Biomathematics. The Principles of Mathematics for Students of Biological and General Science. Vol. 2. Numerical Methods, Matrices, Probability, Statistics. By Cedric A. B. Smith. (Pp. x+682; illustrated + tables. 138s.) London: Charles Griffin. 1969.

This is an enlargement, and separated into a second volume, in the fourth edition of *Biomathematics* which first appeared under the authorship of Dr. W. M. Feldman in 1923. Since then statistical theory has developed apace and the enlargement was inevitable. Professor Smith is a good teacher and this volume is excellent, but why do we have this pretence that statistical theory is different as applied to biology from statistical theory applied to engineering, or traffic, or chemistry, or metallurgy etc. It is not. The materials to which it is applied are different and a statistician entering any new field must gain experience with those materials, but the task of ordering undifferentiated data is essentially the same, and the multifactorial situations that require to be resolved are *in essence* the same mathematically. In a world of overspecialization one resents unnecessary specialization. However, the book is here and one must count one's blessings.

We start by solving equations, in fairly easy stages, and on the way we are taught something about factorials, indices, numerical differentiation and integration, successive approximation, and determinants. This leads naturally to a well-written and thorough chapter on matrices. The next chapter deals with probability. There are many statistical textbooks on the market; they all have a chapter on probability; since the subject in formal treatment is nearly 200 years old, it is not possible for these chapters to differ widely. This particular chapter is better than some. It reads well and is laced with good examples. By contrast the chapter on distributions gives the impression of being a little rambling; it dodges about from theoretical to observational distributions and runs into multivariate distributions without pausing for breath.

So we come to the two most important and best written of all the chapters, those on statistical inference and on the planning and analysis of experiments. Professor Smith deals fairly with the differences of philosophy that exist in the field of probability and adopts a very practical approach throughout especially when dealing with the concept of significance. In the chapter on experimental design the section on uncontrolled observational data will be of great practical help to many 'observers'.

If you have not had enough at the end of all this you can read 'Colson notation—arithmetic made easy'. Amusing but not important.

The presentation is excellent and the mathematical printing is easy to read. The price is formidable especially in a competitive market.

B. BENJAMIN

Biological Aspects of Cancer and Ageing. Studies in Pure Line Mice. (Modern Trends in Physio-

logical Sciences, Vol. 31.) By Leonell C. Strong. (Pp. xv+221; 112 charts. 75s.) Oxford: Pergamon Press. 1968.

How easy it is, when one is accustomed to use an expression in a particular, narrow sense, to come to believe that this is the whole of its meaning. This book is entitled correctly, but is not concerned with the physical and chemical changes in the organism related to senescence and their relevance to the genesis and progression of cancer in that organism. It is an account by Dr. Strong of much of his work concerned with cancer and ageing in its general sense, whether this be the effect of maternal age, the ageing of a line derived from a hybrid cross as it is inbred, or, even, the efficacy as therapeutic agents of extracts from the livers of young and old mice.

The main topics discussed are the effects of maternal age and degree of homozygosity upon longevity and tumour incidence, the effects of selection upon the biological effects of carcinogens, studies on the pleomorphic gene LST and its allele 1st, and the effects of various extracts of liver upon naturally-occurring tumours.

Unfortunately, this book is difficult to read. Of its seven chapters, four are reports of lectures, one is based upon a lecture, and only two are new writing. This leads to repetition, to the use of inappropriate statements (one is repeatedly told, for example, that the author does not have the time to discuss something), and to the use of some illustrations which are acceptable only if the author is present to explain them. The author's prose style, with its idiosyncratic use of words and lack of clarity, adds to the difficulty: it is a pity that the editorial opportunity to present a clear and concise account of this important work has been missed.

The experienced investigator, prepared to take both time and trouble, will find much of interest in this book: it is not recommended to beginners.

D. C. ROBERTS

Der gerechtfertigte Haeckel. Einblicke in seine Schriften aus Anlass des Erscheinens seines Hauptwerkes 'Generelle Morphologie der Organismen' vor 100 Jahren. Compiled by Gerhard Heberer. (Pp. ix+588. DM.78.) Stuttgart: Gustav Fischer. 1968.

In 1859 Darwin and Wallace startled the world with the concept of 'The Origin of Species by means of Natural Selection'. Over one hundred years later it is difficult to realize that these ideas would have been swamped by the vast opposition they aroused, were it not for the detailed corroborative work done by the great biologists and geologists who were fired by Darwinism. One of the greatest of these was Ernst Haeckel whose major works '*Generelle Morphologie der Organismen*' and '*Natürliche Schöpfungsgeschichte*' appeared during 1866-1868. The present volume commemorates their centenary. It contains a brief autobiographical sketch, with a postscript by Heinrich Schmidt; Haeckel's collected bibliography (by Thilo Krumbach); and a eulogy by Wilhelm Bölsche. Selections from Haeckel's various lectures and writing take up about 450 pages and the book

closes with the compiler's summing-up of Haeckel's contribution to biology and philosophy. There is also a valuable index and a good photograph of Haeckel.

Philosophically, Haeckel was a staunch monist and saw Darwin's evolutionary system as a great unifying principle. 'Monism as the link between Religion and Science' was the title of one of his lectures, while he constantly stressed that living matter was not divisible into either the plant or the animal kingdom but was a unity of three major forms, Plant, Protista, and Animal—an interesting emphasis for Protista have been re-established in English teaching curricula only recently. This book is a valuable reminder of our debt to an outstanding biologist.

J. CHAYEN

British Medical Bulletin. Vol. 25, No. 1. New Aspects of Human Genetics. Edited by C. E. Ford and Harry Harris. (Pp. 118. 40s.) London: The British Council. 1969.

As is to be expected from this authoritative survey of current achievements and problems in human genetics, little of fundamental significance has been overlooked. Following an excellent general survey of the contributions by L. S. Penrose, there are 16 papers which cover clinical, cytological, and biochemical issues. It is perhaps enough to list them:

Enzyme and Protein Polymorphism. By Harry Harris. Variations in Structure of Human Haemoglobin. By H. Lehmann and R. W. Carrell.

Genetics of the Thalassaemias. By D. J. Weatherall. Aspects of Human Blood-Group Specificity. By W. T. J. Morgan and Winifred M. Watkins.

Inborn Errors of Amino-Acid Metabolism. By Charles R. Scriver.

Homocystinuria. By D. C. Cusworth and C. E. Dent. The Porphyrias. By Geoffrey Dean.

Genetics of Common Disorders. By C. O. Carter.

Familial Predisposition in Man. By J. H. Edwards.

Progress in Mapping Human Autosomes. By J. H. Renwick.

Human Population Cytogenetics. By W. M. Court Brown and P. G. Smith.

Autosomal Imbalance and its Syndromes, Excluding Down's. By P. E. Polani.

Structural Abnormalities of the Sex Chromosomes. By Patricia A. Jacobs.

Xg and Sex-Chromosome Abnormalities. By R. R. Race and Ruth Sanger.

Mosaics and Chimaeras. By C. E. Ford.

Reciprocal Translocations. By C. E. Ford and Hilary M. Clegg.

ARNOLD SORSBY

Surveys, Symposia, and Transactions

Advances in Immunogenetics. Edited by Tibor J. Greenwalt. (Pp. ix + 223; illustrated + tables. 130s.)

Philadelphia and Toronto: J. B. Lippincott; London: Pitman Medical. 1967.

New concepts and techniques bring with them a new jargon. A recent addition to this list is the term 'immunogenetics' which is the study of genetically determined characters that have been shown to take part in immunological processes, or whose characterization in the laboratory is based on immunological techniques. The present volume documents a symposium on certain red cell and plasma polymorphisms, but an immunological significance is not always apparent. The first half of the volume contains systematically written accounts of the characterization of human immunoglobulins, their structure and pathological and allotypic variations. For the nonspecialist they provide a good introduction to these topics. There is a brief account of variant phenotypes of haptoglobin, transferrin, and a few red cell enzymes. The sections on advances in blood groups and erythroblastosis are less systematic, and the latter is rendered somewhat dated by one of the two most important practical advances in immunogenetics, namely the ability to prevent most instances of maternal Rh immunization. The other major advance is the increased understanding of the genetics of transplantation antigens and of their relevance to tissue transplantation. There is no account of this subject. The last chapter is a stimulating account of the immunogenetics of animals.

The general level of presentation of the material is good. Provided the reader is prepared to follow up what he finds here with a search for further advances which have occurred in the past three years, he will find this book useful.

J. C. WOODROW

Genetic and Environmental Influences on Behaviour. A symposium held by the Eugenics Society in September 1967. Edited by J. M. Thoday and A. S. Parkes. (Pp. x + 217; illustrated + tables. 70s.) Edinburgh: Oliver and Boyd. 1968.

This is the fourth of the Eugenics Society Symposia which have been extremely successful in bringing together experts from many fields and in opening discussions on important themes taken from the borderlands between the social and the life sciences. The symposium reported in these pages was just as broadly based and widely ranging as its predecessors: comparative and ethological studies of human behaviour and its evolution, environmental influences on mammalian evolution, interrelations between genetic and environmental influences on behaviour, and finally five papers more closely related to human genetics. The papers are welded together by introductions and forewords by chairmen, and by a conclusion at the end of the book by Dr. C. O. Carter on some very obvious (when once seen) applications of genetical knowledge to preventive medicine.

All the contributors were accomplished speakers and writers, and the book makes very pleasant reading. Some of the papers offer us authoritative reviews of current knowledge, e.g. Professor Court Brown's review of sex chromosomes and criminality, and the talk on