

## Book Reviews

### **Atlas of Sexual Reproduction in Flowering Plants**

M. Cresti, S. Blackmore and J.L. van Went  
Springer Verlag, Berlin, Heidelberg. 1992.  
xii + 249 pp. Hard cover, DM 148.00. ISBN  
3-540-54904-8.

Nowadays even the titles of scientific books are too ambitious and often promise more than their contents show. This is also the case with this atlas. It deals with the basic processes of sexual reproduction at the microscopic level and is focused on meiosis, gametogenesis and fertilization, not with other aspects of sexual reproduction such as flower pollination, seed development and dispersal or germination.

The book is best described as a plant embryological atlas illustrating processes up to and including gametic fusion. It contains an excellent collection of light microscopic, scanning- and transmission electron microscopic photographs of a high quality made available by a number of plant embryologists working in European laboratories. The book is divided into three parts, anther development, pistil development and progamic phase and fertilization. Each part has a short introduction and a limited number of references. The (about 240) photographs are mounted in 101 thoroughly labelled plates. About half of the photographs have been published in scientific journals before, the other half are original. There is a beautiful series of photomicrographs illustrating the subsequent developmental stages of micro- and megasporo- and gametogenesis, pollen germination and pollen tube growth and of different components of the mature embryo sac. Although *Impatiens*, *Nicotiana*, *Spinacia* and *Brassica* are well represented, the photomicrographs have been made of a larger number of plant species. The legends, printed on the left-hand pages, are concise, widely spaced and most of them are provided with outline drawings indicating the position of the photographed parts in the reproductive organs. Not much attention has been given to the variability in structures. Neither the different types of thickenings of the endothecium, functioning in anther dehiscence, nor various ovule and embryo sac types are illustrated or mentioned. The descriptions of the tenuinucellate and crassinucellate types of ovules are inadequate.

The value of the book lies in the plates. It is the most complete set of illustrations on the subject published so far and it would have required a range of separate papers to acquire comparable information. The atlas enables students in plant embryology to become acquainted with structural aspects at the anatomical, cellular and subcellular level and to

learn to interpret structures only made visible by microscopes.

F. BOUMAN

### **A Guide to Temperate Mycomycetes. An English Translation [of 'De Nederlandse Myxomyceten'] by A. Feest and Y.**

#### **Burggraaf**

N.E. Nannenga-Bremekamp  
Biopress Limited, Bristol. 1991. [6+] 409 pp.  
Paperback, £60.00. ISBN 0-948737-12-3.

The original work was very well received when it appeared in 1974 (review by Sobels, J.C. (1977): *Acta Bot. Neerl.* 26: 96). The intrinsic qualities of the book have not changed and therefore will not be dealt with here.

In the translated edition the introductory chapter has been somewhat condensed by leaving out some topics and by more efficient wording. Nomenclature has been brought up to date and the number of treated species has increased. Criteria for inclusion of species remain unclear. In her preface the author only mentions a few examples of the species recorded since 1983, and she does not specify which of these have been incorporated in the keys. One would expect to find the species that were excluded from the keys in the much enlarged Appendix 2 ('species not included for full description in this book') but *Diderma echinosporum*, for instance, is missing in both. This makes it difficult to assess the coverage of the new edition.

The author states in her preface that 'the English title is somewhat misleading'. The editorial change from 'Dutch' to 'temperate' for organisms with wide, even cosmopolitan distributions, is not particularly helpful, and it might have been wiser to add an explanatory subtitle. The 1977 review called for a translation of this book, and here it is. The translators must have had a hard time finding exact equivalents for a host of subtle descriptive terms for colour shade and shape, and they did their job well; however, by trying to follow the original Dutch text as closely as possible they had to sacrifice some of the easy-to-read style of the original.

The translated version has also undergone some editorial changes, not always improvements. It is understandable that chapters with a relatively low information content, such as the explanation of abbreviations of literature references and the traditional list of authors' names, were considered redundant; this can also be defended for the vouchering of

the specimens from which the text figures were drawn, even though the legends of plates containing such data have remained unchanged. Leaving out the original preface, however, in which the aim and contents are explained in a very personal way, and also the acknowledgements, has removed much of the personal charm of the original. A really unfortunate feature is the removal of the reference list, while references made to it are maintained in the translated text [e.g. p. 326 'B. Ing (1968, 12)'].

The original edition is a beautiful book and a pleasure to read due to careful editing and a well-balanced page design. The use of too much bold face in the present edition is no improvement. The print transgresses the limits of the type page in all directions and frequently moves into margins which are very narrow to begin with. This has results such as a scale bar moved so far sideways into the gutter that it has disappeared into the glue (p. 329), a figure that has partly fallen over the edge (p. 173) or a page so filled with text that top and bottom margins are reduced to 1 mm and there is no space for the page number (p. 265).

In their preface the translators allude to the frustration of those who could only study the illustrations and not the text of the Dutch edition. These readers should cherish their original editions. The text figures have suffered severely from being copied over. There is a general loss of detail, the light parts are too light and the dark parts too dark. The plates illustrating spores have unnecessarily been reduced to as much as 75%. The originals were delicate pencil drawings. In some of these figures, only the legend and the number on the plate are visible, while the figure itself does not show.

A. ELLIS-ADAM

### **Inducible Plant Proteins. Their Biochemistry and Molecular Biology**

J.L. Wray (ed.)

Cambridge University Press, Cambridge. 1992.

xiii + 309 pp. Hard cover. £45.00; US\$89.95. ISBN 0-521-40170-4.

Plants continuously adjust growth and metabolism according to endogenous and environmental signals. Gene expression is altered in temporal and organ-specific manners, leading to the induction of proteins specific to developmental processes and cellular metabolic pathways. This timely volume discusses the role that inducible proteins play in cellular adaptation and the approaches being used to delineate the underlying molecular events which lead to their synthesis.

Proteins are essential to all life processes and all have to be induced at one stage or another. The book

reflects the state of the art in that those responses and pathways are reviewed in which research has progressed into the molecular analysis of gene expression, the identification and characterization of transacting transcription factors, and the exploitation of pathway mutants. These tools are instrumental in finally elucidating the signal-transduction pathways which lead from the perception of the signals to increased mRNA levels and, hence, increased protein synthesis. The book effectively deals with all the strategies that are currently being used, from protein purification up to the molecular dissection of gene-regulatory mechanisms. The topics discussed comprise enzymes regulated by nutrient availability or light, CAM metabolism and hormone-responsive gene expression, as well as proteins induced by heat or cold, anaerobiosis, microbial symbiosis and pathogen attack. Research on those topics has progressed to various depths and this is well reflected in the different angles of incidence taken by the authors, all experts in their fields, even though different contributions differ greatly in detail. Thus, effects of light are only dealt with in connection with transcription factors interacting with the light-regulated promoter of a gene coding for the small subunit of RUBISCO, and the remarkable set of proteins induced in leaves and seed embryos during drought and desiccation is mentioned only briefly in relation to cold-inducible proteins. In metabolic and developmental adaptive pathways, rate-limiting enzymes have been most intensively studied and, consequently, their protein properties and gene regulation receive most attention. In responses to stress conditions many proteins, with largely unknown functions, are collectively induced and the emphasis here is primarily on the common genetic elements responsible for their induction. Most interesting are those contributions in which exogenous signals and endogenous developmental programmes are seen to interact at the level of gene expression, and the resulting complexity, most often evident through the occurrence of multiple isoenzymes, which apparently help to optimize plant responses. This makes the volume of interest to a wide readership, from ecologists interested in understanding how the environment influences key regulatory factors in cellular metabolism, to molecular biologists aiming to elucidate the significance of stress-induced alterations in gene expression and their phenotypic consequences. Not only will manipulation of plant responses by genetic modification contribute significantly to our understanding of the molecular mechanisms underlying the control of gene expression, it will also provide deeper insights into plant acclimation and aid in the novel design of agronomically important genetic traits.

L.C. VAN LOON

### **Pests and Pathogens: Plant Responses to Foliar Attack**

P.G. Ayres (ed.)

Bios Scientific Publishers Ltd., Oxford. 1992.  
xii + 203 pp. Hardback. £40.00. ISBN  
1-872748-01-5.

This book contains twelve contributions to a meeting held in 1992 at the University of Lancaster and devoted to plant responses to pests and pathogens. As stated in the preface, the object of the meeting was to explore the extent to which responses to pests and pathogens are the same and thereby to facilitate cross-boundary thinking and progress in research. These proceedings largely succeed in conveying the message that much can be learned about how plants react to biotic stress factors when plant pathologists studying pathogen attack and plant ecologists and entomologists studying insect pests compare effects on plant growth and defense responses. As is made clear, plants often use similar strategies to cope with infection and attack. This is the more relevant because plants in the field are often assailed simultaneously by both pests and pathogens.

Loss of photosynthetic activity through defoliation or fungal interference and its metabolic and developmental consequences emerge as a central theme of the book. Constitutive defense mechanisms and the role of secondary plant substances are discussed as being directed not only against vertebrate and invertebrate herbivores, but also as being adapted from the regulation of metabolic systems in conjunction with primary metabolism. On the other hand, induced mechanisms allow plants to respond and to divert metabolism only when biotic stress is encountered. These responses depend on the generation of wound- or elicitor-induced signals leading to the synthesis of phytoalexins and novel proteins with anti-pathogenic and cell-wall reinforcing activities. In these contributions also it appears that genes regulating basic developmental processes have been modified to control responses to biotic stresses. The chapters are all short critical reviews of the state of the art with emphasis on physiological and biochemical effects at the level of the whole plant, including their consequences for crop growth. Approaches include a number of modelling studies carried out in order to define relevant physiological parameters, such as the quantitative importance of various injurious factors on photosynthesis, growth rate and yield of field crops. Less attention is paid to the rapidly growing body of data pertaining to alterations at the cellular and molecular level. In particular, molecular techniques have the potential to unravel the genetic and biochemical basis of the common reactions of plants to injury by pests, pathogens and abiotic factors and to allow deeper

insight into the evolutionary constraints of such interactions. The current book can serve as a useful introduction to a further meeting devoted to this topic.

L.C. VAN LOON

### **Phytochemical Resources for Medicine and Agriculture**

H.N. Nigg and D. Siegler (eds)

Plenum Press, New York, London. 1992.  
viii + 445 pp. Hardback. ISBN 0-306-44245-0.

In the past few years interest in natural products as a source of new biologically active compounds (e.g. drugs and crop protectants) has rapidly increased, at least partly stimulated by the finding of important new drugs such as taxol and artemisinin and a crop protectant such as azadirachtin. A symposium on 'Plant chemicals useful to humans' organized in 1989 at the American Chemical Society meeting resulted in the present book. This meeting was organized by economic botanists and food chemists, and consequently a considerable part of the book deals with various secondary metabolites in food plants and their possible biological activities, including possible toxic effects. In fact the chapters dealing with medicinal use of natural products are the least original. The first chapter devoted to this subject is more or less a condensed pharmacognosy text, although the table presented is not complete, e.g. compounds like ajmalicine, artemisinin and emetine are missing. The second chapter on this subject deals with recently discovered biologically active compounds. This information can be found in many recent reviews. On the other hand there are some interesting topics, such as that on plant products used in mummification, which reviews knowledge of the plants that the Egyptians used for this purpose. On the use of natural products as stupeficients, only that as a natural amphetamine-like drug, is reviewed in a separate chapter. Separate chapters deal with specific types of natural product activity: antiparasitic, antifungal, nematocidal, herbicidal and insecticidal. One chapter is devoted to natural toxicants in food. The concluding chapter speculates about the future role of natural products. With the recognition that interdisciplinary research is necessary in the field of natural products and the increasing interest from US funding agencies for such research, the authors expect a bright future for natural products. In fact this book nicely shows the present importance, the width of ongoing research and the potential future benefits of natural products.

The layout is excellent, only the figures are a point for criticism. The quality of the structural drawings differs considerably between the chapters. Moreover,

the way in which the structures are presented is not consistent, e.g. the structure of quinine is presented in three different ways. As so often, also in this book the confusion of atropine (the racemic mixture of *l*- and *d*-hyoscyamine) and hyoscyamine is found, even resulting in a wrong structure for atropine (p. 53).

The editors wished to make this book into an introductory text for courses. To some extent they were successful. Giving all structural formulae of compounds mentioned is very useful. On the other hand too many areas of natural products are not dealt with (e.g. flavours, fragrances, dyes, pheromones) to make this book the basis of a complete course in natural products. It is a useful reference book.

R. VERPOORTE

### Fungi in Vegetation Science

W. Winterhoff (ed.)

Kluwer Academic Publishers, Dordrecht. 1992.  
ix + 258 pp. Hardback. Dfl185.00; US\$109.00;  
£62.50. ISBN 0-7923-1674-6.

Fungal communities are often treated as myco-coenoses separately from phytocoenoses, although the heterotrophic nature of fungi makes them dependent on autotrophic plants, either directly (parasites, mycorrhiza) or indirectly (litter decomposers). Fortunately, this book tries to link both groups.

Due to the difficulty of recognizing microfungi in the field, the authors of six of the eight chapters concentrate on aspects of macrofungi. After a short introduction by Winterhoff, Arnolds presents a well-written and well-documented analysis of methodological aspects of the study and classification of macrofungal communities, emphasizing the annual fluctuation of carpophore productivity and its consequences for the species inventory of macrofungal communities. His recommendation of a stronger emphasis on niche-substrate relationships will certainly stimulate vegetation scientists and ecologists. The two chapters on macrofungi in deciduous (Bujakiewicz) and coniferous forests (Kost) are restricted to the enumeration of macrofungi in several forest ecosystems, without relating them to their ecological impacts on forest processes (cf. M.F. Allen (1991): *The Ecology of Mycorrhizae*. Cambridge University Press). In the review on macrofungal communities in non-forest vegetation, Arnolds gives a stimulating treatise on the relationships between macrofungal coenoses and environmental conditions. Lisiewska narrows this approach to several specific substrates: wood, burnt organic matter, dung, arthropods and mosses. Unfortunately this chapter insufficiently includes the progress, made in the ecology of coprophilous fungi during the past decades.

Referring to microfungi, Gams gives an excellent review of saprophytic microfungi in soil, elaborating the broad ecological spectra of common soil fungi around the world and their impact on modifying their own substrate. The final chapter on communities of parasitic fungi by Hirsch and Braun is once more very descriptive, and does not link modern plant biochemistry with fungal infection and the understanding of specific relations between hosts and parasites.

Despite the discrepancy between the descriptive and ecologically causal chapters, the book gives a good impression of the state of the art. The only aspect I missed was the incorporation of myxomycetes: their occurrence in various vegetation types and their relation to certain substrates is sufficiently known (cf. Nannenga-Bremekamp, N.E. (1974): *De Nederlandse Myxomyceten*. Thieme & Cie, Zutphen; see review of English translation this issue). Perhaps owing to the envisioned readership, the index contains a lot of plant associations, but it is less explicit in ecological keywords. Nevertheless I hope that the book will receive attention not only from mycologists, but especially from plant ecologists and general botanists. Macro- and microfungi will certainly contribute to a better understanding of the biodiversity of ecosystems.

W.H.O. ERNST

### The Daily Growth Cycle of Phytoplankton

T. Berman, H.J. Gons and L.R. Mur (eds)  
Kluwer Academic Publishers, Dordrecht. 1992.  
x + 202 pp. Hardback. Dfl200.00; US\$120.00;  
£67.50. ISBN 0-7923-1907-9.

This book, reprinted from the journal *Hydrobiologia* (1992): 238, presents material from the Fifth GAP International Workshop (GAP=Group of Aquatic Primary Productivity), which was held in April 1990 at Breukelen in The Netherlands.

GAP Workshops bring together a diverse group of scientists interested in many aspects of aquatic primary productivity and the programmes are designed to promote the sharing of expertise through joint experimental work.

The theme of the Fifth Workshop was 'The daily growth cycle of phototrophic microorganisms.' Participants were able to exploit continuous cultures of selected algal species and facilities for the study of phytoplankton communities in two 'natural' systems: the very shallow, eutrophic Lake Loosdrecht and the relatively deep, oligomesotrophic Lake Maarsseveen. Special facilities included a custom-made flow cytometer, labelled silicon uptake and laboratory scale enclosures of lake water. This gave the participants

the ability to compare and test methods, instrumentation and experimental approaches in a variety of aquatic settings.

Part One of the book contains the Keynote Lectures 'Diel periodicity in phytoplankton productivity' by B.B. Prézelin and 'The daily pattern of nitrogen uptake by phytoplankton in dynamic mixed layer environments' by W.F. Vincent.

In Part Two, nine papers present the results of the experiments produced by the twenty-six participants during the workshop. Finally, nine contributed papers dealing with aspects of cell cycle and primary productivity, presented at the workshop as posters, constitute Part Three of the book.

The two Keynote Lectures in Part One, dealing with the time course of photosynthesis and respiration and interaction of the physical environment and daily growth cycle, give a good overall background for the proceedings. The most interesting papers in this book, however, are found in Parts Two and Three, especially those presenting data obtained with flow cytometry and laboratory scale enclosures. Balfoort *et al.* report in 'Flow cytometry: instrumentation and application in phytoplankton research' on the identification of phytoplankton and indicate an area where flow cytometry may supersede more conventional techniques: the analysis of morphological and physiological characteristics of subpopulations in phytoplankton samples. In three papers written by Gons *et al.*, Kromkamp *et al.* and Rijkeboer *et al.*, data are presented which were obtained in laboratory scale enclosures (LSE). In the case of very shallow lakes the LSE may represent an alternative to the 'classic' incubator and can overcome errors which may arise when the spectral irradiance does not match the underwater light *in situ*.

It may be concluded that this book contains much valuable information and can be recommended to all concerned with aquatic research.

E. VAN DONK

### **Fens and Bogs in The Netherlands: Vegetation, History, Nutrient Dynamics and Conservation**

J.T.A. Verhoeven (ed.)

Kluwer Academic Publishers, Dordrecht. 1992.  
vii+490 pp. Hardback, Dfl390.00; US\$239.00;  
£135.50. ISBN 0-7923-1387-9.

This book comprises nine substantive chapters and focuses on the geology, palaeoecology, land use history, ecology and conservation of peatlands (fens and bogs) in The Netherlands. The first three chapters deal with the historical aspects. Pons gives a comprehensive and very valuable review chapter on peat formation in space and time in the Western

Coastal Plain. The chapter may even be too detailed for those who are not familiar with the Dutch geography.

Casparie and Streefkerk pay much attention to the analysis of peat growth mechanisms and hydrological changes in the course of mire development. In a case study they interpret the various stages of development from fen to bog of a mire area in the north-eastern part of The Netherlands. In a chapter on prehistoric and medieval peat exploration presented by Borger, salt-making, digging for fuel, drainage, reclamation and the management activities which resulted in the present artificial landscape are described and discussed. In a chapter based on almost thirty years of study, the late Professor Barkman discusses the plant communities, the synecology and the succession of bogs and heath pools in The Netherlands and north-western Germany. There are two chapters by den Held, Schmitz and Van Wirdum on terrestrializing fen vegetation types in abandoned turbaries. The first chapter gives a classification based on a data set of relevés from fresh water and brackish water areas. Their classification will be a useful tool for nature conservancy policies, such as succession control and restoration of threatened vegetation types. Unfortunately succession diagrams and a more extensive description of vegetation management per type are missing in this chapter. The second chapter focuses on the fen system, rather than the fen vegetation, and includes sections on succession, geological and historical factors, management, and also on the very important ecohydrological factors governing terrestrialization. With the description of the bulrush seres, the authors describe a unique and still existing succession sere of brackish fens. In a chapter on carr vegetation Wiegers concentrates on the synsystematic position and classification of woodlands in fen areas and characterizes the different types by means of ecological indicator values. Koerselman and Verhoeven have studied the differences in nutrient dynamics among mires and they discuss the results of their own studies in Dutch mires in the context of mire studies in other parts of the world. Conservation and management of bog and fen reserves in The Netherlands is the subject of the last chapter by Vermeer and Joosten.

By his choice of co-authors the editor of this book has created a volume that is an excellent sampling of the current 'state of the art' in the research of fens and bogs. The book covers an enormous number of research results and part of the information, until recently, could only be found in internal reports. There are a few editing and translation mistakes. Cross-references between chapters often refer to 1991 instead of 1992.

This excellent multidisciplinary book gives an interesting picture of studies that have been carried

out in Dutch mires over the past 25 years. It is a necessary (but rather expensive) purchase for all those (students and professionals) who have an interest in fens and bogs.

B. VAN GEEL and R. VAN'T VEER

### **Molecular Plant Pathology—A Practical Approach. Volume II**

S.J. Gurr, M.J. McPherson and D.J. Bowles (eds)  
Oxford University Press, Oxford. 1992.  
xxiii + 304 pp. Paperback. ISBN 0-19-963351-7.

This book is the second volume of *Molecular Plant Pathology* within the 'Practical Approach Series'. Volume I contains introductory sections on important plant pathogens including viruses, bacteria, fungi and nematodes. The viruses are treated in three chapters, while the other pathogens are discussed in one chapter each. Volume I also contains a number of chapters describing several recently developed molecular and genetic techniques, including transformation of bacteria and fungi, restriction fragment length polymorphism (RFLP), the polymerase chain reaction (PCR), *in-situ* hybridization, transcriptional regulation of defense genes and gene expression in baculoviruses.

As announced, volume II of this series describes protocols for experiments to study defense responses of plants induced by plant pathogens. However, these responses are not only studied at the molecular level but also at the physiological and biochemical level. Section 1 of volume II contains seven chapters on different aspects of host–defense responses. Most chapters describe in short a particular method or technique, such as the determination of callose, lignin, chitinases, glucanases, and the isolation of intercellular fluid from infected leaves. The chapters on immunolocalization of high molecular weight proteins and carbohydrates, isoflavonoid phytoalexins, and terpenoid phytoalexins give the reader some more background on the subject itself.

Section 2 of this volume deals with inducers of host defense responses, better known as elicitors. This chapter does not give a comprehensive overview of all types of elicitors. Only non-specific cell wall-derived elicitors are discussed in detail. Nothing is mentioned about recent developments in research on avirulence genes and their products, the race-specific elicitors. An additional chapter on bacterial and fungal race-specific elicitors would have given this section a broader perspective. As it is, only oligosaccharide elicitors have been treated, while for race- and cultivar-specificity, proteinaceous elicitors seem to be more relevant than oligosaccharide elicitors. The chapter on xyloglucan oligosaccharides is probably not so relevant for the induction of host defense

responses under natural conditions. If xyloglucan oligosaccharides play a role, their role is probably secondary.

Section 3 deals with signal transduction pathways. The role of calcium and phosphoinositides in signal transduction pathways is described in detail. The reason for including the third chapter, on metabolic changes following infection of leaves by fungi and viruses, in this section is unclear. The importance of signal transduction research for molecular plant pathology is obvious and will grow in the years to come as this field of research is expanding rapidly.

Section 4 contains one extensive chapter on strategies for cloning plant disease resistance genes, one of the most challenging research areas in molecular plant pathology. It gives a clear overview of the state of the art. So far only one disease resistance gene has been successfully cloned, the gene for resistance to *Cochliobolus carbonum*, *Hm1*. This gene encodes a reductase in resistant corn cultivars that inactivates the toxin produced by the pathogen. Although the genetics of resistance genes fitting into gene-for-gene systems have been studied in great detail, the first clone of such a resistance gene still awaits isolation.

It is challenging and difficult to write an up-to-date book on molecular plant pathology. The two volumes in this practical approach series are not comprehensive, but I admit that it is extremely difficult to write a comprehensive review about this topic which has practical implications for modern crop protection and molecular resistance breeding.

Apart from some minor points of criticism, I can highly recommend these two volumes of *Molecular Plant Pathology* to lecturers and graduate students in physiological, biochemical and molecular plant pathology.

P.J.G.M. DE WIT

### **Secondary Metabolites: Their Function and Evolution**

Derek J. Chadwick and Julie Whelan (eds)  
John Wiley & Sons Ltd., Chichester. 1992.  
ix + 318 pp. Hardback. £42.50. ISBN  
0-471-93447-X.

This book contains the proceedings of the 171st CIBA-Symposium in London, 18–20 February 1992. Each chapter gives the text of a lecture followed by a lengthy discussion. Although there is much diversity in opinion on the precise function of secondary metabolites, these compounds are considered by most contributors to be concerned in some way with what is going on outside the producing organism. This is not surprising because most of the producers described are microorganisms and the products that get most attention are antibiotics. The appealing

theme prevalent in the first four chapters is the evolution of secondary pathways. In an introductory chapter Demain explores the field by pointing out the reason why secondary metabolism is receiving much attention nowadays and which phenomena have yet to be explained: the evolution of the biosynthetic routes, of their regulation, and of the resistance mechanism needed for self-protection. Davies *et al.* deal with the evolution of secondary metabolites starting with their potential roles as prebiotic effectors in catalytic RNA reactions. Williams and Maplestone point out how much sophistication has evolved in the fine-tuning of antibiotics to a specific function, and Cavalier-Smith speculates on the origins of secondary metabolites. A more general regulating principle is the relation between differentiation, occurring in the absence of cell division, and secondary metabolism. Ammonium, a medium component that supports growth, suppresses the synthesis of many secondary products. In bacilli, secondary metabolism is related to sporulation, a process that occurs when active growth ceases. As in most other disciplines of biology, the application of molecular biological techniques has provided new insights in areas like the lateral gene transfer from bacteria to fungi, the localization and sometimes clustering of biosynthetic genes on the genome, and the resistance mechanisms in producers and target organisms. The chapter by Cundliffe on self-protection shows that mechanisms as diverse as modification of target RNA molecules and various efflux mechanisms are involved. Most of the other chapters are devoted to case studies describing specific compounds in specific organisms. One chapter deals with marine organisms including algae and animals. There is only one chapter on plants and this is the main shortcoming of the book. The variety in secondary products in plants is much greater than in microorganisms, and plants thus deserve much more attention. The book can be recommended to pharmacognosists and to researchers in the field of secondary metabolites in general.

A.F. CROES

### **Ecological Systems of the Geobiosphere 3. Temperate and Polar Zonobiomes of Northern Eurasia**

H. Walter and S.-W. Breckle  
Springer Verlag, Berlin. 1989. xii+581 pp.  
Illustrated, hard cover. DM298.00. ISBN  
3-540-15029-3.

Volume 3 of the series *Ecological Systems of the Geobiosphere* deals with temperate and polar zonobiomes of northern Eurasia. It is a translation of a book written in German that appeared in 1986. Professor H. Walters' aptitude in Russian together

with his encyclopaedic knowledge of the literature on the geobotany and ecology of eastern Europe and northern Asia makes him the ideal person to mediate across the language barrier facing the geobotanists, actuo- and palaeoecologists in the Western world. An English version of the German edition is therefore very welcome. It provides access to the large amount of Russian literature on ecology and vegetation science that has appeared during the last decade for a larger part of the scientific community. This treatment in one volume, of ecological and vegetation research in an area that reaches from the Atlantic Ocean in the west to the Bering Straits in the east, is a major accomplishment and provides an opportunity to study the imprint of human influence on the vegetation of Europe as compared to less affected Asian regions.

The present volume is well written and translated and the material is presented in a well-structured fashion affording easier access to the original literature compared with former compilations by the same author.

The captions of the figures and the relevant text do not always match and there are occasional misspellings. In a few cases, articles cited in the text cannot be found in the literature list.

In a compilation of research on a large area comprising many biomes one can expect that the level and depth of the ecological research is not the same in the various biomes. However, the present series adequately reflects the present state of the art. This volume is highly recommended for investigators interested in the relation between biosphere, atmosphere and hydrosphere on a global scale in space and time.

L. WIJMSTRA

### **Biology of Plants, 5th Edition**

P.H. Raven, R.F. Evert and S.E. Eichhorn  
Worth Publishers, New York. 1992. xvii+791 pp.  
Illustrated, hard cover. US\$46.95. ISBN  
0-87901-532-2.

Clad in the cover illustrated with Vincent van Gogh's *Undergrowth with Two Figures*, this fifth edition of *Biology of Plants* looks even more attractive than the successful previous editions of this comprehensive textbook of botany for undergraduate students. The text of various parts of the book has been considerably updated and expanded and the illustrative material has been even further improved. In particular, the multicolour life cycles of all major plant groups now constitute perfect teaching aids. Minor imperfections in the fourth edition have been scrupulously corrected. In the preface the authors confess that after exploring in vain the various ways to reduce the

volume of the book 'we felt free to indulge our own strong inclination—to present you with an introductory textbook that we think does justice to the subject'.

This sense of indulgence pervades the entire book and will kindle enthusiasm in teachers and students alike. In each chapter a tremendous amount of factual information is presented in the wider contexts of whole plant biology, evolution, significance of plants for mankind, and other major, captivating themes. The 31 chapters are grouped into six sections: (1) the plant cell—structure and metabolism; (2) genetics and evolution; (3) diversity (the most extensive, 230-page long section which really does justice to the subject); (4) the angiosperm plant body—structure and development; (5) the physiology of seed plants; (6) ecology and the human prospect. If one ever has to argue a case for extending the undergraduate botany curriculum, *Biology of Plants* itself is the most eloquent advocate. However, even for a very limited curriculum the book has great merits because one can use the individual chapters independently for teaching. Once again the authors have succeeded in presenting modern botany in a very inspiring way.

P. BAAS

### **Encyclopaedia of Plant Anatomy XIII, 3—Xerophytes**

A. Fahn and D.F. Cutler  
Gebr. Borntraeger Berlin, Stuttgart. 1992.  
ix+176 pp. Illustrated, hard cover. DM124.00.  
ISBN 3-443-14019-X.

This instalment of the *Encyclopaedia of Plant Anatomy* is a welcome survey of structural adaptations in xerophytic plants, a subject which has fascinated generations of botanists and will continue to do so for many years to come. Although countless publications have appeared on several aspects of this subject, and Napp-Zinn in 1988 very comprehensively treated leaf anatomical adaptations of xerophytes in volume VIII, 2B of this encyclopaedia series, an overall, yet concise survey emphasizing whole plant biology as well as individual anatomical characters was long overdue. The present authors with their respective backgrounds in general plant anatomy and research on desert plants and halophytes from the Middle East, and on xerophytic monocotyledons were well positioned to take on this challenging task.

Following a general introduction on adaptations to drought and on the major arid regions of the world, the main text is organized in two sections. The first is on types of xerophytes with examples of drought escaping plants (ephemerals, with much attention given to their interesting dispersal strate-

gies), and drought resisting plants including drought evading (such as deep rooting plants and geophytes) and drought enduring plants. The second section is on anatomical, adaptive characters of drought resisting plants. The authors rightly stress that of the numerous possible structural adaptations in xerophytes, usually only a few are realized in each individual drought resistant species, and that xeromorphic characters may also occur in mesophytes. The enumeration of anatomical xeromorphic features is understandably biased towards photosynthetic organs but also includes accounts of root and stem anatomy and of wood anatomical character syndromes common in shrubs and trees from arid regions. Adaptations in halophytes are also surveyed. A final, concluding chapter summarizes the remarkable diversity of structural adaptations in xerophytes.

The book gives food for some reflection on the current state of the art in ecological and functional anatomy well over a century after its speculative beginnings. Tremendous progress has been made in understanding the functional significance of for instance structural adaptations in photosynthetic tissues, indumentum and epidermal features thanks to experimental proof or to careful correlation analyses of structural variation with different degrees of water stress. On the other hand, for too many features adaptive interpretations remain as speculative as ever. For instance sclereids, tracheoid idioblasts, plugged stomata, crystals, silica bodies, oil cavities, and oil cells are all quoted as xeromorphic characters, but without data indicating that these features are significantly more common in xerophytes than in mesophytes (they certainly occur in the latter and not just in a few exceptional cases) and without reference to any convincing experimental evidence.

Thus the weaknesses as well as the strengths of modern functional anatomy are exposed in this instalment of the *Encyclopaedia of Plant Anatomy*. It should inspire much integrated anatomical and physiological research into adaptations to water stress. Meanwhile it is an indispensable reference for researchers in these fields as well as an attractive manual for graduate teaching.

P. BAAS

### **Origin and Geography of Cultivated Plants**

N.I. Vavilov  
Translated from the Russian by Doris Löve.  
Cambridge University Press. 1992. xxxiii+498 pp.  
Illustrated, hard cover. GBP 75. ISBN  
0-521-40427-4.

This is an American translation of a Russian book published in 1987, at the centenary of Vavilov's birthday. It contains 23 papers published between



1924 and 1940, one posthumously published paper (1958) and a short letter. More than 100 pages are devoted to a new translation of his classic book of 1926, now under the title 'Centers of origin of cultivated plants', together with the Russian text under the title 'Studies on the origin of cultivated plants'.

The present book does not give the complete collected works and for example the papers (1920, 1922) in which Vavilov's 'law' of homologous series in variation was introduced, are omitted.

Among the most important papers in this anthology are studies on certain regions as centres of origin, written after one or more of his expeditions (Central Asia, Mexico and Central America, Latin America), a treatise on new crops, and two papers on the relation of geographical knowledge of cultivated species and their forms for practical plant breeding.

Although evidently it is a bit repetitive, it is wonderful to read through the book and to see how the concept ('theory') of centres of origin, and the number recognized, developed in Vavilov's mind and writings. It struck me that sometimes the wording in these pioneer papers is quite modern and could have been taken from a recent IBPGR brochure.

It is also interesting to see how Vavilov sometimes blended science with Soviet politics and it is sad to reflect that it did not help to save his life.

Every attentive reader will be able to pick up useful bits of information from these writings although they are more than 50 years old. In particular every economic botanist with a sense of history should end at least one evening going through these papers.

A translator's foreword and a 12 page preface by V.F. Dorofeyev and A.A. Filatenko are added.

C. KALKMAN