

REVIEWS

Astronomy. By William T. Skilling and Robert S. Richardson. (Revised edition. Chapman & Hall Ltd., London), 1947. Pp. xii + 692. Price 28 sh.

Astronomy has a special fascination for all educated people, whether trained in the natural sciences or in the humanities. A good book on astronomy can therefore be expected to interest a large circle of readers of one kind or another; but it is not often that one comes across a book on astronomy which is of universal appeal. Skilling and Richardson's *Astronomy* is one of those rare books whose style and breadth of scope will satisfy almost everyone who is interested in knowledge for its own sake and who has stared up at the stars and felt a thrill of awe in the face of mystery and eternity. The first edition (1939) of the book filled the gap which existed between the entirely popular accounts of astronomy like some of the writings of Eddington and Jeans, which made the average man marvel at the astounding achievements of the human intellect in this branch of science, and the highly mathematical and sometimes abstruse books by the same great astronomers and many others, which are intelligible only to the professional astronomer or mathematical physicist. The revised edition (1947) of Skilling and Richardson's book is therefore sure of a welcome from layman and professional alike.

Although the book appears to be planned primarily as a text-book for American college students, its scope is vast,—that is the only adjective which suits. It is divided into three parts under broad headings. Part I is headed "The Earth and the Moon in Astronomy"; it deals not only with the earth and the moon, but also in a general way with the other members of the solar system and even with the essential principles of construction and use of telescopes, spectroscopes and various other instrumental equipment of the astronomer. A more detailed account of the sun and the planets (other than the earth) and their physical constitution comes under Part II which is headed "The Physical Nature of the Sun and Planets". Again the subject-matter of this part is much more comprehensive than the necessarily short title implies; for, in this part, the authors have wisely included a very simple, but quite effective, summary of the basic properties of light, of the ordinary and the radioactive atoms as well as an outline of the modern theories of the origin of spectra, without which the lay reader would be unable to appreciate the results of the study of the physics of the sun and the planets here described. To many readers,—at any rate to the present reviewer,—the high light of the book would however be Part III, whose title is "The Stars and Nebulæ". Here we have a concise and yet very readable account of the fundamental facts so far discovered, as well as of some of the fascinating theories or specula-

tions concerning the most distant components of the universe.

As I have already said, the scope of the book is vast. This vastness of range is at once the merit and the weakness of the book. The authors have made a praiseworthy attempt to include in a single, essentially descriptive volume practically all important known facts and theories of astronomy. This is humanly impossible to achieve, and the inevitable result has been a certain degree of sketchiness in the treatment of some matters, and some subjects have received inadequate attention notwithstanding their undoubted interest and importance. To mention a few, one would have liked to have a fuller description of the theories of cepheid variation, of the interior of stars, of interstellar matter, of the magnetic fields of stars, etc. Though the book is written in a semi-technical, descriptive style, the authors have achieved a remarkable measure of success in maintaining a high standard of accuracy in the statement of scientific facts. But a few loose statements, though of minor importance, have crept in; for instance, it is not strictly accurate to say that "They (i.e., monochromators developed by Öhman and others) do optically what the spectroheliograph does mechanically" (*vide* p. 167). Again, from the last sentence on p. 364 one gets the impression that prominences projected on the disk of the sun generally appear "as long, dark plume-like markings roughly parallel to the solar equator"; but the fact is that the dark markings definitely show a progressive increase of inclination to the meridians from the equator to the poles, the inclination to the meridians being, on the average, zero at the equator and 90° at the poles.

The book is very well illustrated and has a number of instructive tables and charts, as well as an Appendix which includes a glossary of technical terms used in the text and a list of astronomical and physical constants. It is, I believe, the most up-to-date and informative book on descriptive astronomy that is available at the present moment. The authors, one of whom is a retired college professor and the other an active researcher at the most modern and powerfully equipped observatory in the world, deserve all praise for their planning and writing of this excellent book in which answers in simple language to an amazing number of cosmic problems will be found.

A. K. DAS.

Fundamental Principles of Ionospheric Transmission Radio Research Special Report No. 17 of the Department of Scientific and Industrial Research and Admiralty. Published by H. M. Stationery Office, London. Pp. 82. Price 1s 6d. net.

This booklet was issued during the War to the Services to interpret the results of observations of the conditions in the Ionosphere into instructions for procedure in operating the complex

radio services required. As such, it attempts to cater to the needs of a wide variety of readers. A natural consequence of this has been admitted in the foreward itself. It is too detailed and academic for wireless operators and low grade technicians and rather sketchy for the research physicist and engineer. This, however, does not diminish the value of the book. It is a most welcome publication to persons like the reviewer who have to recommend an authentic and accurate account of the Ionosphere and its effect on radio communication to telecommunication degree students and to a large number of technicians receiving an advanced training. To this class of persons, the book is a real boon. The book is also very useful to the large number of physicists who are not specialists in Radio-physics and to the honours students in physics who have examinations to consider.

The book is divided into seventeen sections which include the discussion of the ionosphere as a refracting medium, vertical and oblique incidence, transmission curve technique, reflection from multiple layers, determination of actual heights, effect of the earth's curvature, effect of the earth's magnetic field, characteristic polarisation of waves, absorption, formation of the ionosphere, diurnal and seasonal variations, echoes, scattering, effect of sunspot cycle etc. The treatment is everywhere simple and straightforward. The use of mathematics is reduced to a minimum. All the statements are accurate and clear. The diagrams are very neatly drawn and very illustrative.

The ray treatment is followed everywhere. This is very useful and makes explanations easy. There is, however, another view. The reviewer is strongly of opinion that it is desirable to follow the full wave treatment and where this is not possible, the results only should be stated. Over-emphasis of the ray treatment may lead to wrong conceptions in the mind of the inexperienced reader. This is the only, if it considered so, a defect of this otherwise excellent book.

On the whole, the book is a very brief but very clear and authentic monograph on Ionospheric Transmission and is certainly worth many times the price for which it is put on sale. It is indispensable to College libraries and can be strongly recommended as a text-book to a wide variety of readers.

S. V. CHANDRASHEKHAR AIYA.

Electron and Nuclear Counters. By Korff, D. Van Nostrand & Co., New York publication & Macmillan & Co., as agents 1948. Price \$3.22 or 18s. net.

This book was first published in April 1946, reprinted in September 1946, April 1947 and January 1948 and has 212 pages. The author is Professor of Physics and Supervisor of Physical Research, College of Engineering, New York University. In this book is gathered together and summarized pertinent facts regarding the theory of the discharge mechanism and the practical operation of various types of counters. As well pointed out in the book, counters have been known for about 40 years, still their construction and operation are claimed by many competent physicists as almost involving

"magic". Various laboratories have indeed developed special procedures for their construction and use, often not fully understanding why particular technique appear to be most successful.

In the book we have first a discussion of the internal mechanism of the discharges in the counter and then of the constructional and operational features which are desirable and the means adopted to secure them. Subjects discussed include the usual and commonly used counters as well as those for special purposes and those selectively sensitive to particular types of particles, such as those which preferentially count neutrons in the presence of a strong background of gamma radiation.

The first chapter serves to introduce the subject and to describe the progressive changes in the behaviour of the counter as the voltage is gradually raised. The terminology to be used in describing the counters is next defined. Then the operation of the instrument, first as an ionization chamber, then as a proportional counter, and finally as a Geiger counter, is developed and the theory and operation of each different type of counter is set forth. The practical aspects are next considered and the construction of counters is taken up. The reasons for the various constructional features are given. The errors and corrections encountered in using these devices are discussed. Finally, the various electronic circuits, which are the essential auxiliaries to the successful operation of various kinds of counters, are presented.

The counter is a basic instrument in the modern day atomic research just like the galvanometer has been ever since the early days of electrical science for current electricity. Prof. Korff's is the first book of its kind in the English language and no student of research or even a teacher expounding the field of recent atomic research can well remain without possessing a copy of this book.

B. DASANNACHARYA.

Mechanical Behaviour of High Polymers. *High Polymers*—Vol. VI. By Turner Alfrey, Jr. (Interscience Publishers, Inc., New York), 1948. Pp. vii + 581. Price \$ 9.50.

This moderately priced and elegantly got up book forms Vol. VI of the famous High Polymers monographs on the Chemistry, Physics and Technology of High Polymers edited by Prof. H. Mark and his colleagues. In this volume Turner Alfrey, Jr. has dealt with the fundamental principles underlying the visco-elastic behaviour of high polymers in relation to the molecular structure, amorphous, crystalline, linear or cross-linked. As only a few of the important high polymers are studied so far from this point of view by Rivilin and Kirkwood, the mechanical behaviour of high polymers such as elasticity, viscous and plastic flow, is discussed on semi-empirical grounds based on the research in the author's laboratory.

This book sets forth a model for further study of similar fundamental studies on the myriads of high polymers not only on the visco-plasto-elastic property which governs the practical application of these polymers but also on the concomitant changes in

molecular structure as revealed by electrical and optical properties such as dielectric constant, double refraction and light scattering by infra-red and X-rays and by other physico-chemical methods such as swelling, adsorption, etc.

The next volume of the High Polymer series deals with phenoplasts, their structure, properties and technology. These books form a valuable contribution to our knowledge of the Physics and Chemistry of Plastics.

S. K. K. JATKAR.

The Science of Plastics Edited by H. Mark and E. S. Proskaur. Vol. I (Interscience Publishers, Inc. New York). 1948. 632 pages. \$9.00.

The publishers have contributed this volume I on the progress of the Science of Plastics during the years 1942-1947 reprinted from the original Abstract Service 'Resins, Rubbers and Plastics' issued in loose leaf form, with a comprehensive Index. The book deals with general properties, physical chemistry, reaction kinetics and technology and with general aspects of different types of Plastics.

These abstracts unlike the usual ones give all the important information such as the sketch of apparatus used, procedure, experimental data (or figures), etc., required by the research workers and technologists, and make it unnecessary to refer to the original papers published in journals, most of which especially the continental ones are not easily available. The value of such moderately priced books to students of Plastics can hardly be overestimated. The progress of research on the Chemistry and Physics of Plastics is so rapid and the practical applications so many, that very few scientists could afford to neglect the up-to-date position of the science of plastics.

Such comprehensive source books are far cheaper than the usual text-books. The method of printing has in no way taken away the clarity of presentation or the get-up of the book.

We look forward to the publication of abstracts of papers on Vol. II which will deal with single plastics.

S. K. K. JATKAR.

Chemical Composition of Plants as an Index of Their Nutritional Status. By D. W. Goodall & F. G. Gregory. (Imperial Bureau of Horticulture & Plantation Crops, Great Britain), 1947. Pp. 167. Price 9d.

This technical communication from the Bureau of Horticulture and Plantation Crops is a very welcome addition to the literature on the subject of plant nutrition and the detection and measurement of nutritional deficiency of field crops. It is devoted mainly to an exposition of the practical application of methods based on chemical analysis of plants for the determination of fertiliser needs of plants.

The book opens with a brief but concise account of the various methods of diagnosis now in vogue, i.e., pot culture studies, field trails, soil analysis, analysis of plants and the observation of symptoms associated with the deficiency of particular nutrients. Then follows a historical account of the progress of methods based on che-

mical analysis of plants, the various theories advanced from time to time on the relationship between the composition of the soil, the plant and the added nutrient and of the present position of the technique in practical agriculture. The rest of the book is devoted to a comprehensive account of the method of diagnostic plant analysis. The treatment is very thorough, and details as to the technique and method and manner of sampling, analysis and interpretation of results, the limitations of the method in practical advisory work are all treated in full. The results of previous workers are discussed in their proper sequence and illustrated with painstakingly collected statement of the results. The advantages of the plant analysis method over other methods is briefly discussed, and the reliability of the results and great rapidity with which they can be obtained are stressed.

The problem of crop yields in relation to fertilizer supply is now engaging the urgent and earnest attention of scientists and others all over India. In the present context of inadequate food supply and undernourishment, the problem is one of added importance. The workers in the various agricultural departments all over India will find this book of immense value. The Indian workers have so far relied on the traditional, timeconsuming methods of soil analysis and field trial to guide them in their efforts to study the fertiliser requirements. Diagnostic plant analysis has not yet received their practical attention. It is a new field with immense possibilities for India where rapid and reliable diagnosis of soil and crop requirements is now an urgent necessity.

The authors have compiled an exhausting bibliography, which alone would make it worthwhile to own a copy of the book.

B. D.

Using Salty Land. An F.A.O. study prepared by H. Greene, Soils Specialist, Land Use Branch, Agriculture Division of the United Nations. (Published: Washington, U.S.A.), February 1948. Price 50 cents.

This is the third number of the F. A. O. Agricultural series and is an excellent small monograph running over 49 pages. Written by one who is a specialist in the field, it is easily understood by the layman and of great interest to the technician. It is of great topical interest as the food production of the world consequent to the World War II is very much below that required by the population. With the establishment of peace and the increase in population that must be expected hereafter, every acre of land that can produce food must be utilized and brought under cultivation. This little book tells of the past trials and successes of bringing salty land under cultivation—land that had once been considered unfit for growing crops.

After dealing with the processes that cause the formation of salty soils, it recounts briefly the reclamation experiments conducted in Egypt, Sudan, North China, Sanjoaquin valley, California, U.S.A., in Northern India, in the Poltava region and the lower Volga region of the U.S.S.R and in Hungary. A brief review

of the work of the Russian Soil Scientists is made based on the account of D. G. Vilensky and the formation of Solonchak, Solonetz, and Solodi described.

Further chapters are devoted to base exchange complex of Solonetz and Solodi, Marine reclamation and a very sufficient account of the problems of reclamation, of removing excessive salts, removal of exchangeable sodium magnesium and hydrogen follows. Irrigation problems, the salt content of irrigation water and the relationship between the salt content of the irrigation water and the salt content of soil and alkalinity of the soil to be reclaimed through irrigation is presented in a very attractive manner.

The last chapter deals with organization that has to handle the problems of reclamation. "There are broadly two ways of undertaking a large-scale project. The administrative authority may take over the whole task providing both the money needed for development and the technicians to carry out all stages of the work. This method is used in the U.S.S.R. and was notably successful in the Tennessee Valley, U.S.A.

On the other hand it is possible in some cases to balance the main items of capital expenditure against increased production from the reclaimed land. It may be convenient for the administrative authority to entrust the main work of reclamation to a commercial corporation, which would buy salty land at low price, reclaim it and sell it at high price. The directors of the commercial corporation can make the general and local surveys in sufficient detail to protect their own interests and the administrative authority can ensure that the profit gained is not unreasonable. The administrative authority will incur additional expenses of a recurrent kind and will be recouped by the increased value of land adjoining that actually reclaimed and by increased revenue from a number of sources..... "It is usually to the advantage of both parties for reclamation to be carried out on a small scale for a few years before the major agreement is made. This system is appropriate to our economic system in which individuals put money and labour into a project in the hope of gaining profit; it also has the advantage that the administration incurs less expense and is less burdened by supervision of details".

Mr. Greene concludes, "In any case success depends on a first evaluation of the physical conditions and on the effective and continued co-operation of people having varied skills."

N. G. C.

Veterinary Education. By Prof. Beveridge. (Cambridge University Press), 1948. Pp. 40. Price 1 sh.

It is a matter of great pleasure to read the booklet since it is not only rich in facts and figures, but unique in its presentation and information in its details. The author has taken great pains to collect information regarding the progress of Veterinary Education from as early as 4000 B.C. Unfortunately he has restricted himself to Western World only,

probably because he could not get enough material to trace the development of this science in the East. He has very ably shown how humanity has transferred some of its disgust towards animals to Veterinarians for no fault of theirs. The author deserves congratulations for a pioneer attempt to remove false impressions and ridiculous associations of the word "Veterinary" in the minds of the public. His remarks regarding the details of Veterinary Curriculum are naturally based on his own experience and though the basic principles cannot be ignored, the details as given by him will have to be modified to suit a particular country. His call for a closer collaboration between Medical and Veterinary professionals in the field of research deserves greatest appreciation. The spirit of co-operation between research workers in such diverse fields as Agriculture, Veterinary and Medical or any of the pure sciences towards a common goal, namely the progress of humanity as a whole, is certainly the greatest need of the day, and the author has correctly hinted at that in his writing.

The booklet is written almost in the form of a brief extract and therefore certain important points are only touched and not dealt with in detail, for instance the subject of animal psychology and its place in present-day Veterinary Education. The author has enunciated a very sound dictum that the aim of Veterinary Education should be to produce graduates whose minds are malleable and who will continue throughout the rest of their lives to absorb and use new knowledge. The book makes its appearance at a very critical period in human civilisation when the acute struggle is going on between mechanisation under the name of industrial progress and spiritual enhancement of human society. If the world were to think of animals only as a means of transport or articles of food, then surely the soul of man has degraded itself, since it cannot appreciate the soul of animal and values only the body of the animal. Prof. Beveridge has rightly said, "In this age of Mechanization we are perhaps apt to forget the tremendous part played by domestic animals in our History."

The Professor has also given a correct conception of Veterinary Science when he says, "It is largely to these losses by Animal Plague that modern Veterinary Colleges owe their origin."

The book is really entertaining in some of the quotations given by the author from old law books and scriptures.

Any one interested in Veterinary Education can refer to this book with pleasure and those who are indifferent will certainly change their feelings about Veterinary world if they go through this book.

S. R. CHADHA.

Botanik der Gegenwart und Vorzeit von Karl F. W. Jessen (Republished by The Chronica Botanica Co., Waltham, Mass., U.S.A.), 1948. Pp. 528. Price \$6.00.

The book under review forms the first volume of offset reprints of out-of-print classic scientific works under the new series *Pallas*. The task

of rendering into scientific precision any historical account of a branch of science, especially biology, is not a light one. In this extremely difficult line Jessen has maintained the German tradition of the nineteenth century when books of a similar type were published by contemporary botanists like Sachs, Meyer and others. Admittedly this little book has a fund of information on all aspects of botanical work in the nineteenth century. To those of us who are almost stupefied by the increasing output of diverse types of researches with a strong bias towards the application of Physical Sciences in the new approaches of botanical investigation, it is refreshing to read about the very conservative and pure line approach of problems of botanical interest during the last century. Quite rightly, Dr. Verdoorn points out that "today it is almost impossible to write a short history of botany in one single volume of limited size as Jessen was able to do." One has to appreciate the cultural aspects of the work and the humanistic approach to a historical account and this has been admirably fulfilled by Jessen. To all lovers of this history of botany the reviewer warmly recommends the book, written in simple yet elegant German, and most probably is a unique production which will be appreciated for its fund of information of nineteenth century botanical progress. Dr. Frans Verdoorn is to be congratulated for bringing this new series which makes available older classical literature which are so rare and difficult to obtain.

T. S. SADASIVAN.

Diseases of Cotton in India, By B. N. Uppal. (Indian Central Cotton Committee), 1948. Price Rs. 2.

The present status of our knowledge regarding diseases of cotton, which is an important crop in India extending over 20 million acres, is summarised in this publication. Seventeen diseases of cotton are described most of them being of minor importance in general, though occasionally they assume an epidemic form, except cotton wilt and cotton root rot, which are serious diseases caused by soil borne organisms. Of some importance in certain areas are dry rot,

anthracnose and red blight, the last one attacking only American cottons. A comprehensive summary of work done in India on these diseases over a period of 25 years is presented by the author paying special attention to etiology, control measures, etc., which will be of value to research workers in this field. Two of the diseases cotton wilt and cotton red rot are described in greater detail than the rest of them. The value to the research worker would have been greatly enhanced if an attempt had been made to correlate the details of the work done in India with work done in other countries on the same or similar diseases. For instance the real cause of wilt (*Fusarium vasinfectum* Atk.) in cotton, once considered to be due to the accumulation in the cells of aluminium salts, is now stated to be due to a chemical compound which remains active after boiling and after passage through a porcelain filter. It is said that the filtrate is not destroyed by heating in an autoclave at 110-115° C., and that the nature of the substance is not fully known. It is twenty years ago that the above mentioned results had been obtained by workers in India. Now, it will provide useful information to a research worker on this disease, if mention has been made about the work done by Gaumann and Jaag (*Experientia* Vol. II, 1946) on the problem of wilt diseases in plants. They found that a plasma poison named *Lykormarasmin* produced by *Fusarium lycopersici* caused pathological wilting of tomato plants at a dilution of 10^{-2} mol and 10^{-3} mol. A similar substance of the Marasmin group ($C_8H_{15}O_7 N_2$) is possibly the cause of wilt in cotton. While no doubt a lot of information has been collected by the author from published and yet unpublished articles, and from information elicited through letters, all of which are presented in this useful publication, correlation of results obtained by workers in India, with those obtained in other countries on cotton diseases will be helpful to future workers. However, we have, in this publication an excellent and comprehensive summary of work done in India on cotton diseases, which will be of great use to workers in this line, both in the laboratory and in the field.

M. J. N.

ANGLO-U.S. EDUCATIONAL AGREEMENT

AN important agreement has been concluded by Britain and the U. S. which will benefit students in both the countries. The agreement was signed by Mr. Bevin, Britain's Foreign Secretary, and the United States representative in London. A Joint Commission of 12 is to be set up in London, the American members being appointed by the American Ambassador and the British members by the Foreign Secretary.

It will recommend how the \$50,000,000 realised from the sale of United States surplus property in Britain shall be spent on educational facilities for the benefit of students undertaking advanced studies in both the countries. This use of the fund from the sale of surplus property is authorised by a United States legislation known as the Fulbright Act. Senator Fulbright was himself present when the agreement was signed.

It is a great post-war experiment based on the feeling that the solution for international problems can be found if people in all countries can be brought to know each other as free men. It is obvious that increased understanding between the United States and Britain resulting from this interchange of students, teachers, professors, and research workers will be of the highest importance.

This fund will be devoted mainly to finance the studies of American students in Britain and the Commonwealth as also of British and Commonwealth students in the United States. Educational programmes will be planned and the teachers, professors and research workers selected to participate in them will be chosen by the Commission.