

Book Reviews

Edwards, A.W.F.: *Foundations of Mathematical Genetics*.

London-New York-Melbourne: Cambridge University Press 1977. 119 pp., 26 figs. Hard bound \$ 5.80

This book is an outline of the basic facts concerning deterministic mathematical population genetics centered around the Fisher-Haldane-Wright model and the 'Fundamental theorem of population genetics'. Contents include: Loci, random mating (rigorous proof that random mating is equivalent with random union of gametes), Hardy-Weinberg-Theorem, 2 alleles at a locus, increase of mean viability and de Finetti diagrams. Included in the discussion of many alleles at a single locus are matrix formulation, increase of mean viability (Kingman's proof) and stability and convergence to equilibrium. (This section seems somewhat vague as only the case of a stable polymorphism is discussed, and the convergence proof is merely the intuitive argument (cf. the referee's treatment in 'Mathematik für Biologen' Springer 1974). There is Feller's discussion of the three-allelic case by barycentric coordinates for gene frequencies (mentioning Van der Heiden, J. of Math. Biol. 1, 321-330 (1975) would have been appropriate, although this author apparently did not know Feller's paper), selection at a sex-linked locus, 2 alleles and many alleles, selection models with sex-dependent viabilities, models with viabilities different in several niches and two di-allelic loci.

The book can be recommended as a compact and concise introductory text for biologists who find it difficult to select the appropriate topics in one of the more voluminous monographs. There are two reservations: 1. The title is somewhat presumptuous since the definite exclusion of stochastic approaches excludes important factors such as genetic drift. 2. One could get the impression that everything has been done. Suggestions for further reading and the discussion of open problems would lead the student into current research.

K.P. Haderler, Tübingen

Beiderbeck, R.: *Pflanzentumoren. Ein Problem der pflanzlichen Entwicklung*.

Stuttgart: Ulmer 1977 216 pp., 39 figs., 14 tabs. Hard bound DM 48,-

This book is a comprehensive reference work of the numerous and frequently conflicting literature data on plant tumours. It gives a clear and concise account of the current state of experimentally derived knowledge and theories. Dr. Beiderbeck is an experienced investigator in this research field and it can be appreciated that he tries to distinguish between actual facts and speculations. Plant tumours can be induced on plants by a bacterium called *Agrobacterium tumefaciens*, by a RNA tumour virus, by radiation and by chemical carcinogens. They also can arise spontaneously on tumour-prone hybrids (the so-called genetic tumours). In all cases the tumours have the capacity for phytohormone autotrophic growth in tissue culture. These phytohormones are generally needed for growth of normal tissue explants. Normal callus tissue, however, can also occasionally change into a phytohormone autotrophic callus tissue spontaneously. This is called habituation. All these different cases of uncontrolled growth are dealt with in separate sections. In the last section tumourogenesis is discussed in relation to normal growth and differentiation.

The reader is given sufficient information about fundamental principles of differentiation and morphogenesis in plants in the introductory sections. One of the hypotheses in the general discus-

sion which receives much attention states that the tumorous state is one of the alternative ways a cell can take and which in principle is programmed by the cell's genome. In this light the tumour disease is comparable to certain stable stages of cell differentiation. One feels that this book is written with this basic philosophy in mind. This most likely is the main reason that the author, in the case of crown gall induction by *A. tumefaciens*, prefers an epigenetic mechanism over a gene-transfer mechanism; i.e., the transfer of TI-plasmid genes from the bacterium to the plant cells, although many bacterial genetic arguments were already in favour of the latter possibility. The first theory does not explain the precise role of *A. tumefaciens*, while the second possibility gives an analogy with oncogenic animal viruses including the occurrence of an induced change in host-genome expression. Indeed, biochemical data on the presence and expression of TI-plasmid genes in crown gall cells were published last year and were not available at the time that the book was written.

This book would certainly be very valuable for the large number of investigators which have started research on crown gall. Unfortunately it will reach only a limited number of them because it is written in German.

R.A. Schilperoort, Leiden

Mather, K.; Jinks, J.L.: *Introduction to Biometrical Genetics*.

London: Chapman & Hall 1977. 231 pp., 22 figs., 59 tabs. Hard bound £ 8.50, Paperback £ 4.50

The present 'Introduction to Biometrical Genetics' is an abridged version of the 2nd edition of 'Biometrical Genetics' published by the same authors in 1971. Its aim is to introduce younger students into the genetics of quantitative characters and to acquaint them with the basic models and the biometrical proceedings resulting therefrom. Mather's concept of the partitioning of variances of segregating generations, first presented in summary in 1949, and the methods of Jinks et al. for the analysis of diallele crosses occupy prominent positions.

As an introduction the authors explain the genetic fundamentals of continuous variation and then describe the general models used for the partition of averages and variances in additive, dominance and interaction components. Following this, some special problems are dealt with. These include the analysis of dialleles, the effects of gene interaction and linkage, interactions between genotype and environment, the analysis of random mating populations and the estimation of the number of effective factors.

The text is arranged clearly and easy to understand. Numeric examples help beginners to carry out derivations and calculations and to get acquainted with the methods of evaluation. The disadvantage of such a presentation, simplified for didactic reasons, is the danger of one-sidedness. The advanced reader will miss critical discussions of the mathematical models on which all estimation procedures are based and of the relevance of the statements obtained. He will regret the fact that the beginner is not encouraged to train his critical reasoning of methods so that he may realize that the estimates of parameters do not show a priori a real picture of the actual biological situation but that they are, in some cases at least, artifacts that do not represent the statements for which they are designated.

In the hands of an experienced and responsible teacher this introduction is possibly a useful book; for autodidacts, on the contrary, it can only be recommended with reservations.

W. Seyffert, Tübingen

F. D'Amato Nuclear cytology in relation to development. Vol. 6: Developmental and Cell Biology, Cambridge: Cambridge University Press 1977. 283 pp., 82 figs. Hard bound £ 15.00

The increasing interest in developmental biology urgently requires critically revised literature which is able to combine the broad body of classic knowledge with the accumulating amount of data from biochemical studies. In this context the book 'Nuclear Cytology in Relation to Development' by F. D'Amato tries to achieve such a synthesis for the nuclear events accompanying developmental processes. The success, however, is somewhat ambiguous. A large amount of data is presented which concerns cytological, genetic and cytogenetic studies on cellular differentiation. It is of great value for the reader to find an extensive collection of results obtained, in particular, from plant systems. In this context the authors succeeds, in contrast to other publications, to expose the remarkable contributions of plant cytology. Thus the book is suited to balance the picture obtained from other comprehensive treatises which are, in the first instance, dedicated to animal cytology and development.

The intention to achieve a critical evaluation of molecular data on developmental processes on the nuclear level, however, suffers from the general problem that our understanding today is completely insufficient to permit a substantiated integration of classic and biochemical data on developmental processes. The molecular aspects covered by the book remain on a much less sophisticated level of presentation and are hardly suited to exceed a fairly basic description of the results. A critical evaluation and discussion is almost entirely missing. It must, however, be admitted that it simply does not appear to be the proper time for successfully approaching a convincing integration of such aspects. The spectacular recent findings on the molecular organization of the eukaryotic genome expose the extent of incompleteness of our knowledge.

In summary it can be expected that the book will be of great value for the expert presentation of cytogenetic data. It may, therefore, be well suited to stimulate biochemical investigations of the great variety of phenomena observed by cytology.

W. Hennig, Nijmegen

Postgate, J.: Nitrogen Fixation. Studies in Biology, no. 92.

London: E. Arnold 1978. 67 pp., 12 figs., 20 tabs. Soft bound £ 1.50

The interest in biological nitrogen fixation has increased considerably during the last ten years. This interest has not only been stimulated by exciting scientific problems and discoveries, but by practical aspects as well. The high demands for nitrogen in agriculture and the increasing costs for production and transport of nitrogenous fertilizers stimulated the idea that more advantage should be taken of living systems that can use the di-nitrogen of the atmosphere. Many specialized books and review articles have appeared which give more or less extensive summaries of recent progress. Yet many biologists will appreciate a short and up-to-date introduction to this field. This small book from one of the leading investigators of nitrogen fixation meets their demands and it does so in an excellent way. Within 67 pages the book contains a wealth of information based on the most recent progress. The illustrations and tables are easily understood. Despite many topics, the book can be easily read by teachers and students.

The chapters include: the nitrogen cycle, the enzyme physiology, the free-living microbes, the plant associations, genetics and evolution with some stimulating ideas about future developments. A short and relevant bibliography introduces the reader to the more specialized literature.

A. Quispel, Leiden

Austin, C.R., Short, R.V. (Eds.): Manipulation der Fortpflanzung. Fortpflanzungsbiologie der Säugetiere, Bd. 5: Pareys Studententexte 10.

Berlin-Hamburg: Parey 1977. 125 pp., 45 figs., 7 tabs. Soft bound DM 25,-

The field of propagation covers a broad spectrum of scientific procedures and methods. Some possible ways of interfering with the reproductive process are under investigation in laboratories or are being tested clinically in humans, many others have yet to be explored. This book, written in a simple and understandable fashion, deals with raising animal production levels and the necessity of an essential humane program to regulate the size of the human population. It is not, however, intended primarily to present general knowledge. Only the procedure of amniocentesis with the cytological and biochemical study of the amniotic fluid and a few aspects of medical genetics are demonstrated.

H.-A. Freye, Halle/S

Fraenkel-Conrat, H.; Wagner, R.R. (eds.): Comprehensive Virology, Vol. 9: Regulation and Genetics.

New York-London: Plenum Press 1977. 610 pp., 39 figs., 46 tabs. Hard bound \$ 59.40

The genetics of animal viruses are presently within the focus of interest of many investigators. During the last few years important advances have been made in the pertinent knowledge of this field. In 10 chapters written by experts [is presented] a comprehensive up-to-date description of the genetics of all animal viruses [..]. Three major classes of animal DNA viruses: Polyoma virus (including SV40, W. Eckhart), adenoviruses (H.S. Ginsberg and C.S.H. Young) and herpes viruses (J.H. Subak-Sharpe and M.C. Timbury) and seven genera of RNA viruses: picornaviruses (P.D. Cooper), togaviruses (E.R. Pfefferkorn), rhabdoviruses (C.R. Pringle), Reoviruses (R.K. Cross and B.N. Fields), RNA tumor viruses (P.K. Vogt), Paramyxoviruses (M.A. Bratt and L.E. Hightower) and Orthomyxoviruses (L.E. Hightower and M.A. Bratt) are delineated with regard to genotypes and phenotypic expression of conditional, host range and deletion mutants. Further more, these sections deal in great detail with mechanisms of mutagenesis, selection of mutants, completion analysis, gene mapping, recombination and others, together with principles and methodology, the relation of genetic properties to nucleic acid structure and function inasmuch as extensively studied to date. In passing, it is not right to say that the main hosts of aphtovirus are rodents (Table 1 in "Genetics of Picornaviruses"), which are susceptible to parenteral infection alone. Only ungulates are the natural hosts of the foot-and-mouth disease virus. Apart from this and despite some important remaining gaps the contributions represent valuable information and should be of great significance to virologists involved in basic research and possessing some knowledge of molecular genetic. Documentation of the contributions and the appearance of the book are also praiseworthy.

H. Röhrer, Rathenow

Levitan, M.: Textbook of Human Genetics. 2. Ed.

Oxford: Oxford University Press 1977. 1012 pp., 194 figs., 130 tabs. Hard bound £ 15.50

In comparison to the first edition of 'Textbook of Human Genetics' (published in 1971) the basic organization of the second edition is nearly the same. It is divided into six parts, containing in all, 20 chapters. The first part reviews the chromosomal background of human genetics and the known on chromosomal aberrations. The second part deals primarily with the genetics of the single locus (Mendel's law, structure of the genetic material, dominance and codominance, pleiotropism, variable expressivity and pene-

trance, lethals, chance and Mendelian ratios). In part three special methods of genetic inference in man are described (pedigrees, sex-related inheritance, special methods for population genetics and twin studies). Part four is devoted to the genetics of multiple loci and is followed by three chapters (part five) related to mutation, selection and genetic drift. In the last part (part six) the authors turn to the role of counselling.

During the six years that have passed between the first and the second edition of this textbook, information about human genetics has increased considerably, thus requiring certain changes to have been introduced. They include a new chapter on identification of the human chromosomes; the description of modern methods of determining linkage and synteny, such as somatic cell hybridization, aberrancy mapping and nucleic acid hybridization (chapter 14 in this edition); the chapter on genetic counselling (chapter 20) and the chapter on special problems of allelism (chapter 16 in this edition) with an up-to-date review of the major histocompatibility locus of man. A number of chapters contain new material that reflect the increasing influence of molecular biology on human genetics. (The molecular basis of thalassemias in chapter 15 should be revised in the next edition.) Generally the choice of subject material is well-balanced and up-to-date.

The book is well illustrated: tables, figures and diagrams are clear. The exercises set at the end of each chapter are well chosen. This book has an extensive bibliography (about 2400) and an excellent index.

The 'Textbook of Human Genetics' satisfies not only students of medicine and biology but also non-geneticist physicians. Scientists in the field of genetics and biology will find this a valuable reference. To my mind it is one of the best and most up-to-date textbooks of human genetics.

F.H. Herrmann, Erfurt

Dawkins, R.: Das egoistische Gen

Berlin-Heidelberg-New York: Springer 1978. 246 pp. Soft bound DM 19,80

This book deals with the natural selection and the behavior of animals from the point of view that the genes are immortal and 'selfish' and that the organisms are only the coat for them. Several aspects of social behavior of animals – man included – are discussed from this standpoint.

This is an interesting book which will be read by geneticists not only with pleasure. The basic knowledge of genetics is partly oversimplified, the definitions of some terms (gen, cistron etc.) are self-willed, and the text does not contain any illustrations.

The German translation is very good.

'The selfish gen' will provoke geneticists to discussion.

F.H. Herrmann, Erfurt

Austin, C.R. Short, R.V. (Eds.): Fortpflanzungsbiologie der Säugetiere. Bd. 2: Embryonale und fötale Entwicklung. Pareys Studentexte Nr. 7.

Berlin-Hamburg: P. Parey 1978. 128 pp., 44 figs., 6 tabs. Soft bound DM 26,-

This book represents the German translation of 'Reproduction in mammals: Book 2: Embryonic and Fetal Development' (London 1972). The text deals with embryonic processes, determination and differentiation of sex, fetus and birth, manipulation of development, abortions and malformations. This volume of 'Pareys Studentexte' contains the basic knowledge now available in the field of embryonic and fetal development of mammals, man included.

The book is well produced and the figures are clear. Undergraduate students in biology, medicine, veterinary medicine and agriculture will find this book valuable.

M. Herrmann, Erfurt

Röbbelen, G., Sharp, E.L.: Mode of Inheritance, Interaction and Application of Genes Conditioning Resistance to Yellow Rust, Fortschritte der Pflanzenzüchtung, Heft 9.

Berlin-Hamburg: P. Parey 1978. 88 pp., 7 figs., 8 tabs. Soft bound DM 41,-

Yellow rust (or stripe rust) caused by *Puccinia striiformis* is one of the major fungal diseases of wheat and barley and host resistance is an important breeding objective. This pathogen is extremely sensitive to environmental conditions so that its handling, especially in genetic work, is more difficult than most other fungal pathogens. These difficulties occasionally lead to controversial experimental data.

Much of the literature, especially with regard to basic work in the early decades of yellow rust research, was published in German, e.g. by G. Gassner, W. Straib and Th. Roemer and coworkers. Later on, 1965 through 1975, K. Hassebrauk published an excellent monograph in four parts; the sections on the genetics of host-pathogen relationships and on breeding for resistance were written in cooperation with the first author of the present treatise. G. Röbbelen from Göttingen and E.L. Sharp from Bozeman, Montana have used these chapters of the monograph, which are mainly concerned with crop resistance, as a basis for the revised and somewhat extended English presentation.

The first part contains eight chapters on the genetics of host-pathogen relations, including mainly the various aspects of inheritance of resistance in wheat and also in barley. The second part deals with the problems of breeding for resistance. Here, the specific difficulties of the work with yellow rust, and also the potentials, become clear. The authors do not hesitate to discuss such hard and subtle problems as horizontal (race-nonspecific, general) resistance or the multi-line and other new (or not so new) concepts for the use of high levels of resistance which, however, are still largely unproven in terms of agricultural production. The authors have succeeded in writing a very careful, competent and well-balanced review of the topic. The treatise is recommended not only to specialists in yellow rust but to all engaged in crop resistance.

F. Scholz, Gatersleben

Jawetz, E., Melnick, J.L., Adelberg, E2A.: Medizinische Mikrobiologie, 4. Ed.

Berlin-Heidelberg-New York: Springer 1977. 774 pp., 278 figs.

Hard bound DM 58,-

This revised fourth German edition is based on the 1977 twelfth American edition.

The book represents an excellent up-to-date introduction to the broad field of medical microbiology. In addition, the authors present a wealth of information of general value for students of microbiology. Special chapters are dedicated to the structure of the cell, bacterial taxonomy, microbial genetics, metabolism and regulation, culture of microorganisms, growth and death and bacteriophages.

The authors followed the system of Haeckel (1868) for the classification of microorganisms distinguishing between 'niederen Protisten' and 'höheren Protisten' in chapter 1. However, in chapter 2 the authors employed the usual classification for procaryotes and eucaryotes.

The reviewer has been disappointed that the book contains no information pertinent to problems of microbial product synthesis and the application of enzymes in chemotherapy.

The sub-title of picture 7-8 must be 'Cholsäure' not 'Chlor-säure'.

The book is well organized and printed and on the whole it is highly recommended.

R. Borriß, Schönebeck

Gottschalk, W.: Allgemeine Genetik.

dtv Wissensch. Reihe, Nr. 4306.

Stuttgart: G. Thieme 1978. 363 pp. DM 16,80

It needs courage to restrict a textbook of modern genetics to classical genetics, even withstanding the fact that it emphasizes aspects which are now in progress, such as experimental mutagenesis, polyploidy and experimental evolution research. Molecular genetics is only included so far as it is necessary for the adequate understanding of general genetics. Furthermore, human genetics is excluded, leaving us with a textbook which fills a hiatus, at least in the modern German genetic compendium literature.

Beginning with the differences between genetic systems of prokaryotes and eucaryotes, the book traces in a clear manner the cytological events of the genetic processes. The description of the genetic material, up to the chromosome and genome level, is very good. Particularly interesting and understandable is the chapter on the influence of the environment on gene expression, including modificability, modifications and phenocopies. The Mendelian laws are presented in extenso, as well as the methods of backcrossing, gene localization, allely, pleiotropy, position effects and polygeny. The principles of evolution and sex determination receive excellent treatment. Relative to the field of competence of the author the problems of changing genetic material are discussed in varying detail. It is no wonder that most of the examples for gene, chromosome and genome mutations are illustrated with clearcut cases in *Pisum*. Some readers may consider it a disadvantage that most of the examples are from plant material. Worthy of notice is the chapter on extrachromosomal inheritance. From the large field of molecular genetics only the genetic control of biosynthesis, gene dependant protein synthesis and regulation of gene activity are discussed, as well as the molecular basis of the mutation events. This handy book is a valuable addition to the textbook market in genetics: comprehensive, clearly illustrated with quite a number of new schemes and systematic in its outline, with a strong emphasis on applied genetics. H.F. Linskens, Nijmegen

Fraenkel-Conrat, H., Wagner, R.R. (Eds.): Comprehensive Virology. Vol. 11: Regulation and Genetics. Plant Viruses.

New York-London: Plenum Press 1977. 348 pp., 40 figs., 21 tabs. Hard bound \$ 35.40

The series 'Comprehensive Virology', which will comprise some 6000 pages in a total of about 22 volumes, represents the first encyclopedic analysis of the current information explosion in animal, plant and bacterial virology. This Volume 11, 'Regulation and Genetics', is the only one dealing entirely with plant viruses. It covers stratetic features of viral agents that appear to be peculiar in plants. Among these are the multicomponent viruses or coviruses, in which each of several particles carries a specific part of the RNA genome. By measuring the infectivity of each single component and of all possible combinations of components, it is possible to determine the combination of components which contains the genetic information required for infectivity. It is the feeling of the authors of these first two chapters, the first one dealing with three-component plant covirus systems (Van Vloten-Doting and Jaspars), the second one with two component systems (Bruening), that the answers to questions raised in connection with coviruses will not only give more insight into the life cycle of eucaryote RNA viruses but also into the secrets of the eucaryotic cell itself. The third chapter (Atabekov) is concerned with defective viruses and satellite plant viruses which are important tools in studies on the genomic structure of many viruses and the mechanisms respon-

sible for the expression of their genetic information. The fourth chapter (Fraenkel-Conrat, Salvato, Hirth) deals with the mode and regulation of the first events after RNA virus infection, especially with the translation strategy of multigenic viral RNAs. The fifth chapter (Takebe) describes the advantages and uses of mesophyll protoplasts in the study of plant virus replication and its regulation. Among others, protoplasts offer a powerful tool to characterize various resistance genes. The sixth chapter (Diener, Hadidi) deals with viroids that have been recognized recently as the smallest agents of infectious disease. Their self-replicating RNA molecules are too small to code for proteins and differ from viruses by the absence of a dormant phase (virions). They may act by causing the activation of pathogenic genes carried within the host's genome.

On account of the immense amount of data of recent research carefully analysed and summarized by important authorities it is simply impossible to realize a complete picture of the contents of this volume, containing detailed literature references at the end of each chapter. As a definitive reference source concerning the field of regulation and genetics of plant viruses, Volume 11 of Comprehensive Virology is of high importance for professionals as well as for students not only relative to virology but also as to genetics, molecular and cell biology as well as to microbiology and biochemistry. G. Schuster, Leipzig

Stewart, P.R., Letham, D.S. (eds.): The Ribonucleic Acids.

Berlin-Heidelberg-New York: Springer 1977. 374 pp., 55 figs. Hard bound DM 47.40

'Today, as evidenced by the contributions to the present volume concerning RNA, our understanding of the molecular basis of gene expression is very extensive and undoubtedly represents one of the most significant achievements of modern scientific endeavor.' In finishing their introductory chapter dealing with the historical aspects of RNA with these words, the editors D.S. Letham and P.R. Stewart lay the foundation for the authors of the various chapters to build up a comprehensive outline of the biological roles of RNA. These chapters have been written especially for students with some basic biochemical training and with a wide variety of biological interests. Your more senior or post-graduate students in fact!

In this, the second edition of the book, G.M. Polyva begins with a description of the mechanism and control of transcription, including a comprehensive and well illustrated section on transcription inhibitors. Chapters on nuclear RNA and messenger RNA by H. Naora and J.M. Adams, respectively, then precede an extensive and lucid account of the structure and function of transfer RNA by D.S. Letham and R.E.H. Wettenhall. The latter conclude with a discussion on the relationship between t-RNA and cytokinin. Following an account of ribosomal RNA by L. Dalgarno and J. Shine, a description of the basic steps in translation of m-RNA is given by R.E.H. Wettenhall and G.D. Clarke-Walker. They draw attention to the fact that the mechanisms for the regulation of translation are in need of further clarification. Mitochondrial RNA and chloroplast RNA are dealt with by P.R. Stewart and P.R. Whitfield, respectively. Overall, the aim of the book in attempting to provide a grounding in established facts and concepts in most aspects of the biology of RNA is handsomely achieved. The book is rounded off with an outline of the isolation, purification and fractionation procedures for the various species of RNA.

J.F. Jackson, Glen Osmond, Australia