

REVIEWS

New Developments in Ferromagnetic Materials.

By J. L. Snoek. (Elsevier, Distributors: Cleaver Hume Press, Ltd., 42-A, South Audley Street, W. 1, London), 1947. Pp. 136 + viii. Price 13sh. 6d.

The book is one of a series of monographs on the Progress of Research in Holland. The purpose of these publications is, according to the Foreword, "to show to the world that scientists in the Netherlands have remained active during the five years of German occupation". The monograph under review is a connected report on the various original investigations on Ferromagnetism carried out during those five years, and would be of great interest to those who are actively engaged in research in these fields. The results reported indicate the praiseworthy co-ordination that has existed between the theoretical and the practical research workers in Holland.

The book is made up of three chapters, the first two dealing with the statics and dynamics of ferromagnetism and the third with the development of new magnetic materials. The first part contains the various consequences of Kersten's extension of the theory of ferromagnetic hysteresis, which is based on the concept of crystal anisotropy and magnetostriction. One of the many results that follow from this theory is that a substance is expected to have a very high value of the initial permeability and a low value of the coercive force if its crystal anisotropy and magnetostriction are both zero. By a careful survey of such "zero points" in binary and ternary alloys, F.C. Went has discovered a new alloy of the permalloy type. The first chapter also contains some experimental discoveries which show that the present theories of ferromagnetism are quite inadequate. Of particular interest is the one in which it is found that crystals of magnetite develop a strong ferromagnetic anisotropy below $114^{\circ}\cdot 5$ K. although the ionic lattice does not undergo any change of symmetry.

The second chapter deals with researches on the magnetic skin effect, and on the various forms of "after-effects", such as magnetic, elastic and ionic, and the time decrease of permeability, very aptly called Dis-accommodation by the author.

The last chapter describes the preparation and the study of the properties of a series of new non-metallic ferromagnetic substances. These substances are produced by appropriately mixing different chemical compounds which go by the name of ferrites. These ferrites have a general formula MO, Fe_2O_3 (where M is a bivalent element) and have the well-known spinal structure. The resulting mixture, commercially known as "Ferroxcube", is a mixed crystal having the same crystal structure. These new magnetic materials are easily workable by grinding and lapping and have a very high specific resistance while the "joints" show very low magnetic resistance. Four different types of materials have been described and their usefulness in most varied purposes involving high frequencies have been proved.

The book contains five appendices, three of which are reprints of papers published in different European Journals.

S. RAMASESHAN.

Why Smash Atoms? By A. K. Solomon. (Penguin Books, Harmondsworth, Middlesex, England.) Pp. 160.

This is the popular edition of a book that was first published in America in 1940. In keeping with the object of popularising the latest advances in science, the fascinating story of the atom and its breaking has been presented here for the layman. The narration assumes very little on the part of the reader and thereby gains in lucidity.

Beginning with the historic experiments of Benjamin Franklin, the fundamentals are logically developed through the discovery and the definition of the electrons, the canal rays and the neutrons. The discovery of radioactivity and the experiments thereon of Rutherford leading to the elucidation of the common structure of atoms are then described. Further clarification and formulation of the atomic structure by Bhor, and the discovery of isotopes by Moseley make fascinating reading.

The story of atom-smashing, beginning with natural radiations, by Rutherford, and then with accelerated particles are described with convincing detail. Numerous diagrams and photographs sprinkled throughout the book help immensely in the comprehension of the subject. But the most important section of the book, to the layman, is "why bother smash the atom?" The consequences of the preceding fundamental researches, in war and peace, are clearly brought out in the III Part. The discovery of induced radio-activity, and the production of radioactive elements on a mass-scale with their enormous usefulness in Medicine and Biology greatly impress the reader, and convinces him that scientists have not, after all, gone mad, and that basic researches are essential for application to human welfare.

In this age of democracy, the importance of the correct appreciation of the fundamental discoveries of science by the man in the street cannot be overestimated, for the "effective application of scientific improvements requires a thorough popular understanding of scientific discoveries". The publishers have eminently succeeded in popularising a scientific subject of first rate importance.

In India it would be a great step forward if such popular publications are retold in Indian languages for the benefit of the masses who have a great leeway to make up in their knowledge of progress of the rest of the world through the application of science before they can effectively co-operate with the government in national development.

In the next edition of the volume such statements like, "An alpha particle—a doubly charged helium atom" (p. 36), may be avoided without sacrifice of lucidity.

K. S. R.

The Machinists' and Draftsmen's Handbook.

By Albert M. Wagener, M.E., and Harlan R. Arthur, B.S. (Messrs. Macmillan & Co., Ltd., London), 1946. Pp. 662. Price 28sh. net.

Engineering handbooks are generally written either elaborately or in a condensed form with the result that the information required is too tedious to get at or difficult to understand without sufficient knowledge of fundamentals. *The Machinists' and Draftsmen's Handbook* is written with a view to eliminating this drawback. As stated in the preface of this book, "most men in the craft have studied mathematics but it is very quickly forgotten by the majority of them". So, this book starts with elementary mathematics and simple geometric constructions which are essential for making and setting out jobs.

The second part of the book deals with modern machine tools, speeds, feeds, limits and tolerances which are important for modern mass production and from the point of view of interchangeability of parts. Due importance is also given to the various milling operations and the chapter on milling is thorough and exhaustive.

The last part of the book is on strength of engineering materials thus giving the operator an idea of the right type of material to be used in the right place. There are a number of useful tables for ready reference, and the book is quite useful to the machinist in his day-to-day work.

But, from the point of view of a draftsman this book is a little disappointing. The draftsman can no doubt use the information given in it, but he needs a lot more for working in an engineering drawing office. For example, the principles of drafting or the various drafting conventions to be used on a working drawing are nowhere mentioned in the book. So the book would have justified the title if it had been "Machinists' Handbook". However, the book is quite useful not only to the machinists working in the shops, but also to the student in a trade school where the machinist trade is taught.

M. R. K. RAO.

Statistical Year-Book of the League of Nations, Geneva, 1942-44. 17th issue. Edited by M. Grzegorz Frumkin of the Economic Financial and Transit Department, 1945. Pp. 315, and 108 tables.

This is a valuable document giving all available information regarding population and vital statistics, movement of population, unemployment, production—agricultural, mineral and industrial—trade, prices, currency and banking statistics and public finance for 44 countries of the world for the years 1942-44 on the eve of the formation of the U.N.O. This publication was issued when the second World War was in progress; and so, numerous difficulties of communications and restrictions had to be faced and hence the delay in the issuing of the year-book. A number of belligerent or neutral countries had suspended publications of their statistics. For certain countries for which data were not available, estimated figures are given and are, therefore, liable to error. In

spite of all these obstacles, the department have enriched the fund of information contained by adding new tables regarding national income of eight countries (the U.S.A., the U.K., Australia, Canada, New Zealand, Union of South Africa, Argentine and Palestine). Two other new tables relate to marriage and marriage rates. The table concerning world trade in terms of Dollars has been omitted from this issue, and some other improvements have been carried out. This is a very useful addition to any statistical library.

M. C. SATYANARAYANA.

The Artificial Insemination of Farm Animals.

Edited by Enos J. Perry. (Chapman & Hall, Ltd., London), 1947. Pp. 265. 15sh.

The development and use of the technique of Artificial Insemination have in recent years eclipsed the progress of other phases of Animal Industry. The mass of scientific information that has accumulated has been brought out in an easily understandable form in this handbook. This helps the animal breeder tremendously in quickly and safely overcoming the time and cost factors in achieving increased production of the various commodities of animal origin. The need for this has probably been never so urgent as now, particularly in India.

This publication is a British edition of the original U.S.A. edition of 1945; but, instead of being brought up to date, it has all the previous printing errors. The editor having no easy job in co-ordinating a number of contributions, the handbook suffers from repetition and lack of uniformity in the presentation of the subject-matter. Inclusion of tabular statements for heat duration, sperm concentration in an ejaculate and the sperm number, and charge-volume required for successful insemination in different species, and a comprehensive discussion on the disorder in reproductive phenomena, on fertility variation and control, would have greatly helped the work of the inseminating centres.

Lucid citations of modern breeders' successes in breeding for improvement, will encourage the future cattle breeders, whetting as they do the appetite for more knowledge of the mystery and manifestations of biotic inheritance.

Chapters 10, 11 and 12 are, however, out of place and not without errors (coefficient of inbreeding, etc.). Probably in an overzealous attempt to simplify, expressions have crept in, which rather detract from the scientific accuracy of the new and quickly-grown knowledge of Genetics. Characters may be hereditary or environmental or due to a combined effect of both these factors. They may be said to be of three kinds but not due to three factors, as mentioned on page 151. Gene legends in the body of the text should be italicised. Further, it may be clarified that the F₂ in a tri-hybrid cross covers a total of 64 *individuals* making the full ratio, which comprises only 27 different genotypes grouped under 8 different phenotypes, *but does not have 64 genotypes* as is stated on page 158. The difference between sex-influenced and sex-limited characters is hardly clear. With these topics the operators of the artificial-insemination centres need not have been bothered.

The rest of the handbook will, however, be immensely helpful to the operators of the artificial insemination centres. Prof. Enos J. Perry has been a notable pioneer in the U.S.A. for the popularisation of artificial insemination, and his comprehensive discussion of the Organization Aspects is very useful. The misconceptions regarding artificial insemination are pointed out, and helpful suggestions given all through the book for making Artificial Insemination service to be widely adopted. But in India, the operator must understandingly tackle the agrarian and the village folk who are the virtual custodians of our cattle industry.

S. V. CHANDIRAMANI.

The Age of the Saline Series in the Salt Range, Punjab. *Proc. National Academy of Sciences, India, Sec. B, Vol. 16, 1946.*

The Age of the Saline Series of the Punjab has been the subject of a long-standing controversy. A Symposium on this subject was held in Poona during 1944 and the opinions expressed by the Palæontologists led by Prof. Birbal Sahni, based on a study of the fossils, were all in favour of a Tertiary Age, but there were sharply divided views amongst the Geologists who based their conclusions on the field evidences. The consensus of opinion then was that further detailed investigations should be made to scrutinise the field data and substantiate the fossil evidences. Accordingly, excursions were arranged to selected exposures of the rocks, and extended studies of fossil material were also made. These developments led to a second Symposium during December 1945, at Udiapur, under the joint auspices of the National Academy of Sciences and the Indian Academy of Sciences. Twenty papers have been contributed to this Symposium by different authorities both from India and abroad, and the discussions cover almost every phase of this vexed question—setting forth not only the results of the most careful and intensive micro-fossil studies but also of the field excursions.

On going through the above Proceedings, it is clear that the fossil evidence in favour of the Tertiary Age is now more convincing than ever and that the reading of the field evidence requires a revision on the part of those who uphold a Cambrian or Pre-Cambrian Age. As Prof. Sahni has warned, "Between the testimony of the rocks and the testimony of the fossils there can be no real conflict," it looks reasonable that the verdict of the fossils should be accepted and the tectonic interpretations re-oriented in the light of these facts.

M. B. R.

Mathematics as a Culture Clue and Other Essays. Vol. I of the collected works of C. J. Keyser. (*Scripta Mathematica.*) Pp. 277. \$3.75.

The proposition that "the type of Mathematics found in any major culture is a key to

the distinctive character of the culture taken as a whole" was first put forth by Oswald Spengler in his *Der Untergang des Abendlandes*. Keyser meditates on this proposition and is inclined to support it. He devotes the major portion of his essay to the examination of classical Western culture, and infers that there is a family-likeness between classical mathematics, classical painting, classical philosophy, etc., which are all characterised by the absence of the concept of the *infinite* and are confirmed to the *finite*. But as the author himself points out, the proposition is yet to be supported by the general consensus of expert opinion. In fact it is a debatable proposition. For, as a freak of nature, a mathematical genius, far above the level of the ordinary folk, may appear in any country at any time. It is, therefore, quite possible that the advancement of mathematical work in a given country at a time is not representative of the culture. For instance, the Indian genius, S. Ramanujan, was not intelligible to his contemporaries in his own country and had to go abroad!

Besides the essay on Culture Clue, the collection contains eleven other essays on interesting topics such as "The Meaning of Mathematics", "The Bearings of Mathematics", "Mathematics and the Dance of Life", "Scientists Teach Laymen", etc. The reader may feel that some of the statements in the book are audacious or exciting, but the thinking is always clear and the presentation simple and straight. The printing and get-up are quite good.

B. S. SASTRY.

Publications Received

"Annual Report of the All-India Institute of Hygiene and Public Health, Calcutta; 1944-45." (Published by the Government of India Press, Calcutta, 1948.)

"Portraits of Eminent Mathematicians". (Published by Chronica Botanica Co., N.Y. Portfolio I. II Edn.)

"John Couch Adams and the Discovery of Neptune". By W. M. Stewart. Occasional Notes No. 11, August 1947. (Royal Astronomical Society, London.)

"A Note on the Occurrence of Mica in Hyderabad State". By Khurshid Mirza, Director of Mines, and Geological Survey, Hyderabad (Deccan), 1943. Price As. 8.

"Bamboo for Pulp and Paper Manufacture"—Parts I-III. By M. P. Bhargava, Forest Research Institute, Dehra Dun, 1946. Price As. 9.