discriminate between different models of quantitative genetic variation.

There are seven papers on the statistical and computational problems involved in analysing pedigrees, in segregation analysis, and in estimating breeding values, gene frequencies and inbreeding coefficients.

Other more abstract but thorough papers by Morton and Cotterman are concerned with genetic changes in populations isolated by distance and with complex relationships between genotypes and phenotypes. A paper by A. W. F. Edwards gives a rather discouraging review of the state of genetic taxonomy. This will come as no surprise to the more traditionally inclined.

There are interesting papers by Renwick on the use of Bayesian-type methods in studying genetic linkage in man and by W. R. Bodmer and others on the association analysis of a leucocyte system. Renwick emphasizes the need for a study of the non-randomness of genes in linkage maps.

The volume concludes with papers on the simulation of deterministic evolutionary changes in three-locus genetic systems and of equilibrium conditions in certain trimorphic self-incompatible systems.

This book raises certain questions about the place of model-building and simulation studies in biology. An attempt to build a mathematical model of a biological system can often suggest deficiencies in knowledge about that system. This can, and should, lead to further observation or experimentation rather than simulation. There are dangers in attempting to simulate a system when there is too little knowledge about that system. This means that the models that are constructed are, inevitably, too flexible and have far too many unknown parameters in them. These models will, by their very nature, fit the data although they may be low in explanatory or data-summarizing power. My own feeling is that simulation and model-building should only be used when a fair amount is known about the biology of the situation and a model can be constructed that is well founded, fairly specific and contains a small enough number of parameters that they can be satisfactorily estimated by whatever data are available. I do have doubts whether some of the systems studied in this set of papers have reached a stage where model-building and simulation can profitably be applied. Latter's paper contains a useful discussion of some of these points.

This volume will clearly be of interest to all those concerned with genetics and the use of computers in genetics. It will also prove a stimulating experience to those who, although unfamiliar with genetics, are interested in the present state of the subject. There are many interesting questions asked, and by no means have all of them been answered. R. N. CURNOW

INTEGRATED GENETICS

Genetic Organization

Edited by Ernest W. Caspari and Arnold W. Ravin. (A Comprehensive Treatise, Vol. 1.) Pp. xi+525. (Academic Press: New York and London, December 1969.) 271*s*.

THIS is the first volume of a proposed multi-volume treatise which will deal with the current state of knowledge in genetics. The reason given for producing it (when there are already so many good texts on advances in genetics) is that the discipline seems to be fragmenting, like most biological subjects of any age; so that molecular, developmental and evolutionary geneticists are losing touch with each other's work. Accordingly, the purpose of the treatise is to provide a medium whereby students of genetics can integrate recent advances in all fields into a single coherent structure, and also to reveal gaps in understanding which may indicate profitable fields of research.

In the first section, L. C. Dunn covers the history of genetics in terms of the main streams which have contributed to our present knowledge. The prose is turgid, but cannot conceal the authority of this most experienced genetic historian. Next follows a section by Henry M. Sobell on the structure of the nucleic acids; this is excellently clear and up to date. In section three, J. H. Taylor gives a masterly exposition of a field which he has made very much his own, namely the structure and duplication of chromosomes. In section four, Walter F. Bodmer and Andrew J. Darlington discuss linkage and recombination at the molecular level. This is a lucid account of recent work on microorganisms which sheds light on these topics and on the present state of knowledge on the enzymology of DNA breakage and repair.

In the fifth section, Sterling Emerson writes on linkage and recombination at the chromosome level. This is a very technical account of evidence from a wide range of organisms. This subject is never easy reading, and comprehension is not helped by the complexity of the data which are presented. The review is perhaps written from a more personal viewpoint than others in this volume, and includes a large addendum containing the author's views on the acquisition and handling of certain genetic data. In the sixth and last section, Rhoda F. Grell reviews knowledge of meiotic and somatic pairing. Here, as in the previous section, the density of the genetic jargon makes reading hard work but cannot conceal either the author's deep knowledge of the field or the exhaustiveness with which this knowledge is deployed.

My feeling about this book is that it is essentially a collection of up to date and authoritative reviews at a high intellectual level. While the clarity of exposition varies considerably between the different authors, the thoroughness with which they have performed their task is unquestionable; the relevant literature has been thoroughly dredged (no doubt all the latest techniques of information retrieval have been used). Whether the book will effect its avowed objects is uncertain. Few scientists will have a broad enough background to read it all with understanding (and even fewer will be able to afford to buy it, certainly in Britain). But many will find this volume (and the ensuing ones if the high standard is maintained) invaluable as a reference book, particularly in their own and related fields. It is to be hoped, therefore, that many libraries will be willing to find the money to purchase it.

E. H. R. FORD

MEDICAL DIAGNOSIS

Physical Principles of Ultrasonic Diagnosis

By P. N. T. Wells. (Medical Physics Series, Vol. 1.) Pp. viii+282. (Academic Press: New York and London, November 1969.) $12.50; 80*s*.

IN the course of some ten years ultrasonic diagnosis has advanced from a rather tentative method in the hands of a few pioneers to an accepted technique complementing, but not replacing, the use of X-rays. This progress has involved close collaboration between clinicians, physicists and engineers. The physics is highly specialized but it must be sufficiently understood by all three groups if the potential of the method is to be exploited. A book designed for this purpose is therefore timely and welcome.

It must be said at once that the difficulty of the task has not been shirked by pretending that the subject is simple. To set it out in full detail would require a very large volume, and the author has compromised by summarizing the essentials in a number of well defined sections which are supplemented by a bibliography of more than four hundred selected literature references. Starting from simple wave motion, he deals in succession with the passage of ultrasonic waves through matter, with transducers and with the ultrasonic field. He then discusses the various techniques which are available including the very important ones based on pulse echo and on the Doppler effect. It is at this stage that he introduces a number of