and 1s. respectively.
- (6) *The Fixation of Atmospheric Nitrogen*. By Dr. J. Knox. Pp. vii+112. (London: Gurney and Jackson, 1914.) Price 2s. net.

(1) **T**HE French text-book of physical chemistry would scarcely be regarded in this country as justifying the author’s description of it as “elementary.” It is essentially an exposition of the work of Willard

Gibbs, with additional theorems and applications developed by the author. Although the book deals with such familiar subjects as chemical equilibrium, the laws of mass action, the phase rule, and osmosis, it does not descend to the discussion of experimental facts, and contains no illustrations of apparatus, no tables of data, and none of the usual graphical representations of equilibria. On the other hand, the mathematical treatment of the problems is very thorough and exact. The book will not be likely to attract the average chemist, who prefers to make use of theories only when they can be kept closely in touch with experiment; but a student who had taken an "honours" degree in mathematics would probably enjoy a course of chemistry in which theory reigns supreme and the limitations of experiment are thrust into the background, or perhaps postponed to a later volume of the series.

(2) Dr. Gray's "Practical Physical Chemistry" contains a series of thirty-nine exercises, which may be carried out by individual students in periods of two to three hours. It is undoubtedly one of the best books of the kind that has yet been published. The exercises deal with real problems and with real apparatus, in a way that should bring the student into touch with modern methods of exact measurement, and make it easy for him to proceed to original work in physical chemistry if the opportunity should arise. The preliminary discussion on "Accuracy" is particularly welcome, and should provide a useful check on the slovenly and inexact measurements which are the chief menace to the success of a course of experimental work in physical chemistry.

(3) Mr. Jeffery's "Notes" are a series of summaries of the data that are necessary for answering ten of the questions that are most commonly set in examinations on chemistry, *e.g.* on acids, salts and bases, oxides, oxidation and reduction, electrolysis, etc. To the student preparing for examinations the advantage of having these data in a compact form will be obvious, though he might well expect to find most of the information in a general text-book. The compilation has been done carefully, and criticism may be confined to points of detail. Thus, it is curious to find no reference at all to the sour taste by which acids first acquired their reputation, although their action on litmus and their electrolytic properties are described; the reader is also not told whether the solubility of metallic hydroxides in caustic alkalies brings them within the category of acids or not. It is, however, satisfactory to find that the author has realised the difficulty of *defining* acids, salts, and bases, and is for the most part

content with *describing* their characteristic properties; such a description might well be made into a historical statement showing the gradual development of the idea of an "acid" in the hands of Lavoisier, Berthollet, Gay Lussac, and Laurent, and of a "salt" in the hands of Boyle, Lavoisier, Berzelius, Laurent, and others. In dealing with students, it is a pity to allow them to "obtain" common salt by mixing caustic soda and hydrochloric acid, and to regard this as a "preparation" of the salt; an exercise on the recrystallisation of rock salt or the extraction of common salt (and Epsom salts) from sea-water would be of greater value, and much more in touch with reality.

(4) Mr. Bassett's book is intended for medical and dental students who require to obtain within the course of a single year some knowledge both of inorganic and of organic chemistry. The requirements of such a syllabus are in no way incompatible with a sound scheme of instruction; the study of alcohol, for example, affords excellent material for explaining methods of purification, tests of purity, and the fundamental principles of analysis in a course of general chemistry. Roscoe's "Lessons" may be quoted as a very successful example of a combined course of inorganic and organic chemistry; but the medical student of the present day has been somewhat badly served in the matter of text-books, and Mr. Bassett's book is an attempt to fill a gap that is recognised clearly by those who are responsible for the teaching of medical and dental students.

In spite of certain merits that the book possesses, it is doubtful whether it will secure any extensive foothold in the medical schools. Actual experience shows that it is a mistake to discuss the periodic classification of the elements before any of them have been studied in detail. Moreover, this classification is not a suitable basis for an introductory study of the elements. The author has boldly adopted it, and described the elements in the order in which they occur in Mendeléeff's table. He therefore postpones the consideration of oxygen and chlorine until all the metals, except those of the iron-group, have been described. Here again, as experience shows, he has made a fatal mistake, and not one student in a hundred is likely to benefit by using the scheme which the author has adopted.

Whilst most of his statements are accurate, the author has admitted several errors, from which the student might reasonably expect to be protected. He would be unwise, for example, to assert with the author that barium monoxide is prepared by heating the carbonate, or that in a combustion oxygen is *drawn* through the ap-

paratus. The definitions of acids, bases, and salts are novel, but altogether bad. If they could be taken literally, they would include amongst the bases such diverse substances as oxygen, phosphorus, potassium permanganate, sugar, alcohol, camphor, benzene, toluene, formic acid, oxalic acid, since all these substances can "react with an acid, giving water as one of the products." Amongst the "salts" one would find chlorine, phosphoric acid, oxalic acid, ethyl acetate, ethylene, ether, camphoric acid, nitrobenzene, benzoic acid, carbon monoxide, and carbon dioxide, since each of these may appear in the guise of "substance, other than water, produced by the reaction of an acid and a base," as defined in the opening sentences of the chapter.

(5) Mr. Bausor's two books on chemical calculations may be commended on the ground that the problems bear a very close resemblance to those that would be met with in the actual experience of a chemical worker. No further commendation is needed except to say that the range of subjects and the working out of typical problems are alike satisfactory. The only improvement that may be suggested is to the effect that greater interest would be aroused and more useful information imparted incidentally if the author had drawn more freely on numerical data taken from classical experiments, such as those of Berzelius and of Stas, together with more modern experiments by Morley, Richards, Morse, Guye, and others.

(6) Dr. Knox's monograph on the fixation of nitrogen includes a great deal that has become very familiar in recent years, but the subject has been treated in a very satisfactory way. In addition to the well-known details of the Birke-land-Eyde process, ample space is devoted to the theory of the operations and to the many scientific experiments that have been made to elucidate them. The section on the ammonia equilibrium is particularly welcome, in view of the fact that this method of fixing nitrogen has been exploited in the technical Press to a much smaller extent than the processes described in the other two sections of the book. It is not usual to permit any detailed study of technical processes in an elementary course of chemistry, yet nothing but good would result if this little monograph were added to the curriculum of such a course; the problems with which it deals are so important and the underlying theories are so illuminating that they might well be used to add an element of romance and a new interest to the oft-told story of elementary inorganic chemistry.

T. M. L.

OUR BOOKSHELF.

Pattern-making. By F. W. Turner and D. G. Town. Pp. v+114. (New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1914.) Price 4s. 6d. net.

THIS little book is intended for young pattern-makers, and presents a general survey of the most suitable materials, the special tools, and the fundamental processes of the trade, together with the relations of the pattern-shop with the allied departments, viz., the drawing office, the foundry, and the machine shop. The pattern-maker is principally concerned with the foundry, and throughout the book we find clear and concise descriptions of moulding processes, well-illustrated, together with discussions of the sometimes conflicting requirements of the moulder and pattern-maker, and explanations of the compromises which have to be adopted. In recent years the development of machine tools, both in the foundry and in the pattern-shop, has altered considerably the art of pattern-making and also the stock of hand-tools composing the private equipment of the artisan.

The book contains many interesting devices which have been developed by American workmen for special purposes, and in this respect will be found to be of considerable interest even to older pattern-makers in this country. A special word may be said regarding the illustrations in the book; these are excellent, both as regards the selection of typical examples and also clearness of drawing and reproduction.

We can confidently recommend the book to young pattern-makers and others connected with engineering, not that it will make them good pattern-makers—experience alone will produce this result—but on account of the broadening of views which is sure to be acquired during the perusal of its pages.

Foundations: a Short Text-book on Ordinary Foundations, including a brief description of the methods used for Difficult Foundations. By Prof. M. A. Howe. Pp. vii+110. (New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1914.) Price 5s. 6d. net.

IN this book the author has treated in an elementary manner both the fundamental principles involved in the design of foundations and also standard methods of carrying out the actual work. Special treatment is given of the footing courses of structures, these being considered apart from the foundation proper. The Rankine theory is adopted for the permissible bearing pressure on soils, and a modified form of Rankine's formula is given; there is a brief discussion of the precautions which must be considered in dealing with various descriptions of soil. Several different methods of construction in the footing courses are given, such as concrete, brick, reinforced concrete, grillage, I beams, and cantilevers; these are clearly described, and the student will have no difficulty in following the methods of calculation. A feature of the book consists in worked-out examples of each case; these will be found to be of