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Book Reviews

Homologous Recombination and Gene Silencing in Plants

Jerzy Paszkowski (ed.).
Kluwer Academic Publishers, Dordrecht, 1994.
xi+385 pp. Hardback, Dfl.275.00; US$162.00;
UK£107.00. ISBN 0-7923-2704-7.

Traditionally, recombination has been studied mainly as an important consequence of meiosis. The use of molecular genetics and transformation has led to an increasing interest in recombination in somatic cells. The importance of recombination comes not only from the interest in the process itself, which became amenable to analysis with molecular techniques, but also from the applied point of view. The integration of transgenes in the recipient genome either at apparently random sites or at homologous DNA sequences allows the analysis of gene function by insertion mutagenesis and gene replacement. Transgenic plants, furthermore, led to unexpected findings such as gene silencing etc.

This multi-author book, written by the leading groups in this field, gives an excellent overview of this relatively new topic in plant biology. As stated by the editor, despite the rapid development in this field, final answers are often not provided. This book therefore serves as a basis for much exciting research to come. The discussion of the (often still hypothetical) mechanisms, together with good cross-references to work in non-plant organisms, mean that the book is extremely valuable for this purpose.

The first three chapters deal with recombination of different types of viruses. Chapters 4 and 5 discuss recombination of mitochondrial and chloroplasts genomes. The central part of the book (chapters 6–11) describes the state of the art with respect to recombination in somatic plant cells, which includes intra- and extra-chromosomal recombination, the mechanism of T-DNA integration, gene replacement and site-specific recombination (e.g. the use of the cre/lox system in plants). The last four chapters deal with gene silencing, especially of transgenes, but also of transposable elements. These chapters, with their attempts to explain the observations, provide much more than just a description of the phenomena, which were discovered only recently.

One critical comment that can be made is that the book lacks a short introduction linking the various chapters and providing a perspective on this relatively new field of plant biology. Such an introduction could have given the reason for the absence of meiotic recombination. An attempt at this can only be found in the middle of the book, in the introduction part of chapter 6. However, the very limited overlap, even between related chapters, the almost complete coverage of the field of somatic recombination and gene silencing, together with the choice of the best authors in these fields indicate that the editor, Dr Paszkowski, did an excellent job.

M. KOORNNEEF

Environment and Plant Metabolism: Flexibility and Acclimation

N. Smirnoff (ed.).
BIOS Scientific Publishers Ltd, Oxford, 1995.
xvi+270 pp. Hardback, UK£60.00; US$120.00.
ISBN 1-872748-93-7.

This book is based on presentations at the Annual Meeting of the Society for Experimental Biology held at the University of Wales in April 1994. It is a worthy addition to the publisher's well-established 'Environmental Plant Biology Series'. The book deals with the molecular and cellular aspects of the ability of plants to respond rapidly to changing environments by modification of gene expression. Topics which are addressed are the interaction between carbon and nitrogen assimilation, the control of malate synthesis in CAM plants and guard cells in relation to changing light and temperature, the effects of temperature on metabolic rates, the response to shortages of phosphate and oxygen in relation to energy production, responses to water deficit, drought, salinity and oxidative stress. Some recurrent themes are the variability of primary metabolism and its control in relation to environmental fluctuations, and the prospects of metabolic engineering. Given the enormous potential generated by the molecular biological approach to manipulate plants with the aim of improving its performance and yield (for example, the selection of mutant or transgenic plants with altered regulatory properties), the understanding of how plants during evolution have learned to cope naturally with the changing environment is most useful. 'Further tinkering (might) have little effect or could even be deleterious'. Thus, a deeper knowledge of plant metabolism and its relation to the environment is a prerequisite to further thinking of practical applications. By setting this stage, the book will primarily be of interest to molecular biologists and biochemists.

H. VAN DEN ENDE

Plant Cell Culture: A Practical Approach

R.A. Dixon and R.A. Gonzales (eds).
Oxford University Press, Oxford, 1994. xx+230 pp.
Paperback, UK£3.00. ISBN 0-19-963402-5.

This book is one of the three volumes of the vast *Practical Approach* series dealing specifically with

plants. It was published in 1985 and updated in 1993. Plant tissue culture is now routinely used in fundamental research and in practice. With respect to the latter, its major applications are in vegetative propagation, elimination of diseases, and breeding. As other volumes in the *Practical Approach* series deal with recombinant DNA-techniques, the editors have rightly left out this subject matter. The book contains sections on medium preparation, explant sterilization, maintenance of callus and suspension cultures, protoplasts, cell selection, somatic embryogenesis, micropropagation, virus elimination, cryopreservation, secondary metabolites and bioreactors. On all these topics, the book contains a wealth of valuable information. In particular, the many step-by-step protocols for the well-established systems are useful. These detailed descriptions will help researchers to develop optimal protocols for the species of their interest. However, the choice of the topics and the length of presentation of the various topics are often not balanced. Cell selection and production of secondary metabolites are dealt with at great length. Haploid induction, for example, has been completely omitted, and micropropagation is only treated briefly in a chapter of 8 pages. There is no special section on shoot regeneration, even though poor adventitious shoot formation is one of the major stumbling blocks in broad application of genetic engineering techniques. Well-recognized problems such as somaclonal variation, vitrification and contamination are not, or only very briefly dealt with. There are also many 'minor' omissions. Agar, for example, is treated as if it is only an inert gelling agent, whereas it is well known that it contains many compounds that affect plant development and that, in fact, the brand of agar often determines the outcome of tissue culture procedure. Thermolability of growth regulators has been indicated, but in such a way that it is difficult to find. The book would also have been more valuable when every chapter had references to relevant reviews and key papers.

Of course plant tissue culture is a very broad area and it is obvious that one book cannot possibly contain all the relevant information. Readers and users should not expect all their questions to be dealt with and, as noted before, many main themes are not discussed at all, or only briefly. However, the book contains valuable information on many selected topics.

G.J. DE KLERK

Plant Physiology

H. Mohr and P. Schopfer.
Springer Verlag, Berlin, 1995. 629 pp.
Hardback, DM98.00; ÖS764.40; SFr94.50.
ISBN 3-540-58016-6.

This is the English translation of the fourth edition of Mohr & Schopfer's textbook. While it is a well-established masterpiece, available on the shelves of every self-respecting botanical institution, I wish to devote some words to its qualities in the perspective of present-day university teaching. It starts almost apologetically: 'Successes in biochemistry and molecular biology have significantly reduced the confidence of the physiologist ...' and it continues by analysing the position of modern-day physiology. Its task is to analyse the organized complexity of the organism based on the multiplicity of interactions of a large number of components which makes it a self-maintaining and adaptable system. Physiology thus is the science of regulatory and control processes. 'The art of designing suitable experiments on intact organisms, that is to say with complete retention of the "organised complexity" remains the basis of experimental biology'. This art is described extensively, in considerable depth, and sometimes in great detail. It is a compact work, with an incredible wealth of information on all major issues in plant physiology, written with great authority. The text is supported by abundant illustrations with experimental material derived from the original literature, with clear explanations and interpretations in the legends, and provided with numerous cross-references. One may wonder if it is not too comprehensive for use in present-day teaching, where plant physiology is only a part of a wide (and superficial) curriculum. I think this is true for students in their first years, but once dedicated to this discipline, they will miss a lot without this book. There are also drawbacks: for example, the cytoskeleton is given very little attention, and I found the chapter on phloem transport confusing and contrasting with the rigorous treatment of water and energy relations elsewhere. A major disadvantage, in view of its use as a student text, is the lack of emphasis on the molecular approaches to study the control of metabolism and development. After all, many of the long-standing problems in plant physiology have been, or are being solved via the isolation, characterization and manipulation of genes. The progress achieved by these approaches is so impressive that it deserves more emphasis. Nonetheless, it is a great text, and its price should by no means inhibit its purchase.

H. VAN DEN ENDE

Exkursionsflora für Kreta + Begleittext

R. Jahn and P. Schönfelder.
Verlag Eugen Ulmer, Stuttgart, 1995. 446 pp. + 101 Farbabb + 7 S/W-Abb. Hardback, DM68.00; ÖS531.00; SFr65.00. ISBN 3-8001-3478-0.

Due to its geographical position and the presence of large mountain chains in different parts of the

country, large variations in climate types are found in Greece. As a result, its flora is extremely rich and comprises a mixture of *c.* 6000 species with Central European, mediterranean or oriental distribution patterns in a relatively small area. In particular, in the more isolated areas, like Crete and the Peloponnese, a vast number of endemics is found.

For the foreign visitor with a slightly more than superficial interest in flora and vegetation, this presents a problem: there is no easy way to identify plant species with certainty. A number of popular field guides have been published, but these are somewhat incomplete and, as a rule, only cover the more showy plant species. With the voluminous *Flora Hellenica* in preparation, less haphazard determinations can only be made by large-scale floras like the *Flora Europaea* or the not always accurate *Flora of Turkey and the East-Aegean Isles*. These have the main disadvantage of exceeding the carrying capacity of the unsuspecting traveller, both in a literal and in a financial sense.

For Crete and the island group around Karpathos, which falls in the same floral district, this gap has been filled by this manageable and modestly priced flora in German. In the first part of this hardback a short introduction is given on climate, geology and soil types. An elementary survey is added on vegetation types, necessarily short because in Greece these have not yet been studied in great detail. Apart from this, a global overview is given on the floral composition of the areas covered. The larger part of the book consists of the description of 1877 species reported from this district, including a long list of introduced and naturalized weeds, and some more or less naturalized ornamentals. Identification of plant species is achieved by clear keys to the families, genera and (sub)species, based on reliable characteristics. As far as I can judge, the species list is close to completeness. The species descriptions are clear and concise, and contain details on geographic distribution patterns within and outside the described region, and their occurrence in relation to altitude and habitat type. The nomenclature is up to date, in my view perhaps too much so in the case of the orchid family. Especially within the genus *Ophrys* a very narrow and disputable species concept is adopted, and a number of recently discovered forms lacking a proper formal description has been distinguished at the species level.

Of 101 species which are endemic or highly characteristic for the region clear colour photographs are included; to my regret, line drawings of the remaining species are lacking.

For the islands of Crete and Karpathos this is an excellent guide for anyone with a more serious botanical interest; with some caution it will also be useful on nearby island groups, such as the Cyclades and the southern Dodekanese. I hope the example for this relatively well studied area will be followed by similar floras for the other regions.

E. Dijk

Plant Lipid Metabolism

Jean-Claude Kader and Paul Mazliak (eds). Kluwer Academic Publishers, Dordrecht, 1995. xvii+588 pp. Hardback, Dfl.365.00; US$241.00; UK£109,00. ISBN 0-7923-3250-4.

It is not often that a book reviewer can freely admit that he hasn't studiously read every page of the book he's reviewing, but this is such a case. Despite the title (*Plant Lipid Metabolism*) and size (576 pages), this is not a comprehensive review of topics in plant lipidology. It is a collection of papers, divided into six sections (fatty acid synthesis; membranes; lipid oxidation and degradation; isoprenoids; lipids and environment; oil seed and gene technology), presented at the 11th International Meeting on Plant Lipids held in Paris at the end of June 1994. As such, it is not meant to be read from cover to cover but rather to be used as a reference book that covers the major topics of current plant lipid research. It can also be used as a springboard into the literature on practically every aspect of plant lipid biochemistry. To appreciate just how many subjects are covered, you should realize that there are 162 separate contributions. This means that each is composed, on average, of 3·5 pages including references. In other words, very many subjects are superficially covered and only a minority of somewhat longer articles attempt to review the related literature. Thus, although the average number of references per article is 8, the vast majority of contributions only provide between 2 and 7. This is because most are just a summary of the results from one aspect of their authors' research presented in poster-style that usually includes at least one figure or diagram. As a consequence, the book is a 'who's who' of plant lipidology coupled to tea-cup-sized summaries of what they've all been doing recently. While these snippets of information help the digestibility, they also frustrate when a tasty subject stops just as your appetite was whetted. That's when you have to delve into the references provided. Nonetheless, the general style of the book leaves one with the impression that it is not much more than an expensive, illustrated book of congress abstracts. That in itself would be useful if the book was truly a complete 'who's who', but in seeking papers on lipid-based signalling systems (the reason I offered to review the book), it soon became obvious that too many of the best groups in this field were noticeable by their absence. Thus, in conclusion, this is a specialist's book and if you're one of them, you'll already have it and if you haven't got it, you

probably don't need it because the next congress will make it obsolete.

In my opinion, congress organizers should not be encouraged to relive their meetings in book form, I would much rather see the highlights presented as a meeting report in an appropriate journal very soon after the congress has taken place.

A. MUSGRAVE

Progress in Botany, Vol. 56

H.-D. Behnke, U. Lüttge, K. Esser, J.W. Kadereit and M. Runge (eds).
Springer-Verlag, Berlin, Heidelberg, New York, 1995. xviii+490 pp. Hardback, DM298.00; ÖS2324.40; sFr281.00. ISBN 3-540-58407-2.

I have reviewed the last two volumes of this series in *Acta Botanica Neerlandica* **43**,(pp. 88 and 404), where I have sketched the history of *Progress in Botany* and commented on the persistent value of the format that combines review with literature survey, even at a time when electronic access to the literature is generally available. The present volume maintains the high standard of the series. Volume 56 contains a special review on Stable Isotopes in Plant Physiology and Ecology by Hubert Ziegler, long-time contributor and editor of *Progress*, to whom volume 55 was dedicated, and 20 regular review chapters in six sections: Structural Botany (2 chapters), Physiology (7), Genetics (5), Taxonomy (2), Geobotany (2) and 'Special Topics' (i.e. Mycorrhiza, 2 chapters). The chapters in volume 56 include updates of topics from volumes 54 and 55, special chapters by regular reviewers and contributions by reviewers recruited here for the first time. This mixture guarantees a surprisingly balanced coverage of the entire field of botany. The most recent five volumes of *Progress* have been convenient and reliable guides to the existing knowledge and research emphasis in most major areas of botany. I have mentioned earlier that it pays to read the Table of Contents in its entirety, because the allocation of sections and chapters is mostly historically and practically determined. There is no section on Ecology, but the special review and at least six chapters in the sections on Physiology, Geobotany and Special Topics are essentially ecological. As usual, the chapters are very concise, and it is admirable how the authors indicate the cardinal features of each cited publication with a few words so that one knows precisely what to look up even though the citations do not include the titles of articles.

KONRAD BACHMANN

