

Book Reviews

Freerikens, E.; Tarnok, I.; Thumim, J.H. (eds.): Genetics of the Actinomycetales. Proceedings of the International Colloquium at the Forschungsintitut Borstel, September 29 - October, 1, 1976. Stuttgart-New York: G. Fischer 1978. XVIII, 278 pp., 85 figs., 116 tabs. Soft bound DM 96,-

It has to be appreciated that the organizers of this symposium were evidently able to bring together a very representative selection of geneticists working with actinomycetes. This allowed them to cover the whole field of Actinomycetales genetics from various points of view. Since there is no space to deal with all of the 29 papers, a survey of the contents will provide the necessary information to decide whether one should have a look at this book. The reviewer certainly recommends this for specialists as well as for those who desire only information on a special field of genetics. Genetics of *Streptomyces* includes: plasmids, genetic control of antibiotic production, genetic control of enzyme synthesis, genetic recombination, gene mapping (11 papers). Genetics of *Mycobacteria* includes: genetic aspects of drug resistance, genetic recombination (7 papers). Genetics of *Nocardia* covers: genetic recombination, gene mapping, regulation of enzyme activities (5 papers). DNA-DNA reassociation studies are discussed (3 papers) as well as phages (3 papers). K. Esser, Bochum

Broertjes, C., Van Harten, A.M.: The Application of Mutation Breeding Methods in the Improvement of Vegetatively Propagated Crops. Developments in Crop Science (2) Amsterdam-Oxford-New York: Elsevier 1978. 296 pp., 26 figs., 30 tabs. Hard bound \$ 57.00

This book deals with considerations as well as with the applications of mutation breeding methods in the improvement of vegetatively propagated crops. Its main aim is to offer a literature review, providing at the same time interpretations and conclusions pertaining to mutation breeding prospects methods and limitations with various crops. The main part of the book discusses available literature crop by crop.

The latter are grouped into: 1. Roots and tubers. 2. Ornamentals. 3. Woody perennials. 4. Fruit trees. 5. Others (including sugarcane, grasses). Ornamentals, as expected, comprise a little over 50% of the space consecrated to specific crops. The introductory, general chapters are more limited in scope and extent. They are comprised of a discussion on mutagens, a chapter dealing with shoot apices, chimeras and diplontic selection. A further, most instructive chapter deals with the adventitious bud technique and the relevance of other in vivo and in vitro propagation methods for mutation breeding. Great importance is attached to the problem of overcoming chimerism. The evaluation of in vitro techniques, necessarily brief, is a welcome addition. More details are given in chapters dedicated to specific crops. On the whole, the introductory chapters are somewhat brief and in places, rather incomplete. A more detailed account on the nature of spontaneous and induced mutations and of basic differences between seed propagated and vegetatively propagated crops might have been useful. The book's special strength resides in the extensive, up to date review of literature (over 1200 references, along with instructive details and evaluations on various in vivo and in vitro techniques, as well as up to date assessments concerning prospects and progress in mutation breeding with different crops.) The value of the book is further enhanced by some very good coloured illustrations exem-

plifying the more significant progress in mutation breeding with ornamentals compared to achievements in fruit crops, potato or sugarcane. The greater ease of manipulating ornamentals is in great part due to the shorter growth cycle, wide use of adventitious bud technique, selection for easily perceptible characters and the possibility of making use of selections with lower fertility and even complete sterility. The book will be a valuable and timely addition to plant breeders and of outstanding value to breeders of ornamental plants. It seems to fill an obvious void in our information on mutation breeding, which has been gained primarily from sexually reproduced crops.

The wide bibliographical search has also been instrumental in bringing to the fore some lesser known, relevant new techniques and in raising important methodological considerations in mutation breeding. P. Spiegel-Roy, Bet Dagan

Kaback, M.M. (ed.): Tay-Sachs Disease. Screening and Prevention, Progress in Clinical and Biological Research, Vol. 18. New York: Alan R. Liss. 1977. 433 pp., 56 figs., 80 tabs. Hard bound £ 34.-

A multidisciplinary report is presented about the results of 6 years of Tay-Sachs disease heterozygote screening. Initiated in 1970 in Baltimore and Washington, and subsequently disseminated to many other cities in several countries, this venture into genetic medicine at the public health level is unique because it provides a model to study the profound implications of screening populations for healthy carriers of a genetic defect. Besides interesting data from the genetic and epidemiologic point of view, valuable observations are presented concerning the psychologic impact of the investigation on the individuals, the families and the communities studied. Useful guidelines can be derived for future carrier detection programs from the technical, organisational, medicolegal and economic aspects described. The follow-up of the screening by providing the genetic counselling needed by the individuals detected to be heterozygous carriers and the couples found to be at risk to produce an affected child, is dealt with in an instructive way. The moral issues raised by the Tay-Sachs disease heterozygote screening is, however, given relatively superficial attention.

T.L. Oei, Nijmegen

Krüssmann, G.: Handbuch der Laubgehölze. 2. Ed.

Berlin-Hamburg: P. Parey 1978. 113 pp., 21 figs., 8 tabs. Hard bound DM 54,-

Two months after the appearance of volume III the index-volume is now available. It is composed mainly of indices, e.g. invalid names, German names, an alphabetical list of families of the genera mentioned in this handbook and an alphabetical list of the genera. In addition, this volume provides a systematic view about the families and genera dealt with. A list of references in abbreviations is also given for the numerous illustrations and last but not least there is addenda and corrections and a list of the most important arboreta in Europe and North America.

It need not be emphasized that this small volume is very important for the user of the monumental dendrological handbook.

W. Vent, Berlin

Günther, E.: *Grundriß der Genetik*. 3. Ed.

Jena: VEB G. Fischer 1978. 504 pp., 314 figs., 55 tabs. Hard bound DM 53,—

Subsequent to the 1st edition published in 1969, a 3rd edition is now presented that is largely newly arranged and updated. It covers practically the entire field of genetics in 23 chapters that have been concentrated into 6 sections.

After a brief explanation of the term heredity and some basic facts the author begins with the discussion of the genetic material (44 pages). In the following two chapters the chemical structure of the hereditary units, including modern methods of sequence analysis, the techniques of denaturation and renaturation, of autoradiography, and cytology of DNS containing structures are discussed. The consistent transition from the molecular level to the next higher level of the chromosome structure is didactically well solved.

In the second section (34 pages) are dealt with replication and segregation under the title 'Verdoppelung und Verteilung des genetischen Materials'. Here also the author enters first into the molecular details of the DNS- and RNS-replication in pro- and eukaryotes and then adds the treatment of cytological distribution procedures as a basis for the recombination mechanisms to be dealt with later on.

The 3rd section (85 pages) entitled 'Wirkung der Gene' contains the chapters 'Proteinbiosynthese und Merkmalsausbildung', 'Regulation der Genaktivität', 'Der Einfluss der Umwelt' and 'Nachweis für den Erbträgercharakter von DNS und RNS'. It begins with transcription and subsequently moves over to the expression of the character and to the definition of the gene via the genetic code and translation. Regulation is shown on exemplary cases from the prokaryotes as well as eukaryotes. The consistent set-up is followed by a discussion of environmental modifications. The chapter on the evidence of DNS and RNS as carriers of the genetic information does not, strictly speaking, belong to the section on gene action, but it prepares one well for the following section 'Mutationen' (96 pages). Here, in three chapters, gene mutations, chromosome mutations and genom mutations are treated not only theoretically but also with regard to evolution and applied genetics.

The 5th section (77 pages) probably by mistake incompletely entitled 'Rekombinationen', is dedicated to recombination in connection with sexual processes. It comprises two chapters in which, Mendelian principles and the behaviour of unlinked genes are first presented followed by information on meiotic and mitotic recombinations within the chromosome.

The 6th section (60 pages) deals in five chapters with different forms of parasexual recombination in pro- and eukaryotes. It begins with parasexual cycles in fungi and somatic cell hybridization and continues with recombination in phages and bacteria. In this connection transformation, transfection, generalized and specialized transduction, conjugation and plasmids are discussed.

The five closing chapters (45 pages) are not coordinated to particular section because they deal with far too different subjects. A very methodical chapter is concerned with the 'Lokalisierung genetischer Bereiche'. It is followed by chapters on extrakaryotic inheritance, 'Populationsgenetik', the 'Anwendung der Rekombinations- und Populationsgenetik in der Züchtung' and a brief summary on 'Immunogenetik'. With this completely revised and noticeably concise 3rd edition of the already approved compendium, the author submits the most progressive German-speaking textbook on general genetics available at present. Its information content is considerable, its language agreeably concise and precise and the examples are well-balanced, clear, and well-chosen. In particular, there are two points to emphasize:

— the author's constant efforts to establish the relationship between genetic knowledge and methods and their application and

— the didactically very useful definitions in the beginning of a chapter and the emphasizing of newly introduced or essential terms by extra bold print. This greatly facilitates studying and consulting. Beginners as well as examinees will welcome it.

Altogether one would like to wish this well turned out new edition a wide-spread distribution. It is, however, questionable whether the publishers' price policy, the book's price is by DM 12,70 higher in the Federal Republic of Germany than in the German Democratic Republic, serves this purpose.

W. Seyffert, Tübingen

Bodmer, W.F. (ed.): *Genetics of the Cell Surface*.

London: The Royal Society 1978. 189 pp., 31 figs., 34 tabs. Hard bound £ 8.00

During a meeting organized by the editor and held in the rooms of the Royal Society on March 24th 1977, the surface of the cell as the component through which the cell communicates with the outside environment and with other cells was discussed. The 9 contributions to the volume illustrate the actual and potential value genetics has to the understanding of some aspects of this subject. The book can be divided into 2 sections: the first 4 contributions deal with a variety of examples of cell surface genetics, from gram-negative bacteria through protozoan variants (trypanosomes) to human blood groups. The incompatibility systems of angiosperms are included and treated in a superb way. The second half of the book concentrates on the histocompatibility of man and mouse; a valid point since those functions are, at least to some extent, understood and their genetics is well developed. The major human histocompatibility system, HLA (for human leucocyte, A for the first system), is a remarkable example of a complex gene cluster containing at least several hundred, if not a few thousand, loci. It codes for two groups of polymorphic cell surface membrane antigens which have been identified as two glycosylated polypeptides of MG 33 000 and 28 000 respectively. Their relationship to the induction and control of the immune response is likely.

H.F. Linskens, Nijmegen

Annual Report 1977. Research Institute for Forestry and Landscape Planning 'De Dorschkamp', Wageningen — Nederland.

121 pp.

The Breeding Division is working not only on the selection and breeding of Black, Balsam and Leuce poplars, Alder, Willow, Birch and Oak but is also conducting a large research program on the breeding of Scotch Pine, Douglas Fir, Norway and Sitka Spruce, *Pinus nigra*, *P. contorta*, *P. strobus*, *P. divaricata* and *Abies grandis*. Experiments on the vegetative propagation of Douglas Fir in vitro are going on: descaled buds are cultured using a modified version of the Boulay method. Up to now, although they grow slowly, 3 roots each on plantlets cultivated in vitro have been induced. Because of the Dutch Elm disease, research on the selection of Elm, using mutation and polyploidy in broadleaved species, is going on. However, vegetative propagation and flowering control also have the attention of researchers. The breeding of hawthorn for resistance to fire blight has so far produced no clear results.

The annual report gives the reader a fine impression about the research on silviculture and forest protection presently being conducted. Programmatic changes related to the further development of research on environmental planning are expressed in a number of extensive projects on evaluation landscape, on the requirements to be laid down for transition zones of urban peripheries and on ecological engineering. The integration of applied genetics into these future projects is, however, only beginning.

H.F. Linskens, Nijmegen

Bodmer, W.F. (ed.): British Medical Bulletin. The HLA System, Vol. 34, No. 3
London: The Medical Department 1978. 324 pp., 30 figs., 51 tabs.
Soft bound \$ 12.50

This issue of the British Medical Bulletin is devoted to the HLA-system. Its aim is to provide a general review of the HLA-system in all its various aspects, but emphasizing in particular the clinical applications. With this in mind the editor W.F. Bodmer has presented a collection of papers by specialists.

The first six papers deal with the basic features of the HLA-system and discuss the definition of the HLA loci, our knowledge about their functions, based especially on work in the mouse, and our knowledge of their genetics and chemistry. The role of the HLA-system in matching donor and recipient and problems of immunological monitoring are reviewed in two papers. An introductory and background review of studies on HLA and disease association lead up to the discussion of some interesting examples of disease association with HLA: HLA, ankylosing spondylitis and rheumatoid arthritis; HLA and multiple sclerosis; HLA genetic heterogeneity in diabetes mellitus; HLA and coeliac disease; HLA and liver disease; HLA in acute leukaemia and Hodgkin's disease; HLA and trophoblastic tumours. A review of the evolution and function of the HLA system rounds off this collection of contributions.

This bulletin is highly recommended to all interested clinicians as well as to immunologists, cell biologists and geneticists.

M.Ch. Herrmann, Erfurt

Muhammed, A., Aksel, R., van Borstel, R.C. (eds.): Genetic Diversity in Plants. Basic Life Sciences, Vol. 8
New York-London: Plenum Press 1977. 506 pp., 64 figs., 103 tabs. Hard bound \$ 39.50

This volume contains the proceedings of a symposium, held in Lahore, Pakistan, dealing with the genetic control of diversity in plants. In the foreword Alexander Hollaender expresses his hope that this symposium will be followed by additional ones in the Far East, and thus will become part of a series similar to the 15 symposia held in Latin America during the last 20 years.

The main aim of the symposium, and this volume, is to provide plant breeders and agronomists with the latest information on the genetic variability that occurs naturally and that can be introduced or induced in cultivated plants. A fact also emphasized is that although plant genetics has universal principles these principles must be applied under local conditions. Thus, throughout the book the special problems of Pakistan are also dealt with.

The present volume contains 41 papers which are grouped into seven chapters. The contributors are from Pakistan, Australia, Belgium, Brazil, Canada, Denmark, Ethiopia, Fed. Rep. Germany, India, United Kingdom, Turkey, USSR and USA.

The volume covers a very wide field and diverse topics. The first topic – after the introduction – is 'Natural and induced genetic variability' with contributions on natural variation and germ plasm conservation in several cultivated plants as well as the use of such genetic techniques as mutation breeding, synthetic amphiploids, aneuploids and semidwarf mutations in several cultivated plants (*Triticum*, *Medicago*, *Cicer arietinum*). The chapter on 'Genetic variability and resistance to disease' contains papers discussing the sources and the ways of mutation induction of resistance against several plant diseases, especially in cereals and *Cicer*. In the chapter on 'Genetics of quantitative characters' studies are reported on the statistical analysis of yield and other characters of a great number of cultivated plants.

Under the title 'Prospects of breeding for physiological charac-

ters' papers are put together which deal with the genetic aspects of salt tolerance of cultivated plants, their responses to high temperature and nitrogen fixation in cereals. The chapter on 'Seed storage proteins' contains papers on the formation, deposition, composition and nutritional values of storage proteins, especially in cereals and legumes; special emphasis is placed on the genetic influence on the improvement of protein quality and the modification of the amino acid pattern.

The papers in all these chapters deal with problems, tasks and methods which can be termed 'conventional'. In contrast, the last chapter 'Genetic manipulation in cell cultures' puts forward 'unconventional methods'. The papers discuss prospects for crop improvement through plant tissue culture, haploid production and cell culture, selection of mutants in cell culture, somatic hybridization and association of cultured cells with nitrogen fixing rhizobia as well as biophysical and genetic studies on transformation of higher plants using DNA from eukaryotic or prokaryotic donors.

Thus, the present volume covers a wide range of interesting and important aspects in the field of genetics and plant breeding. This book provides the reader who is interested in this work with a knowledge of the wide range of problems which are the topics of modern breeding research in cultivated plants. Obviously, all these problems are not dealt with in full detail. The papers are relatively short and often only one author discusses one topic. However, this made it possible to discuss many areas of research in this scientifically and economically important discipline.

R. Hagemann, Halle/S

Roberts, J.A.F., Pembrey, M.E.: An Introduction to Medical Genetics. 7. Ed.

Oxford-New York-Toronto: Oxford University Press 1978. 324 pp., 147 figs. Soft bound £ 5.50

Since the last edition of 'An Introduction to Medical Genetics' was published in 1973 there have been rapid and extensive developments in medical genetics which have direct and practical applications. Subsequently, the text of this new edition has been thoroughly revised and numerous additions have been made. The author of the previous edition has been joined for the first time by his colleague Marcus Pembrey.

In comparison to the last edition the basic organisation of the seventh edition is nearly the same. Five chapters cover the basics of inheritance as well as dominant, recessive, intermediate and sex-linked inheritance or human disorders. Chapter VI is devoted to the multiple alleles. The chapter on molecular genetics and haemoglobinopathies is a new chapter added to the present edition. Chapter VIII which discussed blood groups has been revised and now also includes the genetics of the HLA system. Genetic linkage and chromosome abnormalities are described in chapter IX and X. The chapter on the gene in action (XI) deals with polymorphism, biochemical genetics, gene interaction and gene expression. The multifactorial inheritance, its contribution to continuous variation and its role in the causation of common diseases are discussed in the next chapter. The final chapter considers genetic advice given to patients and prenatal diagnosis. (This chapter has been entirely rewritten.)

The publishing of a seventh edition is proof enough of the high quality of this work. As before, no previous knowledge of genetics is assumed. Where a new principle is introduced, examples are given to illustrate it fully.

This book is an excellent introduction to medical genetics not only for students of medicine and biology but also for non-geneticist physicians.

F.H. Herrmann, Erfurt

Hanus, H., Aimiller, O.: Ertragsvorhersage aus Witterungsdaten. Fortschritte im Acken- und Pflanzenbau, Vol. 5. Berlin-Hamburg: P. Parey 1978. 127 pp., 20 figs., 48 tabs. Soft bound DM 46,-

The development of reliable methods for predicting the large yearly variations in crop yields affected by the actual weather conditions is highly desirable. The present study is a valuable contribution towards solving this problem. The relationships between yields and weather data have been treated by multiple linear regression models. An important point in this type of analysis is the small size of samples (usually time series of yields from no more than 20 years) as compared with a large number of potentially relevant variables (as an example: 7 monthly means or sums of 7 weather factors from 13 weather stations of the FRG result in more than 600 variables). The question has been raised as to how far these small samples can be considered representative. Consequently, a considerable part of this study has been devoted to methodological problems: reduction of the number of variables and selection of those equations which allow the most precise yield predictions, influence of the size and quality of samples on the quality of predictions, improvements of predictions by calculation of means from several estimates due to compensation of positive and negative deviations, determination of a trend function which takes into account changes in breeding and cultivation, and others.

The proposed procedures have been developed with yield numbers of winter wheat and weather data from the FRG. However, examples are given which demonstrate the more general applicability of these methods to other crops and other regions. Therefore the inclusion in this German text of an English translation of the summarizing discussions will be appreciated by many readers. Generally the mean errors have not exceeded 5% of the actual yields but the authors concede that in years with extreme weather conditions greater deviations cannot be excluded.

It has been shown that relatively good yield predictions are possible as early as the end of April. This result has been interpreted as a consequence of indirect influences of weather conditions via mineralization and leaching of nutrients, especially nitrogen, at early times during the growth period. This hypothesis is supported by the results of special fertilization experiments and opens promising possibilities in compensating, in part, for yield fluctuations by specific fertilization measures. Experiments with the aim of confirming this expectation are under study now.

M. Peisker, Gatersleben

Young, J.Z.: Programs of the Brain

Oxford: Oxford University Press 1978. 325 pp., 51 figs. Hard bound £ 5.95

In spite of the important progress that brain research has made during the last few decades, there is still no generally satisfactory way of describing the operations of whole masses of nervous tissue. In this book, which is based on the Gifford lectures given in 1975-1977 in the University of Aberdeen, Young proposes with much courage and imagination that a good method for doing this might be to say that the brain contains sets of 'programs' (i.e. plans of procedures). Each individual life would follow a program written in four main languages: (1) the fundamental program written in the DNA code (instructions inherited from the past), (2) the structure of the brain (e.g. the topographical organization that

provides a faithful representation of events outside), (3) speech and culture, (4) writing and other forms of recorded speech.

Although this concept is enlightening for some of the discussed topics, one often also wonders whether Young's definition of the brain as 'a set of nerve cells providing the programs of action that ensures survival of the individual ...' is really more helpful than the classical one (e.g. in Dorland's medical dictionary: 'the mass of nerve tissue contained within the cranium'). This shortcoming is, however, certainly not due to Young's vivid descriptions but rather to the enormous gap that still exists between the knowledge collected by neurobiologists and the understanding of daily human activities that are discussed (e.g. memory, feeling, seeing, eating, drinking, loving, fighting, hearing, speaking, writing, knowing, thinking, sleeping, dreaming, creating, believing, worshipping). Young's attempt to bridge this gap will certainly score high on Wundt's curve of pleasure: it produces enough arousal to interest the general public in brain research, combined with only an occasional too intense arousal for neurobiologists themselves by the inclusion of questionable information on their specific fields.

D.F. Swaab, Amsterdam

Nover, L., Luckner, M., Parthier, B. (eds): Zelldifferenzierung. Molekulare Grundlagen und Probleme

Jena: VEB G. Fischer 1978. 582 pp., 162 figs., 31 tabs., Soft bound DM 68,-

It must be considered an adventure at the present stage of investigation to attempt to draw a general concept of the recall of genetic information in order to differentiate cellular structures. The authors of the present book do so for all living beings. In an introductory chapter terms are defined and a short biochemistry of gene expression is presented. The second part of the book begins with a history of the terminology of differentiation and is followed by a discussion of the molecular basis of the differentiation process, gene activation, transcription, gene expression and intracellular and intercellular signals. In the special third part of the book important experimental systems are treated in detail: adaptive enzyme synthesis of arabinase-degradation in *E. Coli*, light-dependent transformation of proplastids into plastids in algae and higher plants, transcription of the ovalbumin gene, differential gene activity in polytene chromosomes, isoenzymes in differentiation processes, gene expression in secondary product metabolism, regulation of reserve protein biosynthesis in seeds, expression of the immune systems, morphogenetic processes in phages of *E. coli*, gene expression programs of cell divisions, nucleo-plasmatic interaction of morphogenesis in *Actabularia*, transformation to crown-gall tumor cells and the developmental genetics of cellular slime molds. All these different systems are clearly and critically treated and the explanations are accompanied by graphs, tables and extensive literature lists. It becomes clear that the principal mechanisms of storage and selective realization of genetic information in prokaryotic and eucaryotic organisms are identical; they only differ in the degree of complexity of the genetic material and the interactions between the cells. They all represent the same system of order in organisms. It is possible that the process of de- and re-differentiation could have been included in more detail, but on a whole this multi-authored book is an excellent introduction to the advanced level of the molecular base of cell genetics and to the actual, and yet unsolved, problem of a field of genetics which has made a great deal of progress during the last 10 years.

H.F. Linskens, Nijmegen