

Book reviews

Günther, E.: Textbook of Genetics, 6th new enlarged edition. Jena, G. Fischer 1991. 503 pages, 343 illustrations, Hard bound.

The fact that the “Günther” is in its 6th edition speaks for the quality of the book. More than 20 years have passed since the author, Prof. Günther, accomplished the by no means mean feat of publishing a textbook on genetics for the students in the former German Democratic Republic (GDR). She succeeded in spite of all the difficulties that arose from the existence of the wall between the West and the GDR, especially with regard to the exchange of scientific information.

Given the scientific background of the author, the emphasis of the book is, of course, on classic genetics. However, in line with the developments over the past decades, the sections dealing with molecular genetics have been continuously expanded, so that it now represents a serious competitor for those textbooks which set the standard in that part of Germany which alone constituted the Federal Republic of Germany (FRG). Nonetheless, the difficulties with regard to obtaining reference literature the author obviously encountered, even in recent years, are apparent in some parts of the textbook. For example, it would be desirable if plasmids, which for approximately 14 years have been known to be associated with eukaryotes, and the resulting possibility of cloning genes with integrative plasmids had been given a more detailed review. This also applies on a similar level to mitochondrial genetics in the molecular field, i.e. senescence.

Furthermore, it appears that Anglo-American literature was more readily available than such from the FRG. However, these deficiencies do not lessen the value of the book. Few geneticists are nowadays still capable of presenting the entire fields of classic and molecular genetics in such a way that they are understandable to students.

Let us hope that the “Günther” will assert itself in competition with the multitude of textbooks on genetics in the “old” FRG and find its place in education at universities in the “new” FRG and other German-speaking countries.

K. Esser, Bochum

Sussman, M.; Collins, C. H.; Skinner, F. A.; Stewart-Tull, D. E. (eds.): The Release of Genetically-Engineered Microorganisms. London: Academic Press 1988. 306 pp., multiple figs. and tabs. Hard bound £ 29.50.

This book constitutes the proceedings of the First International Conference on the release of Genetically Engineered Microorganisms which took place in Cardiff, South Wales, April 5–8, 1988. As pointed out by Sir Hans Kornberg in his opening remarks, this important conference served to stimulate discussions on three distinct levels: a *scientific* debate to evaluate whether the introduction of genetically engineered microorganisms (GEM's) in the environment could cause significant harm; a *regulation* debate to come up with a balanced regulatory framework on a national and international level, as well as a *public perception* debate, to try to dispel the air of mystery and dread associated with recombinant DNA work, which exists in the mind of the public.

Clearly the first two goals are well achieved in this volume, although the third goal may have been only partially achieved due to the highly scientific nature of most of the presentations. The 12 well-written (well-edited) chapters, authored by an impressive group of experts in the field, cover virtually all aspects of the release of GEM's into the environment, from (molecular) genetic aspects of engineering organisms for safety, the survival and monitoring of GEM's under different environmental conditions, parameters and genetic transfer, to concrete field trials and prerelease testing procedures. Particularly informative and well-done are the eight Round Tables, which contain a wealth of data and food for thought for anyone planning, carrying out or “regulating” such experiments. Although the work in this general area is moving forward rapidly, this volume published in 1988 is still very useful and of general interest today. Its very nice layout and comprehensive cross-index, reflecting the editors' and printer's careful and dedicated work, make this book a *must* for people working in the field and interested outsiders. It is well worth the money.

F. J. de Bruijn, Köln

Bajaj, Y. P. S. (ed.): Rice. Biotechnology in Agriculture and Forestry, Vol. 14. Berlin Heidelberg New York Tokyo: Springer 1991. 655 pp., 198 figs., many tabs. Hard bound DM 498.00.

The Green Revolution was a direct result of the introduction of new rice varieties that had been created by classical breeding techniques at the International Rice Research Institute, the Philippines. Rice, the most important of the cereal crops, is the main dietary staple for more than half of the world's population. Consequently, great efforts will have to be expended to increase world rice production to 560 million tons by the year 2000. The main targets of these efforts will be the development of disease resistance, tolerance to insects, tolerance to drought and high soil salt content, and quality improvement, including protein content. The techniques used will have to include genetic engineering. Until recently it has seemed to be impossible to make use of these new strategies in research on rice. However, research conducted during these last 5 years has demonstrated that these innovative approaches have great value for the further improvement of this crop as well. The volume under review summarizes these approaches, which have to be integrated into the more traditional rice breeding programs to generate genetic diversity. The majority of the investigators in the field of rice breeding are from China, Japan, Korea, Italy, and Hungary. This fact is reflected in the list of contributors to this volume. There are 38 chapters in eight sections: tissue, embryo, anther, and protoplast culture, in vitro mutation and somaclonal variation, transformation, conservation of genetic resources, and cryopreservation. Why rice tissue culture studies in the USSR, Hungary, and France get special treatment is not clear. Special attention is given to the regeneration of plants from protoplasts, which for a long time was the critical problem in the production of haploids and the release of new cultivars from in vitro culture. This volume gives an excellent introduction into innovative methods and demonstrates their far-reaching implications to rice breeding programs of the future.

H. F. Linskens, Nijmegen

Obe, G.; Evans, H. J.; Natarajan, A. T.; Rosenkranz, H. S.; Sobels, F. H.; Sugimora, T. (eds.): **Advances in Mutagenesis Research**. Volume 2 (Obe, G.; ed.) 326 pp., 82 figs., 30 tabs. Hard bound DM 198.00. Volume 3 (Obe, G.; ed.) 197 pp., 58 figs., 21 tabs. Hard bound DM 198.00 each. Berlin Heidelberg New York Tokyo: Springer 1990 and 1991.

This series has two aims: firstly, an understanding of the molecular mechanisms leading to mutations; secondly, the prevention of a thoughtless introduction of mutagenic agents into our environment. It is quite evident that the second aim can not be the task of research and/or of a scientific publication series since it involves political decisions.

In ten (vol. 2) and six (vol. 3) review articles overviews of highly specialized topics are given which demonstrate that mutation rates are not only dependent on the release of man-made mutagenic agents into the environment, but that they are also balanced phenomena that are necessary for evolution and adaptation. Is it true that "elevation of the mutation rates . . . would lead to an increase of the frequencies of cancer" (cited from the foreword)? One can also ask the question of whether as such articles on birth defects in South America and those on individual genetic counselling belong in volumes on mutation research. This is a demonstration of the heterogeneity of the series, which has an editorial board but for the first three volumes only one editor.

H. F. Linskens, Nijmegen

Kung, S. D.; Arntzen, C. J.: **Plant biotechnology, biotechnology series, vol. 11**. Boston, London, etc.: Butterworths 1989. 423+XXI pp., several figs. and tabs. Hard bound £ 60.00.

This book aims at promoting biotechnology and its applications in plant systems. The eighteen chapters of the book are therefore clearly grouped into four parts. The first part (five chapters) deals with basic techniques essential for plant biotechnology. Here, specific information is missing about some techniques and methods, e.g., electrofusion, application of the herbicide amiprofos-methyl for efficient induction of micronucleation in plant cells, and mitochondrial manipulation with respect to the transfer of cytoplasmic male sterility. There are some printing errors in one of the chapters (pp. 67-69). The second part (seven chapters) reviews various examples of gene expression (gene expression in relation to somatic embryogenesis, photoregulation, hormonal activity and stress regulation). Although this part gives much interesting information, the linking of the subjects to biotechnology is not always clearly indicated. In part three (five chapters), much attention has been given to background information concerning manipulation of the chloroplast genome. However, one of the authors, perhaps rightly, points out the fact that there appears to be no rational means of chloroplast transformation that can guarantee any reasonable degree of success (p. 333). Finally, the fourth part of the book, merely a single small chapter on the applications of biotechnology in plant systems, is restricted to a superficial description of various examples of genetic engineering for crop improvement.

Some interesting chapters are rather outside the scope of the book. Part I contains a chapter on the organization and expression of plant genes in microorganisms (i.e. *Escherichia coli* and yeast) in order to understand the properties of the genes or their products, and how these can interact with the microbial cell. In Part II a chapter deals with genes for photosynthetic pigments in purple nonsulfur bacteria, which have a photochemical reaction centre similar to, but much simpler than, the chloroplast photosystem-II. The last chapter of Part III deals with the molecular evolution of *Nicotiana* chloroplast genomes.

In general, the texts of the chapters are clearly written. Most chapters give a short introduction and end with future prospects or concluding remarks to the subject. It is a pity, however, that the reference lists of all chapters do not give the article titles. In addition, most references are from 1986 or earlier; only some chapters contain a very few references from 1987 and 1988. This made the book out-of-date already at the time of appearance in 1989.

In conclusion, the title and aim of this rather expensive book do not fit well to its interesting, but slightly out-of-date content. Its purchase is, therefore, only recommended half-heartedly.

L. J. W. Gilissen, Wageningen

Bennett, J. W.; Lasure, L. L. (eds.) **Gene Manipulations in Fungi**. Orlando: Academic Press 1985. 558 pp., 51 figs., 44 tabs. Soft bound £ 30.00

According to the editors, 'Gene manipulations in fungi' can be regarded as 'the first of many books celebrating the marriage between molecular biology and mycology'. Twenty-three chapters, written by a total of 35 authors, are grouped into five major sections. The book starts with chapters on classical fungal genetics and continues with articles about the application of modern genetic techniques to fungi. It ends with speculations about the future of molecular mycology.

In particular, the book provides basic information on appropriate vector systems and broadly applicable selectable markers suitable for the transformation of yeast, as a eukaryotic model system, and of molds (especially *Aspergillus nidulans* and *Neurospora crassa*).

However, the rapid growth of molecular mycology makes the book, which was published 5 years ago, out-of-date. Recent developments in molecular mycology are missing. For instance, the reader can not expect to learn about the new applications that are presently available to manipulate fungal organisms of economic importance or pathogens of plants and animals. Chapters on chromosomal mapping using pulsed-field gel electrophoresis are similarly absent. Consequently, the book can only be recommended to those who would like to have an introduction into the field of molecular mycology and who intend to start with experiments using fungal transformation systems.

U. Kück, Bochum

Alscher, Ruth G.; Cumming, Jonathan R.: **Stress Responses in Plants: Adaptation and Acclimation Mechanisms**. Plant Biology Vol. 12. New York: John Wiley-Alan Liss 1990. 419 pp. \$ 99.50.

Since the discovery of the heat-shock response in *Drosophila*, the phenomenon has been shown to be ubiquitous in living organisms. This stress response, a reprogramming of cellular activities to ensure survival during the stress period and resumption of normal cellular activities in the recovery period, is not only similar for all types of stress but also identical for all sorts of organisms. Although this short-term response to different stressors can be the same, the alteration in plant molecular events and metabolic patterns reflecting the coping mechanism of the plant in rapidly changing environments probably is not. Physiological changes based on continued growth under stress conditions, i.e. long-term stress responses, could be responsible for the survival mechanism of the plant in the long run. The central focus of this volume in the Plant Biology Series is on physiological and molecular mechanisms of acclimation and adaptation to stress in higher plants and the relative success or

effectiveness of various coping strategies. This volume covers in 15 chapters the short-term rapid responses (i.e. acclimation) and long-term responses (adaptation) to heat, cold, light, ozone, desiccation and (heavy) metal stress at the various levels of organization, ranging from the whole plant to the gene. The processing of the external signals, detected by temperature and other receptors, by means of plant hormones is dealt with in the two remaining chapters.

I agree with the authors that this volume is not only interesting as a source of information for graduate studies in plant stress physiology, but also useful for researchers in related biological disciplines.

M. M. A. van Herpen, Nijmegen

Bajaj, Y. P. S. (ed.): Medical and Aromatic Plants III. Biotechnology in Agriculture and Forestry, Vol. 15. Berlin Heidelberg New York Tokyo: Springer 1991. 502 pp., 208 figs. Hard cover DM 478.00.

The discovery of rapidly growing, reproductive, and stable cell cultures has revolutionized the role played by in vitro culture in fine chemical synthesis, especially in the synthesis of compounds used in medicine and pharmacology, and those used as fungicides, insecticides or as fragrances in the perfume industry. The 29 chapters of this volume of the biotechnical series in question are arranged alphabetically according to the Latin species' names of the plants. The direct consequence of this is that different groups of essential compounds, for which in vitro culture, regeneration, cryopreservation, and the production of compounds are described, are scattered throughout the volume. The very short subject index makes it difficult to obtain easy access to the aromatic compounds and secondary metabolites that one is interested in. The chapters themselves, however, are all written by experts and are concise and to the point so that the user of this book can quite easily extract all the information necessary to start tissue or cell culture for the production of alkaloids, anthocyanins, flavonoids, organic acids, essential oils, vitamins, flavors, and other secondary metabolites. The following genera are treated: *Atropa*, *Ageratina*, *Ailanthus*, *Aconitum*, *Apium*, *Aloë*, *Akebia*, *Bidens*, *Carthamus*, *Chamomilla*, *Carum*, *Citrus*, *Cymbopogon*, *Dysosma*, *Euphorbia*, *Fritillaria*, *Glycyrrhiza*, *Lavandula*, *Nigella*, *Pelargonium*, *Perilla*, *Podophyllum*, *Rosa*, *Scutellaria*, *Securinega*, *Solanum*, *Swertia*, *Symphytum*, and *Syringa*.

Most of the photographic plates have no informational value at all, or are very restricted in what can be obtained from them: the callus cultures all look alike, as do the grass seedlings on agar.

H. F. Linskens, Nijmegen

Lycett, G. W.; Grierson, D. (eds.): Genetic engineering of crop plants. ISBN 0-408-04779-8. London, Boston, etc.: Butterworths 1990. 293+X pp., several tabs. and illustrations. Hard bound £ 65.00.

Most crop plants suffer from a variety of defects, like sensitivity to various diseases, insect attacks, adverse conditions, etc., which influences yield. The genetic imperfections of cultivars, the major concern to breeders and farmers, are a challenge to scientists working in the field of plant genetic engineering and biotechnology. The present book (consisting of edited papers selected from the proceedings of the 49th Nottingham Easter School in Agricultural Science, the first on the topic of Genetic Engineering of Crop Plants, held in 1989) forms an illustrative

example of the 'transmission' of such challenges into research activities. The book reviews many recent developments in the genetic manipulation of crop plants and demonstrates the increase in our understanding and the broadening of our knowledge on various characteristics that are worthy of improvement in several respects, e.g., seed quality, seed and tuber development, fruit ripening, various kinds of resistances (i.e., to diseases, insect pests, herbicides, stress, etc.), root nodule development and nitrogen fixation, and photosynthesis. These diverse topics are covered in 23 chapters of this book, written by leading scientists on their respective subjects. The chapters are well supplied with clear illustrations, photographs, tables, and an extended, up-to-date list of complete references.

On the whole this book is an important source of information on the functioning of various plant characteristics in general and plant genetic manipulation in particular. Therefore, the book will maintain its stimulating value to a great degree to researchers and practitioners in the field of plant genetic manipulation for a long time.

L. J. W. Gilissen, Wageningen

Boehme, H.; Mettin, D.; Mueller-Stoll, W. R.; Muentz, K.; Rieger, R.; Rieth, A.; Scholz, F. (eds.): Die Kulturpflanze. Mitteilungen aus dem Institut für Genetik und Kulturpflanzenforschung Gatersleben der Akademie der Wissenschaften, Berlin. Vol. 38. Berlin: Akademie-Verlag 1990. 507 pp., 63 figs., 17 tabs.

This latest volume of this series is for a large part devoted to the founder and former director of the East German Institute of Cultivated Plant Research, the late Hans Stubbe, who passed away on October 11, 1989. Between 1946 and 1973 he was also the managing editor of TAG and MGG. Although most of his scientific publications were published in his mother tongue, German, he became internationally recognized after his lecture at the 24th Cold Spring Harbor Symposium in 1959 and with the English translation of his "History of Genetics till the Re-discovery of the Rules of Gregor Mendel" (1963). There is no doubt at all that he was an eminent scientist who set the foundation for mutation genetics in *Antirrhinum*. One of his special qualities was his resistance of the monopoly of Lyssenko-Mitschurinism during the 1950s. Lyssenko-Mitschurinism was a sort of pseudo-genetics, which confounded classical genetics. Stubbe was the recognized organizer of fundamental genetic research in the now defunct communist state of the former German Democratic Republic. As a convinced socialist he made no concessions to human values. All this is expressed in the three obituaries and remembrances by D. Mettin, H. Dathe, and H. Boehme, and the three scientific lectures given during the commemoration ceremony for Hans Stubbe, on molecular regulation of photosynthesis, chemical mutagenesis, and gene transfer in hexaploid wheat. In addition, this last volume of the series founded by Stubbe contains two more reviews – on the autocatalytic RNA replication of viruses for the improvement of foreign gene expression and on the Gatersleben *Antirrhinum* collection. The majority of the other 11 original papers and documentations come from K. Hammer and his collaborators and concern a survey of the Gatersleben *Brassica* collection and reports on collecting trips in Georgia, Korea, Italy, Tadzhikistan, and of course, Cuba. Most interesting is the bibliography on patent applications that was published by the German patent offices in 1989 concerning plants, horticulture, plant cell or tissues, and genetic engineering. Interested readers can ask for a copy on a floppy disk.

H. F. Linskens, Nijmegen