

Reviews.

X-RAYS IN THEORY AND EXPERIMENT. By Arthur H. Compton, Ph.D., Sc.D., LL.D., Nobel Laureate and Dr. Samuel K. Allison. (Macmillan & Co., 1935.) Pp. 828. Price 31s. 6d.

This is the second and revised edition of Prof. Compton's well-known book *X-Rays and Electrons* first published in 1926. The first edition and a revised reprint of the same were soon sold out. The present revised second edition was announced some two or three years ago but as the senior author remarks in the preface "attempts at revision could not keep pace with the rapid growth of the subject". Prof. Dr. Allison who joined in collaboration is a well-known authority on X-rays, and has taken the primary responsibility for the greater part of the present volume, such as X-rays and crystals, dispersion and absorption and X-ray spectra.

The subject-matter is divided into nine chapters, appendix and index, comprising 828 pages. The first chapter gives a wonderfully clear and concise presentation of X-rays and their properties written by Prof. Compton himself, bringing out the advances in the whole field of X-rays which have been treated in detail in the rest of the chapters. The second chapter deals with the production of X-rays from the point of view of different theories and their experimental verification. The third chapter also written by Prof. Compton is divided into four parts and deals with scattering by independent electrons, interference with scattered X-rays, the corpuscular aspects of X-rays and the wave-mechanical theory of X-ray scattering. Dispersion theory applied to X-rays is dealt in chapter IV and the study of crystal structure in chapter V. Diffraction of X-rays from crystals is dealt in two parts from point of view of perfect crystals and second of imperfect crystals. The phenomena of ionisation, fluorescence, magnetic spectra, absorption and ejection of photo-electrons are treated in chapter VII. The next chapter is on the interpretation of X-ray spectra and includes systematisation, relative intensities as well as good discussions on non-diagram lines, absorption edges and chemical effects. The last chapter is devoted to a discussion of accurate methods of X-ray wave-length measurements and their results. It includes discussions on double spectrometer measurements and focussing X-ray spectrographs.

There are 11 appendices dealing with subjects like velocity of wave groups, atomic structure factors, electronic structure of elements and discussions of Ewald's reciprocal vectors which have been found very useful in the study of crystals having non-orthogonal axes.

This much-looked-for book is unique in its importance and indispensable to advanced students in general and research workers in particular. It is with great difficulty that the authors have managed to give a presentation which, while it is not loaded with the great amount of matter that had accumulated, is at the same time thoroughly adequate and convincing. Full credit is given to all workers in the field. In the introductory first chapter, for example, results of Bohr's theory on energy levels etc., are taken and the screening constant is put in as a correction due to the repulsion of other electrons wisely avoiding any derivation of these. The authors remark "other methods of calculating these have been proposed by Sommerfeld, Heisenberg, Schrödinger and others. From the standpoint of the assumptions involved, these recent theories are preferable; but the calculations are more complex and the results are very nearly the same as those reached by Bohr. It is probably safe to say that the Bohr theory offers as satisfactory a *picture* of what happens in the atom when radiation is emitted as can at present be supplied". Further in preference to their own earlier photographs, the authors reproduce only the excellent photographs of Du Mond and Kirkpatrick on the scattering from carbon showing the Compton shift and obtained by the use of their multiple crystal spectrograph. In a note the authors remark "among those who have published experiments showing the type of spectrum described above are:" and a list of about thirty original papers are given.

We are happy to note that the work of Indian workers in the field has received adequate recognition.

One does not like to find fault with a book so masterly written. It is, however, difficult to follow figures 1-25 given on p. 29 to illustrate the Bragg law. The interfering beams are shown parallel to each other, one wonders how they could meet and interfere. The get-up of the book is excellent and typing

errors found here and there in first edition are absent in this edition.

B. DASANNACHARYA.

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THE STRUCTURE AND PROPERTIES OF MATTER. By Herman T. Briscoë. (McGraw-Hill Book Company, Inc., New York and London. First Edition, 1935.) Pp. vii+420. Price 21s. net.

The book under review is of great interest to those who wish to learn the fundamentals of the Physics and Chemistry of atoms. The author's aim has been to describe the physical concepts concerning the structure of different forms of matter in relation to their chemical properties. In the first three chapters of the book there is a nice historical review of the growth of the atomic concept from the time of the ancient Greek Philosophers to the time of the discovery of Radioactivity. Then follow chapters on Radioactivity, the Electron, Protons, the atomic nucleus, the determination of nuclear charge, structure of crystals, Octet theory, Bohr's theory, distribution of Electrons about the nucleus, valency and lastly, the new Quantum Mechanics. The author's object throughout has been to treat the subject from the viewpoint of the chemist rather than that of the physicist. It is not, therefore, surprising that the abstruse mathematical steps that are introduced in treatises on the subject have been rigorously avoided, and the final results have been given with their physical and chemical significance. The author has chosen a happy *via media* between a "popular" book and an exhaustive treatise. The chapter on the new Quantum Mechanics gives a very clear account of the recent advances without the introduction of mathematical formulæ, and serves as an excellent introduction to the subject.

The references given in the book are to the standard text-books and treatises on the various aspects of the structure of matter. It should have been much more useful to those who wish to pursue the subject further, if references to the more important original papers had also been incorporated. The Octet theory though mainly of historical interest now, has been given a little too much space. We should have very much welcomed a more detailed treatment of recent topics like Artificial Radioactivity and the Hydrogen Isotope. Almost the whole book is confined to the structure of the atom rather than the molecule. A chapter on the structure of molecules, a subject of supreme

interest to Physicists and Chemists alike could have been added with advantage. One feels disappointed to find no mention of Raman Effect and its applications to chemistry.

This book fulfils to a remarkable extent the long-felt need on the part of students of Chemistry of a suitable book which deals with the varied aspects of the structure of matter, not usually available in a single text-book. Though the book is highly useful for the students of the Honours classes, its high price may preclude its use as a text-book.

M. P. V.

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THE DISCOVERY OF SPECIFIC AND LATENT HEATS. By Douglas McKie and Niels H. de V. Heathcote. (Edward Arnold & Co., London, 1935.) Pp. 155 and six plates. Price 6s. net.

Nowadays the history of Science is coming to be regarded as important as the history of Kings and Empires and we find that an increasing measure of accurate and painstaking scholarship is being devoted to the subject. The volume before us is a welcome addition to the growing literature on the history of Science and describes an important chapter in the development of Physics. The researches of Black, Irvine and Watt on the one hand and of Krafft, Richmann and Wilcke on the other, are described and their several claims are judiciously appraised. The material has been taken from original sources and the story is told in the investigators' own words as far as possible. Much sympathy and understanding are necessary to penetrate the obscure thought and quaint reasoning employed in the infant stage of the science: the authors have succeeded very well in making these intelligible to the reader. The plates giving portraits of the important personages in this drama enhance the value of the book. Some long current notions are shown to be ill-founded such as the idea that Black designed and used an ice-calorimeter, which is embellished in most text-books by a drawing of the apparatus. We recommend the book warmly to all students of the history of Science.

T. S. S.

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"HAND UND JAHRBUCH DER CHEMISCHEN PHYSIK" unter mitwirkung Zahlreicher Fachgenossen Herausgegeben von A. Eucken Göttingen und K. l. Wolf Keil. Band 9.

Abschnitt I. "Atomspektren" von H. Kuhn, Oxford. Mit 78 Figuren im text. (Akademische Verlags-gesellschaft M. B. H., Leipzig, 1934.) Pp. 265. Price R.M. 26.

Atomic Spectra by H. Kuhn of Oxford forms the first part of Volume 9 of the series appearing under the title *Hand and Year Book of Chemical Physics* published with the co-operation of numerous scientific workers and edited by Eucken of Göttingen and Prof. Wolf of Keil. Dr. Kuhn has developed his subject from four main aspects, namely, the empirical foundations of atomic spectra, the theoretical foundations of atomic spectra, the structure and character of various spectra and lastly, the structure of the individual spectral lines themselves. In Section A the author begins with a brief description of the various spectroscopic instruments employed in the study of visible, ultraviolet and X-ray regions and then passes on to the empirical classification of simple spectra. Section B dealing with the theoretical foundations of the problem has been dealt appropriately enough first with Bohr's theory of atomic spectra and then the corresponding wave mechanical theory. Section C dealing with the structure and character of the various spectra has naturally been considered at some length. Even here the treatment is no doubt complete dealing as it does with subjects like multiplet structure, Zeeman effect, Stark effect, periodic table and X-rays and lastly, the many electronic or complex spectra, but one feels that the whole treatment is too brief. Section D deals with the structure of the individual spectral lines and the natural width and other influences on the spectral lines. Here again we are of the opinion that the author has not given the problem of hyperfine structure of spectral lines the importance that it deserves, it being one of the live problems of the day. Finally, we no doubt agree that this is a fitting companion volume to the series forming the *Hand and Year Book of Chemical Physics*. It would certainly have served a more useful purpose if it had only been enlarged and not condensed into such a small volume. The printing and general get-up of the book comes up to the usual high standard set by the German publications.

B. V. R.

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AN INTRODUCTION TO THE MODERN THEORY OF VALENCY. By J. C. Speakman. (Messrs.

Edward Arnold & Co., London, 1935.) Pp. vii+157. Price 4s. 6d.

Since the discovery of the electron in 1897 by J. J. Thomson and the nuclear atom by Rutherford in 1911, the developments of the last decade have gradually tended to the general acceptance of the electronic theory of valency and no small part of its triumphs is due to the British School of Scientists. It has united under a single self-consistent viewpoint the three pre-existing partial theories of valency for ionising, non-ionising and molecular compounds.

This modest looking volume by one of the workers in the field gives a lucid exposition of the theory. The essential distinction between electrovalency and covalency, the structure of cyanides and isocyanides, the three electron bond of Pauling and a suggestive chapter on elementary wave mechanics, have been clearly and convincingly presented, the lines along which future advance is to be looked for, being also briefly indicated. The author has taken special pains to suggest a definite system regarding symbolization and terminology of the different types of valencies. A few omissions like that of metallic conduction do not detract from the merit of a book of this introductory character. The treatment is simple, elegant and sufficient and no better introduction can be recommended to one, at present, who wishes to acquaint himself with the modern theory of valency.

B. S. R.

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LA SYNTHÈSE ASYMETRIQUE. By J. P. Mathieu. (Actualités Scientifiques et Industrielles, No. 209. Hermann et Cie, Paris, 1935.) Pp. 29. Price 8 Fr.

This is a lucid exposition of the present state of the subject of total or absolute asymmetric synthesis. While partial asymmetric synthesis, that is, synthesis under the directing influence of an already active substance has been achieved in a number of cases, the complete asymmetric synthesis without the influence of any living organism or its product has met with varying amounts of success and failure. The best results have been obtained by using circularly polarised light, and the present monograph recounts in a concise manner the methods and principles involved in the choice of this light energy, and ends with a critical examination of both the positive and the negative results obtained. The monograph will be

found to be highly interesting both to the general reader and the specialist.

M. A. G.

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ELEMENTARY SOLID GEOMETRY. By Naik and Bondale. (Arya Bhushan Press, Poona.) Pp. 214. Price Rs. 2-4-0 net.

The book is well adapted for the use of students of the Intermediate classes. Its main features are a copious collection of examples, a nice and interesting chapter on Preliminary Experimental work and a concise set of postulates. A successful attempt has been made to minimise the number of propositions by appending several results as simple deductions at the end of many of them. The book may appeal to a wider circle of readers if a few chapters on Geometrical Perspective Drawing as taught in the First Year Engineering classes are added.

M. VENKATARAMA IYER.

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DICTIONNAIRE DE LA CHIMIE ET DE SES APPLICATIONS. By Clement Duval, Raymond Duval, and Roger Dolique. With a Preface by H. Luc. (Hermann & Cie, Paris.) Pp. xxxii+747. Price 90 Francs.

This important publication is intended only for readers who have an adequate knowledge of the French language. It is not a French-English dictionary dealing with chemical topics.

The 747 pages of this work are packed with information of such an exceedingly useful character as to entitle it to be included in the usual list of books of ready reference. For instance, under cobalt is listed more than 250 of its compounds, each one of them with the appropriate formula. The organic compounds, including those recently investigated, are listed under the appropriate heads and their accepted nomenclature and formulæ are clearly indicated. Being of the nature of an encyclopædia, the material is arranged in alphabetical order which greatly facilitates the task of reference.

The work under review gives not only a list of compounds but indicates at the same time the meaning and significance of the various operations connected with them in the chemical laboratory and industry. It will undoubtedly serve a useful purpose especially in satisfying the immediate needs of workers who are far away from well-equipped libraries.

K. R. K.

VAN NOSTRANDS' CHEMICAL ANNUAL. A handbook of useful data for analytical, manufacturing and investigating chemists, chemical engineers and students. Edited by Prof. John C. Olsen. Seventh Issue, 1935. Pp. xviii+1029. Price 25s.

The seventh issue of this well-known handbook, which has been recently published, will be welcomed by every serious student of Chemistry. Handbooks get rapidly out of date as accurate data accumulate, and therefore need periodic revision. The new edition of the *Chemical Annual* which is being repeatedly improved upon, incorporates a large number of new and useful tables dealing with physical and chemical data and tables giving boiling points, vapour pressures and latent heats of evaporation. The chemical engineers, in particular, will find this handbook invaluable and the well-known author of the "Unit processes and principles of chemical engineering" who has edited this handbook with the help of Dr. B. Whitney Fergusson, as Assistant Editor, and 13 contributors, has spared no pains in bringing out a thoroughly revised and up-to-date handbook.

The publication of handbooks and dictionaries involves a stupendous amount of meticulous care and labour. It is very difficult to review also these publications. Publications which have undergone several editions should be reliable due not only to the fact that they have undergone revision but also because, the chemists, who consult these handbooks, will draw the attention of Editors, in regard to errors in preceding issues and suggest addition of new tables and data. The Editor of *Chemical Annual* has earned the gratitude of a very large community of scientists, who will have numerous occasions to consult the book in the course of their professional work.

A very useful list of the more important books published since 1926 has been included and with the help of the index which serves as a guide to content matter, it is easy enough to locate the pages in which the required data are to be found. The get-up of the book is excellent.

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CHEMISTRY IN COMMERCE. (George Newnes, Ltd., London, 1935.) Vols. III and IV. Pp. 777-1544+iv. Issued in 16 parts of 1/- each.

The four volumes of *Chemistry in Commerce* which were issued in 32 weekly instalments have recently been completed.

One cannot fail to be struck by the encyclopaedic information which the volumes comprise and it can be safely said that we have here, a valuable work, copiously illustrated, at comparatively small cost, which the practising chemist will find numerous occasions to consult.

The subjects dealt with are of varied interest. History, Laboratory devices, analytical control in various industries, etc., are all dealt with by authorities who, by virtue of their intensive works experience, have described in precise terms, with numerous illustrations, the relevant details in simple and eminently understandable language. The chapters on bacteriological research (pp. 1161-1166), Pasteur and fermentation industries (pp. 777-778) make excellent reading. Under Chemistry in Stratosphere (p. 1027), a short account of how Professor Piccard carried a small air-conditioning laboratory into the stratosphere, is described. The chapter on Poison Hazards in Industry (pp. 1430-1435), is invaluable to every chemist. Under Accidental Discoveries in industry (pp. 1158-1160), several instances are described where discoveries were made not entirely by design. "In the field of observation chance only favours those who are prepared" (Pasteur, 1854). "Many men who are very clever—much cleverer than discoverers—never originate anything" (Darwin, 1871). These serve to show how luck enters the field of discoveries. The theme of each chapter has been logically developed. Thus in the chapter on High Speed Centrifuges (pp. 1001-1005), we have first a section on some typical applications, then follows an explanation of centrifugal force and finally a section on the care and maintenance of centrifuges. There are also several notes on the care and maintenance of chemical plant, such as autoclaves (p. 1367) and, on the use of synthetic resins for acid-proofing of chemical plant (p. 1157). Of particular interest are the chapters on measurements of high temperature (p. 1397) and on the use of Parr Bomb calorimeter (pp. 1190-1195). The chemistry and pharmacy of vegetable drugs are dealt with in 14 parts and are systematically treated. The pressure control bottle described on p. 1010, the mechanical shaker prepared from an old bicycle wheel (p. 1042) and the filtering apparatus to maintain constant head described on p. S19 and many other highly useful but simple laboratory devices are to be found throughout

the text. The examples mentioned here serve to show the variety of features covered by the book.

One wonders why the manufacture of tea and coffee has escaped the attention of the Editors. On p. 1280, under hydrogenation, molebdirum is spelt as molebdirum. No reference is made to honey under foods. The electrodeposition of lac, a process which has been recently developed (*Chemistry and Industry*, 1934, **26**, 882) has not found a mention in the chapter on lac.

The volumes are, undoubtedly, of the highest interest and we expect that they will gain the popularity which they deserve. Every student of chemistry should learn the ramifications of the subject he is studying and books written in such an easy and understandable manner and still conveying such authoritative information on a large variety of topics, are indeed rare.

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THE CARBOHYDRATES. By E. F. Armstrong and K. F. Armstrong. (Longmans, Green & Co., London, 1934.) Pp. vii+252. Price 15s.

During the last quarter of a century Armstrongs' monograph "The carbohydrates and glucosides," has been an indispensable volume in the library of every one interested in the chemistry of sugars. The growth of knowledge in this important field of chemistry necessitated the separation of the glucosides, and a separate monograph entitled "Glycosides" by E. F. Armstrong and K. F. Armstrong, appeared in 1931. The publication under review completes the work of revision and the two companion volumes constitute a masterly exposition of a highly intricate subject.

The volume was eagerly awaited for some years past, notably as a result of the great advances on the structural aspects of the carbohydrates due to the work of Professor Haworth and his school at Birmingham. The volume has been thoroughly revised retaining the main features of treatment, which have proved so popular. Thus, attention is confined to natural sugars and their derivatives; glucose is taken as a typical sugar and its properties and reactions considered with particular reference to its biochemical transformations.

Since Fisher's discovery (1893) of the isomeric derivatives of glucose α and β , an enormous volume of work has accumulated on the structure of glucose. Tollen's butylene oxide ring structure was accepted by Fisher.

The discovery of yet a third reactive form, the so-called γ -form by Fisher and Irvine, needed some revision. The remarkable success which attended the work of Haworth, on the structure of the glucose rings, by the well-known methylation method, resulted in giving the amylen oxide structure (1926) to the oxide form of glucose. Conclusive proof has now been adduced to show that the α and β forms are represented by the 1:5 Gluco-pyranose structure and the γ -form by the 1:4 gluco-furanose structure. The book under review gives a masterly exposition of the structural aspects of the chemistry of sugars.

The present edition dealing with recent work which has resulted in giving some degree of certainty on matters of structure where controversy existed before, will be welcomed by all.

This brief note cannot be concluded without paying a tribute to the authors of the excellent volume. It is very sad to reflect that the demise of the junior author has removed from the field a bright and promising young scientist, thus resulting in an irreparable loss.

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TEXT-BOOK OF BIOLOGY. By E. R. Spratt and A. V. Spratt. (University Tutorial Press Ltd., London.) Price 9s. 6d.

The study of biology has become more and more a matter of public interest. The Panama canal was as much a victory over the mosquito and those two diseases, yellow fever and malaria, as a feat of engineering skill. The medical student begins his study with a course in biology and medicine is becoming more a question of applied biology and less a mere study of disease. Biological knowledge is found to be more and more indispensable in agriculture and various industries. Civilised society finds biological knowledge to be of great economic and cultural importance. The recognition of the value of biology has led to its being introduced in schools and colleges. Educationists feel that no subject in the school curriculum, except the mother tongue, is of as great a value as biology. And with the introduction of the subject in schools, there has come up a crop of books on biology. Some are of the old general biology type. Some are merely botany and zoology text-books stitched under the same cover. A few, however, are fresh in their treatment, emphasising the point of view of biology, that something is characteristic of *all* living things and

that this something is achieved in many different ways. The book under review takes after the traditional method. Function should receive greater emphasis. On this foundation the study of structure should be based. And animal-life and plant-life should form the two dovetailing pieces of one subject. The common forms usually found in books on general biology are dealt with in the greater part of the book. There are some chapters on the physiology of plants and animals. Some account of the ecology of plants and animals is given. A chapter on heredity, variation and evolution is also included. The book may be of use to students who take up biology in the Intermediate Colleges and to medical students.

T. M. S.

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BOTANY PRINCIPLES AND PROBLEMS. By E. W. Sinnott. (McGraw-Hill Book Co., Inc., New York and London.) Third Edition, 1935, pp. xix+525, Price 21s. net.

This is a valuable addition to the list of books on Botany for use in Colleges. The book may be divided into two parts. The first few chapters of the earlier part deal with the introductory survey, the history of botany, the cell, the morphology and physiology of the various organs of the plant like the root, leaf and stem. The next two chapters deal with the physiology of metabolism and growth. Then comes an useful and interesting chapter on "Development and Morphogenesis" followed by two chapters on certain aspects of ecology. The special chapters on "Heredity and Variation" and "Plant Evolution" not only provide refreshing changes from the commonly used text-books packed with morphological details but also serve to widen the scope and horizon of the beginner in botany and bring before him the interesting and useful aspects of the subject. A really good book not only catalogues facts but also arouses the interest and curiosity of the student.

In the second part of the book the various groups of the plant kingdom are discussed with the help of a few specific types. It is interesting to note that the vascular plants as a whole have been called Tracheophyta and divided into three broad groups, the Lycopsidea, Sphenopsida and Pteropsida. A chapter on primitive vascular plants—Psilophytales has also been rightly included and placed at the beginning of the Tracheophyta. The author opines that the seed-bearing

habit is not the monopoly of the Gymnosperms and Angiosperms which comprised the old group—Spermatophyta. Consequently this term has been discarded altogether.

Reading through the book one however gets an impression that the treatment in the second part of the book has been somewhat rapid. The systematic botany of the Angiosperms may well have been dealt with in greater details and a few families discussed. The Charophyta are better kept as a separate group instead of being wedged in between the Chlorophyceæ and Phæophyceæ; and the number of genera in the Charophyta is certainly not restricted to two as stated on page 379.

The author has within the space at his disposal dealt with the various aspects of botany. The language is clear and direct while the profuse illustrations and excellent get-up of the book leave nothing to be desired. Another valuable feature of this book is the questionnaire at the end of each chapter which not only helps the student to test how much he has assimilated but also helps him to think and to develop gradually the "inquisitive and critical attitude".

A. R. R.

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LES PROBLEMES DE LA RADIOGEOLOGIE. By W. Vernadsky. (Hermann et Cie, Paris, 1935.) 66 pages. Price 15 francs.

This brochure forms number 201 of the series, "Actualités Scientifiques et Industrielles", the geological section of which is published under the direction of M. Lucien Cayeux. The book is based mainly on two lectures delivered by the author at the University of Paris in 1933. In the earlier pages, the author gives a brief résumé of the outstanding contributions to the subject of radio-geology by scientists like Curie, Joly and Strutt. This is followed by a classification of the scope of the subject. The remaining portion of the work is devoted to a discussion of the special problems pertaining to radiogeology, such as the determination of the oldest portions of the earth's crust, calculation of the age of sedimentary rocks, Joly's thermal cycles, thermal heterogeneity of the biosphere, the low temperatures of the ocean, petroliferous beds as fields of radio-chemical phenomena, the migration of uranium lead, the radio-chemical alteration of radio-active minerals, the carbonaceous minerals (tucholite group) discovered in ancient pegmatites, the chemistry of the

oldest portions of the earth and the planetary exhalation of helium.

The bibliography is printed in very small type and this is probably the reason for the many typographical errors found in it. The International Table of Radioactive Elements forms a useful appendix to this excellent summary of the subject of radiogeology.

C. S. P.

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INTRODUCTION TO GEOLOGY. By Prof. E. B. Branson and Prof. W. A. Tarr. (McGraw-Hill Book Co., Ltd., New York and London.) Pp. viii+470. 21s. net.

"Introduction to Geology" by Profs. Branson and Tarr forms a useful addition to many of the excellent text-books on the subject which have been published in English. In this book the authors have aimed to present the fundamental principles of Geology in a style simple enough to meet the needs of elementary students who require but an intelligent initiation into a study of the subject.

The book is divided into two parts. Part I deals with physical Geology. Starting with an account of the mode of formation of igneous rocks and their constituent minerals, the processes of weathering and rock decay are described followed by the next four chapters on the earth sculpture as brought about by various denuding agencies. Chapters IX and X deal with sedimentary and metamorphic rocks, and are succeeded by two more chapters on the action of snow, ice and wind. The next three chapters XIII to XV give some account of the structural and dynamical geology, the last one being devoted to earthquakes. Part II deals with historical Geology. A concise statement of the views on the origin of the Earth is followed by a narration of the conditions which existed during different geological periods. Descriptions of the plant and animal fossils of the several formations are given and in addition the economic products found in them are also noted. Chapter XX of this part gives an account of the origin, distribution and methods of locating petroleum.

In spite of the limited scope of treatment of the subject one would have liked to see some account of the coral reefs and the importance of corals as rock builders, included in the book. The presentation of the fundamental principles of any branch of science in a simplified style divested with

much of technical phraseology is no simple matter and unless considerable care is exercised in the selections of suitable terms, loose expressions are likely to creep in which would lead to a misconception of statements. The book under review is not entirely free from a few such faults. The terms lava and magma as used by the authors would have been the better for a clearer definition. At the great depths, mentioned by the authors in page 212, pressure is likely to induce rock flowage and not granulation as stated therein.

Substitution of "conjunction" for "connection" in line 37, p. 211; "does" for "is" in line 9, p. 212; "becomes" for "became" in line 6 (reading from the bottom p. 222) would perhaps make the sense clearer.

The phenomena of re-fusion, density stratification of magmas and igneous intrusions by magmatic stoping are still too controversial to be presented to elementary students as well-established facts.

Despite these few slips, the authors have succeeded in achieving their main purpose, and the book will certainly prove to be a welcome addition and appeal to those readers, who require an elementary knowledge of Geology. It is profusely illustrated with well-chosen photographs and drawings and the general get-up of the volume is all that could be desired.

B. R. R.

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THE WORKING, HEAT TREATING AND WELDING OF STEEL. By H. L. Campbell. (Messrs. Chapman & Hall, Ltd., London.) Pp. 185. Price 11s. 6d.

The above book is a welcome addition to the large number of treatises already available on the subject of Steel Metallurgy, and should serve as an introduction to the study of different aspects of Steel Metallurgy. It is not usual to find in one book references to the manufacturing processes as well as the shaping, treating and testing of different classes of steel. It is from this point of view that the text-book should be recommended not only to students and apprentices who desire to take up the profession of iron and steel manufacture but also to Managers of industrial establishments who desire to have a general knowledge of all phases of Steel Metallurgy.

The first 3 chapters dealing with various methods of manufacturing steel and the basis on which the steels are classified give all information that is necessary in as brief

and intelligible a manner as possible for making a beginning of the study. The author's reference to the High Frequency Furnace shows that all the latest developments in the field of steel making have been kept in view. The physical tests of steel which may perhaps have been dealt with later, deal with only the important tests on the basis of which the qualities of different steels are compared.

The effects of temperature changes and mechanical working of steel form a proper prelude to the next chapter giving a very brief account of different kinds of working steel. The development of steel products from ingots, and the equipment for the manufacture of important classes of steel products such as rails, sections, plates, tubes and axles are brought out very clearly without going into great details which would surely confuse the beginner. Cold rolling which has been playing so prominent a part in the production of quality steel products is given its due importance.

The brief description of the physical constituents of steel with suitable micro-photographs of the important constituents in steel is necessary for proper understanding of the heat treatment of steel which plays so important a part in the utilisation of the best qualities that are available in steels; and the equipment required for a proper sized heat treatment shop should serve as a valuable guide to the Engineering or Metallurgical student during his first years of apprenticeship.

Only one chapter for alloy steels and their heat treatment seems rather too brief, considering the varieties of alloy steels in common use and their growing importance in all fields of engineering activities. Even in a small text-book such as the one under review one would like to have more information and data about stainless steels, high speed steels and spring steels.

The extensive use of welding in the construction of engineering structures, automobiles, rail-road cars, etc., fully justifies a detailed description of the principle of welding and the different processes which are in vogue. The concluding chapter describing the various processes adopted for the preservation of steel forms a fit ending for this admirable, though brief, text-book. One should have no hesitation in stating that this book should find a prominent place on the tables of all students of engineering and metallurgy.

A reference to the bibliography on the metallurgy of steel given at the end of the book may not be out of place. From a perusal of the list, one is satisfied that he can get any information, however detailed, relating to the practice of steel making, rolling of different steel products, the treatment of different classes of steel, standards accepted for the various classes of steel, and micro-graphic study of the constituents of steel. One would have, however, liked to see in this list several valuable contributions from well-known Metallurgists on the Continent and in England.

The laboratory assignments given at the end emphasise the scope of the book, namely, its use as a text-book by technical students.

D. V. KRISHNA RAO.

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COFFEE IN 1931 AND 1932.—Economic and Technical Aspects. (International Institute of Agriculture, Rome.) Pp. 229.

This monograph, published under the auspices of the International Institute of Agriculture, Rome, is the first of the series of monographs on important agricultural subjects which the Institute proposes to publish.

A considerable portion of the monograph is devoted to the economics of coffee production, and over-production, no doubt due to the severe depression the coffee trade is struggling under ever since 1929. Over-production seems to be not so much a result of better yields as of increased acreage under coffee. The phenomenon of over-production is possibly only a temporary one, fostered by the boom years prior to 1929, and, therefore, may be expected to be checked by the lean years that have followed since then. Over-production is not, however, the only problem that faces the coffee grower. Other problems of various and varied interest like soil exhaustion, control of insect pests and fungoid diseases, improvement in quality, improved methods of marketing are all becoming increasingly important and clamour for solution.

These and allied problems form the subject-matter of the latter parts of the monograph. An exhaustive review of work on technical and ecological aspects of coffee growing forms an interesting and instructive chapter to both planters and students alike for study and assimilation. Equally of interest is the chapter on diseases and pests of coffee.

The monograph gains value by the in-

clusion of a short but instructive chapter on the preparation of coffee in its various stages. This attempt is specially welcome in view of the numerous attempts that are being made all the world over to improve the quality of the berry before it comes into the market. That quantity must give place to quality cannot be too often stressed and it is therefore of particular satisfaction that a monograph on coffee should include and emphasise this point for thoughtful consideration.

The value of the monograph as a reference book, which it is intended to be, is enhanced by the inclusion at the end of each chapter of a fairly exhaustive bibliography of the period which it covers.

The book deals with the years 1931 and 1932, a period during which the depression in the coffee trade first began to be felt seriously. The situation has not improved with the passage of time and with the prices at the level that they are gives little hope of improvement in the near future. It is therefore of obvious importance that a pause should be made in the field of competitive production—nay, over-production—and a stock of the situation taken. The book under review does this in an eminently practical manner and more, adds technical information towards a solution of the various problems that beset both the coffee grower and the trader alike. The book may be consulted with advantage not only by the planter but also by the scientist.

B. N. I.

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INDUSTRIAL POSSIBILITIES OF SOME RESEARCH WORK DONE IN INDIA. By Gilbert J. Fowler, D.Sc., F.I.C. (Society of Biological Chemists, India, 1934.) Pp. 42. Price Re. 1.

This neat little publication contains the substance of two lectures delivered by the author at Bangalore under the auspices of the Society. It is very welcome just now, when two Research Organisations have recently been established, one by the Government of India and the other by the Government of Mysore for co-ordinating Industrial Research being pursued at different centres at present.

The first part of the brochure deals with "Researches resulting in permanent factories," particular mention being made of The Sandalwood Oil Factory, Mysore, The Whitelead Syndicate, Bangalore, The Government Soap Factory, Bangalore and the Turpentine Distilleries at Clutterbuckganj

and Jallo. Next part dealing with problems which have been investigated and the results of which await commercial exploitation is of greater interest. Manufacture of Glue as a Cottage Industry and as a subsidiary industry in Tanneries is well worth serious consideration by all interested in a self-sufficient India. Utilization of Molasses is the problem of the day, in view of the large number of Sugar Factories (152) recently started and manufacture of cheap power alcohol should become an accomplished fact very soon; actually, the Mysore Sugar Co., Mandya, have already started the manufacture of cheap alcohol from molasses. The section dealing with small industries requiring very little capital is the most important in the opinion of the reviewer, as the starting of such industries is the only possible means of improving the economic condition of the masses.

By drawing attention to a large number of problems of economic importance to India, Dr. Fowler has done a distinct service to the cause of economic reconstruction in this country. One only hopes that the trouble he has taken will to a small extent at least be repaid by organised research on the new problems and accumulation of useful and practical data.

A very adequate bibliography enhances the usefulness of this important brochure considerably.

K. A. N. R.

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REPORT ON THE SALT INDUSTRY OF RAICHUR AND GULBARGA DISTRICTS. By S. R. Phate, B.A., B.Sc., with notes by L. S. Krishna-

murthy, B.Sc., and Captain L. Munn, O.B.E., M.E. (Bulletin No. 11, Department of Commerce and Industries, H. E. H. the Nizam's Government; Industrial Laboratory.) Pp. 154. Price Rs. 2-8-0.

The publication under review discusses in detail all the sources of salt in Hyderabad which may be classed under the two heads: (1) Salt earth and (2) Saline water. The quality of salt at present manufactured as a cottage industry has been investigated by the analysis of a large number of samples from different localities and useful and necessary data have been accumulated.

The relative merits of pan evaporation and stack evaporation of brine have been investigated and as a result of these investigations the author arrives at the very interesting conclusion that "the advantage of stack evaporation (10' cube) over solar pan evaporation (10' square) is 22.5 times". It is therefore suggested that stack evaporation should be adopted and would be a distinct aid to this cottage industry. But one might sound a note of caution that more work is probably necessary before this point could be definitely settled.

The Government Industrial Laboratory, Hyderabad, is doing a distinct service to Indian Industry by publishing reports of the investigations conducted there, but, without any intention of striking a discordant note, it may legitimately be asked whether a price of Rs. 2-8-0 for such publications is not far too high in a country like India where the purchasing power of educated classes is so small.

K. A. N. R.

Forthcoming Event.

IMPERIAL COUNCIL OF AGRICULTURAL RESEARCH.
September 2nd to 4th, 1935—Meeting of the Governing Council.
