

Book reviews

Draper, J.; Scott, R.; Armitage, P.; Walden, R.: Plant Genetic Transformation and Gene Expression. A Laboratory Manual. Oxford London Edinburgh Boston Palo Alto Melbourne: Blackwell 1988. X, 355 pp., several figs. and tables. Soft bound £ 29.50.

Plant Genetic Transformation and Gene Expression was compiled by experts possessing wide experience in organizing practical courses in this field. This manual under review is based on just such a course given at Leicester University.

The manual provides solid practical information to those planning to carry out plant cell transformation experiments. The various aspects involved are excellently explained in six chapters, which include such topics as: vectors, transformation using Ti plasmids, DNA-mediated gene transfer and topics associated with the study and analysis of the transformed plants, namely the isolation of nucleic acids, DNA analysis and the analysis of gene expression.

As the basic material was compiled in 1986, some of the most recent methods are missing from this manual. In addition, cell biological aspects of genetic manipulation are presented in greater depth than some of the molecular biological aspects, such as the construction of cDNA and genomic clone banks, aspects that are also essential in plant transformation work. However, this manual is particularly suitable for beginners and those who have to give courses on plant cell transformation. Based on my own experience in the field of plant transformation, I can recommend this manual with sincerity to anyone carrying out transformation experiments and, in particular, to those who intend to start such experiments, but are hampered by the lack of experience in their surroundings.

G. J. Wullems, Nijmegen

Sandberg, A. (ed.): Progress and Topics in Cytogenetics. The Cytogenetics of Mammalian Autosomal Rearrangements. New York: Alan R. Liss 1988. 921 pp. Hard bound \$ 295.00.

Cytogenetics is being applied more and more to fields in which early diagnosis of the state of the structural components of the genetic information is of great interest. Sophisticated methods, including the use of molecular-biological techniques, have been developed that are able to elucidate interchromosomal and intrachromosomal rearrangements. This enables the research to understand an important part of the fundamentals of biological variability and, consequently, of the evolution or selection processes. However, the techniques enabling early diagnosis of hereditary diseases or of genetic risks might be even more important. Our basic knowledge of this field is compiled in this book, which presents a clear concept of the subject matter, reads well, and has a detailed index of terms and references. It should be read not only by investigators, but also by instructors and students. Items of common knowledge are explained in ways that define the subject matter and demonstrate the progress being made. It must be stressed that the majority of the articles deal with the relationship between genotype and phenotype, thus elucidating the biologically essential and applicable aspects of the cytogenetic findings. With respect to elucidating this relationship using a combination of cytogenetic and

molecular-biological methods, which is a generally adopted technique these days, further explanations, e.g., on the rearrangements of human chromosome no. 6 relative to histocompatibility and their connections with the adrenogenital syndrome would have been desirable. So would have been a more detailed explanation of autosomal rearrangements regarding the mammalian immunological state. Obviously this has not been done because of the predominantly submicroscopic nature of these rearrangements.

Nevertheless, the reviewer agrees with the statement in the foreword; "that readers will find this book to be a major source of cytogenetic information on chromosomal rearrangements".

B. Löhre, Rostock

Turner, M. J.; Arnot, D. (eds.): Molecular Genetics of Parasitic Protozoa; Current Communications in Molecular Biology. Cold Spring Harbor: CSH Laboratory 1988. 170 pp.; many ill. Soft bound. \$ 25.00.

Protozoa are not only the ciliates and amoebae that, as we learned at school, crowd "every drop of pond water" (which turned out not to be true), they are also organisms as *Trypanosoma* and *Plasmodium* which cause the most severe infectious diseases of man and domestic animals. Although *Plasmodium* was identified in the 1880s, it took about 100 years before molecular biologists found parasitic flagellates and sporozoa interesting subjects for study. The present book is one of the more recent contributions to the knowledge and better understanding of these organisms. It results from a meeting held in 1987 by a small group of specialists who wanted to discuss the novel aspects of protozoan molecular biology. The experimental organisms were seen "as cells with genomes first, and pathogens second". Of the 28 articles, 19 are devoted to *Trypanosoma* and *Leishmania*, 6 to *Plasmodium*, 2 to *Theileria*, and 1 to *Giardia*. To give an impression about the content: Tait et al. and Le Page et al. show, by means of isocitrate dehydrogenase electrophoretic markers and DNA length measurements, that the African trypanosomes have a sexual stage with mating occurring in the tsetse fly. Still, the exact ploidy of the trypanosomes is unknown. Several groups work on trypanosome variant cell-surface glycoproteins (VSG), which encode as many as 1,000 different genes. By changing the expression of the VSG genes at different points in time – hereby also changing the cell coat – the trypanosomes evade the immune response of the host. Novel contributions to the VSG gene system are, amongst others, the expression of VSG genes within large polycistronic mRNA (e.g. Kooter et al.) and the biochemical analysis of the *trans*-splicing of the capped mini-exon to the polycistronic transcript (e.g. Boothroyd et al.). In *Plasmodium*, progress is reported on genetic analysis with marked strains (Walliker et al.), chromosome separation and gene-mapping techniques (Wellems). McCutchan et al. describe the expression of two structurally distinct nuclear rRNA genes at different stages of the *Plasmodium* life cycle. Williams et al. report on the strange "immortalization" of lymphocytes infected by *Theileria* schizonts.

The book can be recommended to parasitologists and geneticists, and furthermore to all biologists who delight in the molecular aspects of parasite virtuosity. C. K. Stumm, Nijmegen

Hattori, T.: The Viable Count. Quantitative and Environmental Aspects. Brock/Springer Series in Contemporary Bioscience. 1st. Madison/Wisconsin: Science Tech, Inc. Madison, WI; Springer: Berlin Heidelberg New York 1988. 88 pp.; 53 figs.; 20 tabs. Soft bound DM 49,-.

In the field of pure and applied microbiology, colony methods are widely used for isolating microorganisms and enumerating the number of viable cells. An understanding of the mechanisms and kinetics of microbial colony formation, therefore, must be of substantial interest.

In the critical point of view of many microbiologists, the commonly used plate count method gives only approximate numbers of viable cells. In the preface the author describes the main aims of this book. First, to show "that the plating technique can provide very accurate information about the condition and the behavior of individual cells and also about their total number". The second main question deals with the optimal incubation time of the plates in order to obtain accurate counts. The author provides "a kinetic model of colony formation which will allow readers to determine the shortest possible time for a particular application. Using the approaches suggested, significant reductions in incubation times may be possible, thus greatly increasing the efficiency and utility of the plate count method". The third topic is concerned with possible explanations for the often detected large discrepancies between microscopic and plate counts of microbial cells, especially for cells isolated from natural environments. These discrepancies cannot be attributed to purely technical aspects.

Without any doubt, these three problems are of substantial importance for pure and applied microbiology.

The book has been divided into eight chapters and a final overview. A citation of the chapter headings will provide a sufficient insight into the classification and content of this book: "The characteristics of colony formation", "The normal distribution (ND) model", "A kinetic model of colony formation", "The basis of microcolony formation", "Plate counts from mixed populations", "The analysis of colony-forming curves", "Statistical aspects of plate count data", and "Practical implications of the kinetic (FOR) model". Emphasis is given to the statistical aspects and the statistical modeling of the mechanism and kinetics of microbial colony formation.

The author succeeds in keeping the mathematics and statistics involved to an extraordinary moderate level. Only a knowledge of some very basic facts from mathematics, statistics, and probability theory has been presumed. The list of cited references seems to be somewhat restricted with only 31 titles where more than the half of these papers were published before 1970. The book is written in a very clear and easily readable way. Each chapter is divided into several sub-chapters with suggestive and informative sub-chapter headings.

This volume can be used as an introductory textbook for a first course on a quantitative analysis of microbial colony formation. M. Huehn, Kiel

Eigen, M.: Stufen zum Leben. München, Zürich: Piper 1987. 311 pp.; many figs. Hard bound DM 39,80.

The book does not present the complete story on the origin of life, but then the author did not intend it to do so. Instead, the author concentrates on some important theses based on

recent studies in molecular evolution. From the abundance of concepts presented, the following messages are, in my opinion, especially useful for gaining an understanding of molecular evolution. (1) The "Quasi species" theory: the wild-type individuals of a species have no common nucleotide sequence. The wild-type, however, represents the consensus sequence, whereas in reality different organisms show a high degree of variability. (2) The theory of the "Sequenzraum". The mutative optimum of the most important genes for all essential functions occurred before the genes were integrated into the macromolecules of the genome. (3) Some replication enzymes have the ability to synthesize relatively homogeneous ribonucleic acid molecules of 100–200 nucleotides without any nucleic acid template.

The book presents many interesting ideas, and it was a pleasure reading the text as it is written in an almost exciting manner, accessible to a broad group of readers. The important facts are dealt with in the first part (120 pp). The second part "Tafeln zur Molekularbiologie" is an introduction to certain topics in molecular biology and provides additional explanations and more detailed information on the first part as well as descriptions of various studies on evolutionary research. In the first part, the literature available on molecular biology as well as its history, population genetics, and evolution are reviewed in a very valuable fashion.

The book makes fascinating not only for biologists but for all scientists interested in those important problems.

E. Günther, Greifswald

Emrich, U.; Globig, M. (eds.): Max-Planck-Gesellschaft Jahrbuch 1988. Göttingen: Vandenhoeck and Ruprecht 1988. 832 pp.; numerous figs. in colour and black-and-white. DM 88,-.

This volume is the yearly report of the West German research organization and provides a detailed account of its activities over the past year. This organization, which consists of 2,051 scientists and has a yearly budget of 1.2 billion German marks, is characterized by its attitude of giving excellent scientists the facilities for conducting research, independent of any profit factor or any potential practical application. By definition, therefore, it is always in a state of permanent flux and so secures a constant rejuvenation of the organization itself and a stream of new ideas. The average age of a scientist upon being appointed is 43 years. The principle point of departure of the organization is that the curiosity of the scientist is the source and the starting-point of the research.

One of the institutes that falls under the comprehensive umbrella of this organization is the Erwin-Bauer-Institute for plant breeding at Cologne. The four departments of this institute cover the fields of the genetic basis of plant breeding (director – Jozef St. Schell), molecular plant genetics (H. Saedler), biochemistry (K. Hahlbroek), breeding and yield physiology (F. Salamini), and a working group on somatic cell genetics and transformation in cereals (H. Loerz). Gene transfer, the expression of storage proteins, induction of defence responses, breeding for virus and nematode resistance, and the production of transgenic plants are all topics which should attract the attention of the practical breeder. Therefore, the recommendation of this reviewer is to take a look at this yearly report, which gives a short description of the work done and a complete list of publications for each research group. H. F. Linskens, Nijmegen