

Book Reviews

Luckner, M.; Nover, L.; Böhm, H.: Molecular Biology, Biochemistry and Biophysics. Vol. 23, 1. Ed. Berlin-Heidelberg-New York: Springer 1977. 130 pp., 52 figs., 7 tabs. Hard bound US \$ 21.20

The twentythird volume of the series "Molecular Biology, Biochemistry and Biophysics" presents a review of recent important findings on secondary metabolism and cell differentiation. This volume is composed of two chapters:

1. Expression of secondary metabolism: aspects of cell specializations of microorganisms, higher plants, and animals (authors: Luckner and Nover);
2. Secondary metabolism in cell cultures of higher plants and problems of differentiation (author: Böhm).

An introduction to the general aspects of secondary metabolism and differentiation is followed by a treatment of the problem of coordinated and uncoordinated formation of enzymes (the examples provided include flavonoid metabolism in parsley cell cultures). The regulatory effectors of secondary metabolism are thoroughly discussed. They include, for example, the effect of tryptophan and tryptophan analogs on the expression of ergolin alkaloid biosynthesis in *Claviceps* species, the effect of cinnamic acid on anthocyan synthesis in *Petunia hybrida* and the influence of phytochrome on the regulation of phenylpropanoid metabolism. Sepecial emphasis is laid on the problems concerning phase dependence of secondary metabolism and organisation of differentiation programme. Examples of microbial systems (e.g. integration of alkaloid metabolism into the developmental programme of *Penicillium cyclopium*) and systems of higher plants and animals provide insight into this interesting problem.

The second chapter of this book critically covers the fate of secondary metabolism during initiation of plant cell cultures as well as the realisation of secondary metabolism in plant cell cultures on the basis of recent literature. Furthermore, triggering factors and activities of various enzymes involved in secondary metabolism, especially in the flavonoid metabolism are discussed. Findings on cell cultures are compared with those on related intact plants. It must be mentioned that in one part of this chapter an effort has been made to correlate secondary metabolism with cellular structure.

At the end of each chapter concluding remarks and on extensive list of literature are given. The literature cited is carefully chosen, permitting deep insights into the subjects treated. Some of the numerous problems related to secondary metabolism and cell differentiation are emphasized in this volume. Probably it was not the intention of the authors to provide a comprehensive review; if certainly would not have been possible with the small volume of this book. Based on the current status of research, this book does indeed provide a large amount information and many ideas and can be recommended to anyone interested in these problems.

R. Wiermann, Münster/Westfalen

Bergfeld, H.: Sexualität bei Pflanzen. Stuttgart: E. Ulmer 1977. 128 pp., 29 figs. Hard bound DM 42,-

This monograph attempts to present an overall picture of the sexuality in the ontogeny of the plant kingdom. It is based primarily on an literature search of the fifties and sixties, with a serious absence of more re-

levant recent material. On the other hand, an intensive study has been made of the classical papers of de Bary, Correns, Hartmann, Klebs, Pringsheim, Westergaard, and Fritz von Wettstein. Thus, a comparative treatment of the evolution of the sexual organs of plants is presented from these highly selective literature sources. For the convenience of the reader, a uniform terminology, based on the suggestion of D. von Denffer (1967), was generally adopted. An exception was made with reference to sex determination in seed plants, where the terminology used differs greatly from that used in most textbooks.

The book begins with a short history of the discovery of sexuality in plants, a discussion of terminology of reproductive structures, differentiation of gametes, and a detailed treatment of the importance of the meiotic division for the sexual process. The sexual reproduction of eukaryotic plants is emphasized and divided into units of sexuality in halplonts, diplonts, and in plants with an alteration of generations. The physiology of gamones in algae and fungi gets a nearly up-to-date treatment but the physiology of flower formation is excluded and, strangely enough, selective fertilization and gamete competition are not mentioned.

Parasexual processes in procaryots, including the question of its existence in blue-green algae, are touched upon slightly in only two pages. The evolution of sexuality is discussed on one page with one reference.

This author of this book wants, above all, to encourage discussions. The book cannot be read without remembering the late F. Oehlkers who tried in his reluctantly torso textbook to use the transition from life in water to life on continents as a principle of classification for sexual structures in plants. Such an ecological approach definitely influenced this book and gives it a somewhat personalized standpoint on sexual processes, the potential evolution of sexuality and the factors which control adaptation.

H.F. Linskens, Nijmegen

Schwiegk, H. (Ed.): Handbuch der inneren Medizin. Bd. 7: Stoffwechselkrankheiten, T. 3: Gicht (Ed. Zöllner, N.) Berlin-Heidelberg-New York: Springer 1976. 661 pp., 205 figs. DM 290,-

Volume 7 of the 'Manual of Internal Medicine', initiated by L. Mohr and R. Staehlin and edited by H. Schwiegk, is in the 5th, completely revised and enlarged edition, reserved for the metabolic diseases. In addition to the representation of the hereditary defects of the carbohydrate/amino-acid and protein metabolism (part 1), of the diabetes mellitus (part 2a and b) and the aliphatic metabolism (part 4), part 3 'The Gout' also is present. Re-edited by N. Zöllner and W. Gröbner and discussed by 23 specialists, hyperuricemia and gout have been considered and expounded on 650 pages from nearly all medicine-theoretical and clinic-practical aspects. Due to progress in clinical biochemistry and experimental medicine, hardly any other field of the internal medicine in recent years has developed as rapidly as the metabolic diseases of man. The fact that four extensive parts are necessary for their entire representation and that the treatment of the disturbances of the purine metabolism takes a part-volume tells its own tale. An abundance of new knowledge, especially towards the

etiology of hyperuricemia, the elucidation of rare genetically caused disturbances of the purine metabolism and their incorporation into the entire picture, more exact conceptions about the mechanisms of the gout attack and, in particular, the therapeutic and prophylactic starting points, considerably improved in recent years, made a consistent delineation of this set of problems within the frame of the 'Manual of Internal Medicine' desirable. This concern is satisfied by the present part-volume in an excellent manner.

Though written by several authors, reiterations are avoided. The book is easily readable and offers both the theoretically and the clinically acting physician a multitude of facts as well as suggestions to own scientific work. In this context the voluminous list of references is to be pointed out, which can be regarded the latest findings up to the printing time. The feasibility of treating genetic metabolic defects by means of fibroblastic cultures recognized in recent years, to give an example, is likewise embodied in the references as acute quotations towards the basic discussion of the actual genetic defects of the primary gout at the cell.

Altogether the book is not only a welcome collection of our current knowledges on the subject of hyperuricemia and gout, but it also might - beyond the actual concern of a manual - be recommended as a textbook for the daily use of the interested physician working clinically as well as the theorist.

Th. Wichmann, Halle/Saale

Auerbach, C.: Mutation Research (Problems, Results and Perspectives).

London: Chapman & Hall 1976. 504 pp., 86 figs., 37 tabs. Bound 12 £

Nobody interested in mutation research is unaware of the significant experimental and conceptual contributions made by Prof. Auerbach during a more than 30 years period of creative work in the field. Her profound knowledge of the field's development and of the still unsolved problems is well documented by the present book, dedicated to the memory of J.J. Muller, which is equally useful and important to those who desire a comprehensive introduction to the subject and to those who are actively carrying out research on mutagenesis.

The book is divided into 23 chapters which cover all relevant topics of mutation research, starting with the history of mutation research, the classification of mutational changes at the level of the chromosome and gene, and reverse mutations as well as suppressor mutations. The next chapters are concerned with X-ray data and repair of X-ray damage, mutagenesis by UV and repair of UV damage, and chemical mutagenesis by various classes of chemical mutagens. The relations between induced crossing-over, chromosomal rearrangement and mutations, mutagen specificity, spontaneous mutations, instabilities, and applied mutation research are the topics of further chapters. A large number of references per chapter ensures that the significant journal and report literature is well represented and allows to go back to the original sources of the data being discussed. There is a bibliography, an author index and a subject index. The book is well produced, clearly printed, and well illustrated by diagrams wherever necessary. Each chapter is appropriately introduced and the argument subsequently explained and documented. The data discussed, the questions raised and the answers provided by Professor Auerbach make the book a major achievement among the books presently available in the field of mutation research. It

provides a splendid account of its subject, makes beautiful and stimulating reading, and represents an essential acquisition for all those interested in the current state of mutation research.

R. Rieger, Gatersleben

Ts'o, P.O.P.: The Molecular Biology of the Mammalian Genetic Apparatus. Vol. 1, 1. Ed.

Amsterdam-New York-Oxford: North-Holland 1977. 468 pp., 198 figs., 37 tabs. Hard bound US \$ 46.00

This book is a well deserved tribute to James Bonner, a man who for decades has championed the idea that the key to the understanding of gene regulation and differentiation in eukaryotes is through the study of the organization of chromatin. Nowadays chromatin has been granted full citizenship among cell components. Not too long ago (and in fact at the time when James Bonner started his work on chromatin) many cell biologists still considered chromatin no more than a technical artifact, almost a hangover of the paraffin-section-era of cytology. This change should make old Flemming rejoice in his grave.

The technical advances in cell fractionation have now reached the point where nuclear contents can be prepared under conditions which make one feel tolerably confident that the products are not artifacts and in fact that they are acceptably clean preparations. Thus, twenty years after the discovery of the basic principles governing the molecular structure of DNA, the solution of the problem of chromatin organization appears to be within our reach. This book witnesses how great an effort is being made all over the world to clarify the major issues of chromatin organization; and offers an excellent overview of the conceptual and technical variety of approaches to the problem. Naming the subjects of the 23 chapters would be too long and certainly not too meaningful. Suffice it here to mention that most of the contributions are centered around the models of chromatin organization that can be derived from recent information on the interaction between histones and non-histone proteins and DNA. The major breakthroughs in the study of the genetic apparatus of both prokaryotes and eukaryotes have been achieved by the use of restriction enzymes combined with high resolution electron microscopy; i.e. the combination of sophisticated biochemistry and morphology. Although many questions still remain to be answered and there is still quite a bit of disagreement on several issues, the beads-and-strings model seems to be generally accepted as a reasonable starting point for further research. This is a book worth reading by everyone interested in this most fascinating field of biology, in spite of its high price. A. Monroy, Napoli

Nachtsheim, H.; Stengel, H.: Vom Wildtier zum Haustier. 3 Ed.

Berlin, Hamburg: Paul Parey 1977. 156 pp., 76 figs. 10 tabs. Soft bound DM 38,-

The authors consider domestication as the oldest, largest and also most successful, biological experiment humans have ever conducted. In this context it is remarkable that domestication has received so little attention in the biological literature. This book helps somewhat to fill this gap.

The book has been written for a wide range of interested people. It assumes little basic knowledge of genetics. On the other hand, the book reaches a good standard in many aspects, certainly at the level of a textbook for undergraduates.

The chapters one to four give a general outline of the process of domestication. It deals with questions

like: which species are involved and why these are suitable and others not, which circumstances make the main difference between artificial and natural selection, what is the genetic basis of the development of breeds within a species, and which phenotypical changes are reached. Many beautiful examples are given, illustrating the effects of domestication on behaviour or physical characteristics in one or another species.

Chapter five discusses in much greater detail the effects of artificial selection in one species, the rabbit. The authors selected the rabbit due to their own intensive studies of this animal. The various stages of domestication are described, from the wild state of the rabbit up to the numerous breeds we know at present. Much attention has been paid to the inheritance of the colour patterns. Undoubtedly this chapter forms the most profound part of the book and is most interesting from the genetic point of view.

Following chapters deal, among others, with some negative effects of domestication as the development and maintenance of anomalies, and lethal and sublethal factors. Further, the question of returning domestic animals to the natural environment is discussed. While still presenting many stimulating discussion points, these later chapters too often lack data from the literature. This critical note brings me to a more general point. Even within its present set-up the book could clearly have been improved by more information from the literature. The discussions are sometimes outdated. However the general approach to the subject is satisfactory and the presentation is very clear.

J.H.M. Metz, Wageningen

Lewin, B.: Gene Expression Vol. 3: Plasmids & Phages. 1. Ed.

New York, London, Sydney, Toronto: John Wiley & Sons 1977. 925 pp., 209 figs., 21 tabs. Hard bound \$ 40.65

This book is the third volume in a series on gene expression. The first and second volumes dealt with the gene expression in bacteria and in eucaryotes respectively. The third volume is concerned with plasmids and bacteriophages.

Two main themes constitute this latter volume: The nature of the systems by which genetic information is transferred between bacterial cells, and the means by which the small elements that constitute the plasmids and phages are perpetuated.

The transfer of genetic information by transformation and conjugation is covered in the first two chapters. Specialized transduction is mainly included in the phage lambda section, while generalized transduction, which is poorly treated, is somewhat hidden in the discussion on phage lambda. In chapters 3 to 9, the author has focused his work mainly on the plasmids and phages that are the best characterized. He has discussed these systems in great detail, which makes the book a good reference source for those who are working in the field or in related fields. For those who are entering the field of plasmid or phage research, the book is not easily readable. It is too detailed, it is lacking a general introduction to plasmids and phages, and there are no summaries or conclusions at the end of the chapters. Further, I would have preferred the treatment of some additional, relevant plasmids and phages. For example, bacteriophage P1 and P22, although not belonging to the best known phages, could have been discussed in more detail, because of their importance in generalized transduction. Mutator phage Mu is not mentioned at all. The research on phage Mu is expanding, particularly because this phage has pro-

erties remarkably similar to those of the insertion sequences (IS), which have been discussed by Lewin in the chapter dealing with plasmids.

In summary, Gene Expression - 3 is a good reference book and will be a welcome addition to the library of research workers in the field of molecular biology of plasmids and phages. The book, however, cannot be advised as an introduction to this field.

H.J.J. Nijkamp, Amsterdam

Unger, K. (Ed.): Biophysikalische Analyse pflanzlicher Systeme. 1. Ed.

Jena: VEB Gustav Fischer 1977. 301 pp., 107 figs., 17 tabs. Hard bound DM 78.--

This book contains 32 articles written by 44 authors. Most of the articles are edited versions of lectures delivered at the second international symposium on biophysics of botanical systems, held in Potsdam 1974, but some of them were written especially for this volume. After an introductory chapter "Biophysikalische Analyse pflanzlicher Systeme" (Biophysical Analysis of Botanic Systems), the remaining articles are organized into 5 sections: 1. Biophysikalische Modelle zur Ertragsbildung (Biophysical Models for Yield Formation) (9 articles, 86 pages), 2. Biophysikalische Modelle des Energie- und Wasserhaushaltes der Pflanzen (Biophysical Models of the Management of Energy and Water by Plants) (7 articles, 47 pages), 3. Biophysikalische Aspekte zum Metabolismus der Pflanzen (Biophysical Aspects of Plant Metabolism) (8 articles, 67 pages), 4. Bestimmung physikalischer Kenngrößen des pflanzlichen Systems (Determination of Physical Characteristics of the Plant System) (2 articles, 19 pages), 5. Modellbetrachtungen zur Analyse von Ökosystemen (Model Considerations for the Analysis of Ecosystems) (5 articles, 53 pages).

The scientific study of complicated systems requires building, specifying and testing of models. The articles in the book discuss several aspects of modeling, with an emphasis on agricultural plant systems and other ecosystems influenced by man. The term "biophysical" means really that models are developed in a way analogous to what is customary in physics. Although physical considerations, for instance energetics, receive due attention, it cannot be said that all models proposed in this book are biophysical in the sense that all biological processes are reduced to physical ones. There are general articles on the methodology of model building as well as specific examples concerning models of given systems, rough outlines as well as detailed models. It is therefore impossible to discuss the contents of this book fully in this review. Agriculturists, plant physiologists, and plant ecologists will find a survey of the state of their art, especially as regards modeling. Biomathematicians and theoretical biologists will find an interesting collection of examples which, apart from their own intrinsic interest, may be quite useful for teaching purposes.

Most of the contributions are rather short, and for detailed information the references cited at the end of the articles must be consulted. Nearly all models are deterministic, so the reader will find very little about inference concerning stochastic models, or statistical methods. The articles are written in two languages (25 in German, 7 in English). Some of them contain a short summary, but others don't. The quality of most texts is good to reasonable, but there are differences in the clarity in which e.g. formulae, diagrams, or graphs are explained to non-specialists. Layout and typography are satisfactory. J. Reddingius, Haren

Day, P.R. : The Genetic Basis of Epidemics in Agriculture. Vol. 287: Annals of The New York Academy of Sciences. 1. Ed.

New York: The New York Academy of Sciences 1977. 400 pp., 6 figs., 107 tabs. Soft bound \$ 35.00

This book consists of a collection of 30 papers given at a meeting held in New York City in April 1976 to review current theories on the causes of plant disease epidemics and on how to protect the world's crops from them.

Although the methods of control discussed include only those loosely related to the genetical structure of the crop plant and crop population, a great diversity of opinions is presented. This results partly from the diverse crops, pathogens and pests discussed which is one of the chief merits of the book. We are reminded that there is no single answer to the genetical control of diseases in plants. Many of the authors suggest that genetic homogeneity of crops creates a potential disease hazard but the first few papers emphasize that, despite the evidence of the southern corn leaf blight epidemic on maize in the United States in 1970, genetic uniformity of crops is still increasing and especially rapidly in developing countries. On the other hand, it is pointed out by Buddenhagen in a later chapter that many successful tropical crops are extremely uniform genetically but are not eliminated by diseases.

Among cereal pathologists dealing with diseases in which epidemics can increase rapidly, such as rusts and powdery mildews, there is general agreement that the wide deployment of single race-specific resistance genes is not a successful method of disease control so it is surprising to find that this is the very method recommended by Gallun for the control of Hessian fly. Perhaps epidemiological factors are at the root of this divergence of opinion and these could be explained with the help of some of the models in the six chapters devoted to the mathematical description or simulation of disease epidemics. The models now incorporate many refinements in attempts to approach realistic descriptions of the spread of diseases. Several of them are used to test hypotheses about multiline varieties but varying opinions persist about the ability of multilines to stabilize the race structure of pathogens. More data from practical experiments, such as those described by Frey et al. and by Wolfe and Barrett, are required to permit further development of the models and to prevent them escaping from the real world of plant disease epidemics.

A valuable aspect of the book is that it brings together descriptions of practical breeding programmes in several crops. It seems that in the more vigorous breeding programmes, for example those of CIMMYT and IRRI, little attention is paid to theoretical models but it cannot be denied that on the evidence presented here practical breeding programmes have often been successful in improving disease resistance in crops. One might, however, be forgiven for questioning the apparent complete certainty expressed by Robinson that all our troubles with plant diseases will be over in a few years when most crops will be protected by horizontal resistance. Those who wrote chapters on the conservation of genetic diversity presumably share the view that pathogens will not be so easily defeated and further resources may be necessary. One possible source of genetic variation for disease resistance would be mutation but unfortunately resistance is scarcely referred to in the chapter on mutation and the challenge by Frankel that the number of induced mutations for disease resistance is small is not taken up, perhaps confirming Frankel's view.

No doubt, with the divergence of views presented in the papers, there must have been some lively discussion and it is a pity that the benefit of this could not reach the reader. It is admittedly difficult, however, to capture the salient points from discussions and though these often constitute the more interesting part of a meeting, reports of them frequently form the less interesting parts of a book.

The editor evidently had some difficulty in separating the papers into different groups and other arrangements seem possible - but perhaps no better. Two systems of listing the references, in the sequence in which they are referred to or alphabetically under author, are used - I prefer the latter. These are minor criticisms of a book which will be useful to many people working on disease control in crops, and especially to plant breeders and their supporting pathologists.

R. Johnson, Cambridge

Czihak, G.; Langer, H.; Ziegler, H. (Eds.): Biologie: Ein Lehrbuch für Studenten der Biologie. Berlin, Heidelberg, New York: Springer 1976. XXIII, 837 pp., 957 figs., 2 tabs. Bound 69,--

During the last two decades several fields of biology have passed a very rapid development, and their stock of knowledge has increased so strongly that an individual author is unable to write a qualified textbook including all the fields of this science. At most universities specialization took place in only some sections of biology, depending on the special interest of the persons holding the chairs. This frequently is the reason for certain gaps in the education of students. Therefore it can be welcomed that 26 prominent biologists have joined in order to define and to lay down the subjects necessary for basic knowledge in biology and therefore important for understanding the processes of life. The result of this cooperation is a textbook, which certainly is unique for the German written literature, as regards both quality and scope of subjects.

The content is divided into three main parts: Structure and performance of cells, Structure and function of organisms, and Organisms in populations. Thus the subject is arranged in three logical levels of organisation: Cell - Organism - Population. The authors represent these elements of biology in a didactically excellent way. The editors had intended to remove the boundaries between the traditional fields of biology and to accent the general rules and principles. This aim has been reached here in a better way than in any other textbook of biology known to the reviewer.

Within the three main parts there are the following 11 chapters: Cytology, Genetics, Reproduction and sexuality, Development, Structure and function of plant and animal organs, Structural and functional integration in the whole organism, Behaviour, Ecology, Plant and animal distribution, Evolution, and Fundamentals and aims of biological classification. The book ends with two large folded sheets which give general surveys of the relationships in the systems of recent plants (Angiosperms) and animals.

This book is addressed first to the student of biology, who should master these elementary subjects before moving to a specialized field of biology. But it can also be recommended to teachers of biology in secondary and high schools as well as to all biologically interested scientists. This textbook offers not only a large amount of solid facts, but its skilful representation and excellent illustration may be able to bring about interest and enthusiasms for biology.

K. Gröber, Gatersleben