

Probability and Statistics

By H. Freudenthal. Pp. v+139. (Amsterdam, London and New York: Elsevier Publishing Co., 1965.) 30s.

A SCIENTIST or technologist with modest mathematical skill and no fear of unfamiliar notation could gain considerable insight into statistical thought from this book. He would not advance far in learning standard statistical techniques for use in his own problems because the book does not attempt their systematic presentation. Prof. Freudenthal's strength lies in a largely intuitive approach allied to an attractively easy style. He does not retreat from difficulties, but he refuses to conceal the essential features of a proof by trappings of mathematical rigour appropriate only to more advanced texts.

Early chapters are largely concerned with probability theory, made vivid by excellent simple examples of independence and conditionality. The implication that sampling with replacement is theoretically preferable to sampling without replacement is strange, but possibly translation from the Dutch has permitted entry of a confusion between simplicity of theory and practical desirability. Prof. Freudenthal uses the central limit theorem to justify widespread practical dependence on the normal distribution. The final one-third of the book has chapters concerned with sampling inspection (including sequential sampling), distribution-free tests, games and strategy, and population genetics. None of these topics is taken far, and all are regarded a little abstractly as playgrounds for mathematicians rather than as fields of investigation in which the statistician must make a great contribution. In the context of a book that may make an intellectual appeal to mature readers but that is not suitable as an introductory text, they play their part well. The book can be confidently recommended to those who find its form seeming to meet their needs, but disregarded as of no fundamental importance by those to whom its somewhat unusual style makes no appeal. Of few books on probability and statistics can both these statements be made!

D. J. FINNEY

ALGOL 60 Implementation

The Translation and Use of ALGOL 60 Programs on a Computer. By B. Randell and L. J. Russell. (A.P.I.C. Studies in Data Processing, No. 5.) Pp. xiv+418. (London: Academic Press, Inc. (London), Ltd.; New York: Academic Press, Inc., 1964.) 84s.

THE introduction of automatic computer languages has opened up the use of computers to a large public by making the programming of digital computers much easier. This is due to the development of compilers: the large programmes which translate automatic languages, which are relatively easy to use, into machine languages which are much more difficult to use. Initially automatic languages and their compilers were very much empirical *ad hoc* affairs; the writing of compilers was more of a craft than a science. But recently this state of affairs has changed, an important step in this direction being the publication some five years ago of the ALGOL report. Using the notations and techniques of mathematical logic, this defines precisely a programming language suitable for scientific computations. This stimulated the systematic study of compiling methods and many papers on the subject began to appear.

This book is an excellent and welcome contribution to the literature; it will make more accessible to a large public some of the more commonly used and basic compiler techniques. The compiler described produces in one pass an object programme which is obeyed interpretively by a control routine during run time. This may not be very efficient, but many of the concepts explained in this book are relevant to other forms of compilers. In particular, repeated use is made of the concept of stack or push-down store.

Because this is among the first books on the subject, the form and contents of the book may put off the uninitiated reader, but it is well worth persevering with. An attractive aspect of the book is the large number of very short programmes illustrating the many difficulties a compiler has to deal with.

I. M. KHABAZA

Einführung in die Atomphysik

Von Dr. Wolfgang Finkelburg. Neunte und Zehnte Ergänzte und Neubearbeitete Auflage. Pp. xii+552. (Berlin, Göttingen, und Heidelberg: Springer-Verlag, 1964.) 45 D.M.

THE present issue of *Einführung in die Atomphysik*, by Prof. W. Finkelburg, is the nineteenth and twentieth reprint, revised and brought up to date by the author, who is a member of the Siemens-Schuckertwerke group in Erlangen. It is intended for physicists in the applied fields, engineers, chemists and technical personnel. Its scope is very wide, comprising, besides atomic physics, extensive chapters on quantum mechanics, nuclear physics, 'elementary' particles, molecular and solid-state physics. The author is manifestly an experienced pedagogue who leads the reader in carefully planned steps through the various phases of an argument. It is a magnificent and, on the whole, successful effort to provide a readable text of a complex scientific field.

It is, however, clear that the maximum one can achieve in the circumstances is plausibility, which is probably what the author aimed at. The question then arises if it is a good plan to incorporate a fair proportion of the wave mechanical formalism (according to Sommerfeld), without the mathematical background (see p. 360, where the formula is completely without meaning). It must be admitted that the figures of electron distribution and some wave functions are excellent.

The book, as such, comes up to the expectation one holds for a production from the publishing firm of Springer; it is quite cheap at 45 D.M., and will no doubt greatly contribute to the education of that most important part of the scientific community who apply science.

E. BRETSCHER

Physique des Semiconducteurs

Comptes Rendus du 7^e Congrès International. (Physics of Semiconductors: Proceedings of the 7th International Conference.) Pp. xxii+1368. (Paris: Dunod, 1964.) 145 francs.

PHYSIQUE des Semiconducteurs: Comptes Rendus du 7^e Congrès International contains about 200 distinct original items, five of which are reports on symposia on related topics. It will be an invaluable work of reference pointing to other and fuller papers on certain topics, and indicating the major aspects of present interest in the field. It has been remarked that this field, like women, has become more sophisticated with age, and this volume certainly gives evidence in favour of this assertion. More accurate measurements, and more detailed calculations are reported here, of quantities the broad significance of which has in many cases been known for some years. This impression is strengthened by the fact that the details of the symposia on radiative recombination, radiation damage, and solid-state plasma effects, all very active fields, have been published separately. This still leaves interesting effects within the scope of this volume—effects which were not expected two years before (during the corresponding meeting at Exeter in 1962). The relativistic correction to band structure calculations is an example. The importance of lasers is another example, for they have enhanced the interest in studies of electron transitions in solids, which may compete with radiative transitions. Papers in this volume deal with these and other important effects. It is clear that this field is con-

tinuing to throw up important new developments, and it is reasonable to expect an average of one important development per annum to be maintained until the next volume of this series (reporting the meeting in Tokyo in 1966) is reviewed in these columns.

P. T. LANDSBERG

Counterexamples in Analysis

By Prof. Bernard R. Gelbaum and Prof. John M. H. Olmsted. (The Mathesis Series.) Pp. xxiv + 194. (San Francisco, London and Amsterdam: Holden-Day, Inc., 1964.) 7.95 dollars.

THE schoolboy learns that the harmonic series does not converge, although its n th term tends to zero; the undergraduate is shown Weierstrass's function, which is continuous but not differentiable; at a later stage, a mathematician's pleasing speculation may be disrupted by an instance of its falsity. The construction of counterexamples is a not unimportant part of the technique of the analyst, as, for example, in the theory of Fourier series, and this collection of some 250 items may serve for profit as well as for amusement. The authors have made a selection from number systems, functions, limits, differentiability, integration, convergence, set and measure theory in one and two dimensions, metric, topological and function spaces. Almost any dip will come up with something pleasing; a random opening provided functions f and g such that f^2 and g^2 are integrable but $(f + g)^2$ is not. But the book will be more seriously useful to the teacher of analysis, who is often in need of examples of this type to show why the conditions imposed on a theorem are necessary, and to the young research worker who may have to test heuristic ideas by hard fact.

T. A. A. BROADBENT

Radioactive Fallout, Soils, Plants, Foods, Man

Edited by E. B. Fowler. Pp. 317. (Amsterdam, London and New York: Elsevier Publishing Company, 1965.) 80s.

THE evaluation of the significance of dietary contamination with radioactive fall-out requires the co-operation of many disciplines, and our understanding of this subject has owed much to meetings at which meteorologists, health physicists, agricultural scientists and medical radiobiologists have brought together the relevant information from their various subjects.

Two particularly important meetings of this type were arranged in 1959 by the University of Minnesota and the Food and Agriculture Organization in Rome. The publications to which they led in the following year largely paved the way to the first authoritative and comprehensive assessment of mechanisms of dietary contamination which the United Nations Scientific Committee on the Effects of Atomic Radiation included in its 1962 report. Other meetings with the same general objective had meanwhile been held, among them being a symposium of the American Chemical Society, at Cleveland, Ohio, in April 1960.

The volume under review is based on the papers presented at the Ohio meeting. The editor's preface shows his consciousness of the disadvantage of delay in publishing reports of symposia on rapidly developing subjects, and an endeavour was made to revise and to 'up-date' contributions. This was notably achieved in the discussion of the "Transfer of Fallout Radionuclides from Diet to Man", by Drs. Wasserman Lengemann, Thompson and Comar, in a chapter which contains about half the references to publications dated 1962 or later which are to be found in the entire volume. Read in 1965, some of the other chapters are mainly of historical interest. Not only are a number of transfer routes of much smaller importance than was sometimes thought in 1960 but also interest in the significance of fall-out now centres primarily on the effects of weapon tests in 1961

and 1962 which were of considerably greater magnitude than the earlier series.

Piante Medicinali

Chimica Farmacologia e Terapia, Vol. 2. Da R. Benigni, C. Capra and P. E. Cattorini. Pp. 731-1832. (Milan: Inverni e della Beffa, 1964.) L.12,000.

THIS is the second part of a comprehensive Italian work on medicinal plants, Volume 1 having already been reviewed in these pages (*Nature*, 196, 609; 1962). Plants are arranged according to their Italian common name. Volume 1 covered the letters A-H. The present volume deals with the rest of the alphabet, representing some 120 different species. As in the case of the earlier volume, there are notes on etymology, nomenclature, habitat, parts used, active principle, therapeutical properties, pharmacology, and chemical composition. There is special emphasis on the chemistry of the plants, which is covered in some detail and the latest information incorporated. This applies particularly to plants that have recently attracted special attention, for example, *Rauwolfia serpentina* has 149 pages devoted to it and there are more than 800 references. *Strophanthus* (*Strophanthus kombé*) covers 25 pages, with 161 references.

Other well-known medicinal plants dealt with in this volume include golden seal, Iceland moss, ipecacuanha, jaborandi, liquorice, lobelia, clive, opium poppy, peppermint, rhubarb, senna and strychnine or nux-vomica. Many of the other species treated, although well known, are of little importance medicinally to-day. Nevertheless it is of value to have so much information in relation to them brought together. The common horse-chestnut (*Aesculus hippocastanum*) is not usually looked on as a medicinal plant, yet 14 pages are devoted to it along with 38 references. This may be because of the saponin it contains.

F. N. HOWES

Pollen Physiology and Fertilization

Edited by H. F. Linskens. (A Symposium held at the University of Nijmegen, The Netherlands, August 1963.) Pp. xii + 257. (Amsterdam: North-Holland Publishing Company, 1964.) 80s.

IN August 1963 a symposium was organized at the University of Nijmegen to bring together a number of people interested in the study of pollen tube formation and germination, and the processes leading up to the formation of the zygote in higher plants. The papers and discussions given at this symposium are now published under the title *Pollen Physiology and Fertilization*, edited by Prof. H. F. Linskens.

The symposium was organized in seven sections each of about three or four papers followed by a tape-recorded discussion. Subjects included the physiology of the embryo sac, and the biochemistry of pollen wall formation; pollen tube metabolism; the effects of boron on growth; chemotropism and sections on controlled fertilization and incompatibility. Particular interest is derived from the high proportion of papers in which relatively modern techniques such as electron microscopy, histochemistry and *in vivo* methods of controlling fertilization are used to investigate the problems raised.

The publication of papers read at any specialized symposium inevitably results in the reappearance of a fairly high proportion of material already familiar as a result of its appearance in regular journals, and this is no exception. Nevertheless, this volume does provide a readily accessible collection in one place of contributions by a number of well-known authorities on the subject; and the convenience for comparison and survey which this provides, combined with the general high standard, or controversial interest, of the papers will make it a welcome addition to the collection of anyone interested in the physiology of pollen germination and fertilization.

P. A. THOMPSON