

BOOK REVIEWS AND ANNOUNCEMENTS

M. K. HECHT, B. WALLACE & G. T. PRANCE (Eds.): *Evolutionary Biology*, Vol. 20. Plenum Press, New York and London, 1986. XV + 472 pp., ill. Cloth \$ 59.50 ISBN 0-306-42253-0

The twentieth volume of this excellent series is dedicated to the bryologist Dr. William Campbell Steere, one of the founder editors and former co-editor of the series, on the occasion of this eightieth birthday.

The first chapter gives an outline of Dr. Steere's life and outstanding career, including a complete bibliography of his 511 scientific publications, 98 of which were published after this retirement of administration in 1973.

Some other papers in this volume, e.g. on the origin of the tetrapod limb and on developmental evidence for Amphibian origins will not be discussed here. I shall confine myself to some aspects of the second chapter (pages 25-248) by D. E. Giannasi and D. J. Crawford on 'Biochemical Systematics II, a reprise'. Since the publication of Alston's paper on 'Biochemical Systematics' in the first volume of the series 'Evolutionary Biology' in 1967 much progress has been made in this field and the information presented has been gleaned from more than 800 papers. This survey makes convincingly clear that the authors recognize the importance of placing new observations into their reasonable perspective and that biochemical systematics is in need of a basic synthesis. They admit that the scope of their survey is necessarily limited and quite selective.

The first part of chapter II is devoted to micromolecules (low-molecular weight compounds - 1000 mol.wt. or less, such as flavonoids, terpenoids and alkaloids -), the second to macromolecules (electrophoretic studies of enzymes and proteins, amino acid sequencing, systematic serology and nucleic acids). Among the many contributions to the survey of micromolecules the reviewer would especially mention those on flavonoids in artificial auto- and allopolyploids in *Phlox* by Levy and Levin and on flavonoids in *Silene (Melandrium)* by van Brederode and van Nigtevecht. The first series of papers showed convincingly that some new chemical variability is produced by allopolyploidization and to some extent by autopolyploidization as well. The papers on *Silene* describe how different alleles at a single locus can produce the same end-product and show that inferences about genetic similarity are not always possible from flavonoid profiles alone. It is a pity that the authors of the review mention only the papers on *Silene* which were published before 1978 by van Brederode c.s. There are many more (e.g. by Kamsteeg, Mastenbroek and Steijns), all of which throw a great deal of light on the subject. It is clear however, that one cannot achieve a 100% coverage.

The second part of chapter II clearly shows that systematic and evolutionary studies increasingly involve macromolecules. The use of these molecules broadened the field to include molecular and cellular biology. The authors stress the importance of enzyme electrophoresis for taxonomic information at lower levels and for the study of the mechanisms of speciation. They give a survey of the value and limitations of comparative systematic serology. They expect that future studies will probably use single proteins rather than mixtures. Also the use of monoclonal antibodies is expected to provide more precise data.

Comparative studies using nucleic acids represent a very rapidly expanding area of plant systematics and evolution. They provide one of the most stimulating areas of current systematic and evolutionary interest. DNA studies appear to be useful at various levels in the taxonomic hierarchy, as was shown by the studies in *Atriplex* by Belford c.s., on repeated DNA sequences in cereals by Flavell, or rDNA in *Claytonia* by Doyle c.s., on sequence organization on the genomes of wheat by Flavell c.s., and on plant organelle DNA from plastids and mitochondria in various genera such as *Triticum*, *Brassica* and *Pisum* by Ogihara and Palmer c.s., respectively. Restriction enzyme analysis and sequencing are likely to be the primary methods employed in the future.

This 20th volume of the series 'Evolutionary Biology' is a valuable stimulus to future research and an important reference work not only for taxonomists, but also for all students in the ever expanding field of evolutionary biology.

T. W. J. GADELLA

P. D. MOORE & S. B. CHAPMAN (Eds.): *Methods in Plant Ecology*. Second edition. Blackwell Scientific Publications, Oxford, 1986. XIII + 589 pp., ill. Cloth £ 34.80 (ISBN 0-632-00989-6); Paperback £ 23.80 (ISBN 0-632-00996-9 Pbk)

This book is the revised second edition of a volume edited by S. B. Chapman, first published in 1976. Of the fourteen authors in the 1976 edition, only seven contribute to the 1986 edition. There are eight new names in the list of contributors. Also the contents of the book has changed completely. Of the nine chapters in the first edition, only the chapters 'Chemical analysis' (of soils, plant material and waters) and 'sites and soil' retained their names. All other eight chapters in the second edition have undergone changes or are completely new.

Books that discuss methods in Ecology, Plant Ecology in particular, are rare. This volume deserves great respect for the broad collection of methods, equipment and techniques that are presented and discussed. Anyone involved in ecological research and teaching will find the book helpful.

The chapters provide an introduction, but never a complete survey and analysis of the particular fields of plant ecology. The new chapter 'faecal analysis and enclosure studies' by R. Bhadresra, seems to be rather specialized compared to the other, more general chapters. The chapter 'Water relations and stress' by P. Bannister is less pretentious than his chapter 'Physiological Ecology and Plant nutrition' in the first edition. The present more specialized field is treated rather classically and lacks the treatment of Infra Red Gas Analysis for photosynthetic measurements and the use of the microprobe for direct turgor pressure readings.

The chapter 'Mineral nutrition' (by H. Rorison and D. Robinson) and 'Plant Population Biology' (by M. Hutchings) are very stimulating and as starting points they provide very useful information. The chapter on 'Data analysis' by S. D. Prince contains a collection of methods and procedures that could have been more readable with more illustrations and examples.

All in all, 'Methods in Plant Ecology' provides a useful introduction and guidance to teachers and scientists of plant ecology.

J. ROZEMA

KLINGMÜLLER, W. (Ed.): *Azospirillum III. Genetics, physiology, ecology*. Proceedings of the Third Bayreuth Azospirillum Workshop. Springer Verlag, Berlin, Heidelberg, New York, Tokyo, 1985. XIV + 263 pp., 102 figs. Hard cover DM 78,- ISBN 3-540-15914-2

Biological nitrogen fixation attracts many scientists as shown by the large number of meetings devoted to this subject. However, too often these meetings are dominated by scientists working with the agriculturally well-accepted *Rhizobium* symbiosis, and it is understandable that scientists working with other N₂-fixing organisms are eager to have their own meetings. This book contains the report of such a workshop, devoted exclusively to *Azospirillum*, organized for the third time in Bayreuth, W. Germany. In accordance with the general trend, the major part of this book (9 chapters) deals with (molecular) genetics. Six chapters are concerned with N₂-fixation, three with plant hormones and the remaining five the morphology and physiology of *Azospirillum*.

Azospirillum, first described by the famous Dutch microbiologist Beyerinck in 1922, became very popular after the demonstration by Döbereiner in Brazil in 1973, that this N₂-fixing bacterium is very common in the rhizosphere of many plants, including cereals and corn. This has led to the

speculation that *Azospirillum* may play a similar role in grasses as *Rhizobium* does in legumes. However, this optimistic view was not realized and it is now commonly agreed that the amount of nitrogen fixed and supplied to the plant is just a few kg ha⁻¹ year⁻¹ and is not sufficient to support plant growth. The papers in these proceedings do not change this view.

In the absence of a clear, beneficial effect of N₂-fixation on the host plant, it has been suggested that plant growth hormones, produced by *Azospirillum* and which stimulate root growth, are beneficial to plant growth, especially under stress conditions. It should be borne in mind, however, that many other soil bacteria are also capable of producing these growth hormones. In this respect *Azospirillum* is not unique.

Azospirillum is an interesting bacterium, capable of fixing nitrogen and also of using nitrate for respiration (denitrification). Moreover, it can form a close association with plant roots, although without forming root nodules. Therefore this *Azospirillum*-plant system may represent a simple model for symbiosis, and a fundamental study of this system may be helpful for our understanding of the more complicated root nodule symbiosis with *Rhizobium*. Results obtained with modern techniques, as applied to N₂-fixing bacteria, are of general interest and several groups of researchers are now active in developing methods to construct the genomic library of *Azospirillum*.

Finally, this book is intended for the specialist, which, however needs a critical mind since it contains good as well as poor papers.

T. A. LIE

J. L. HARPER, B. R. ROSEN and J. WHITE (Eds.): *The growth and form of modular organisms*. Proceedings of a Royal Society discussion meeting held on 27 and 28 June 1985. The Royal Society, London, 1986. 250 pp., ill. Hard cover. £ 43.00 UK, £ 46.00 overseas. ISBN 0-85403-281-9. (*Phil. Trans. R. Soc. Lond. B.* 313, No. 1159. 1-250, 1986)

One of the more exciting recent developments in ecology is the increasing awareness of the importance of clonal growth as a basic notion in population biological and evolutionary studies. In their introduction, the editors of the book under review here even put it this way: 'It may be that the distinction between the biology of modular and unitary organisms is more profound than the classic distinction between animals and plants.'

Being modular in this context means being the product of interactive growth, a deliberately vague definition, and has the following connotations: being sessile instead of mobile, having architecture instead of behaviour and not having the germ plasm segregated from the soma, which makes modular organisms at least potentially immortal. In order to prove their point, an equal number of botanists and zoologists was asked to contribute to a discussion meeting on modular growth in plants as well as in animals in London in the summer of 1985 under the auspices of the Royal Society. Their ideas are now available as a special edition of the Philosophical Transactions of the Royal Society of London. Being a discussion meeting, a wide array of problems related to this topic is touched upon in various fields like genetics, physiology, morphology, ecology and evolutionary biology and with various levels of generalisation, from detailed research papers to general overviews, like the one by Watkinson and White on the life-historical consequences of modular construction in plants.

The book ends on a cautious note with respect to the use of the term module. From this and from the ongoing debate in Oikos (Jerling, 1985; Vuorisalo and Tuomi, 1986) it becomes clear that semantic problems in its use should be clarified before confusion is going to obstruct the progress in this promising line of research. To me at least the paper by Rosen, one of the editors of this book, made clear the fundamental distinction between analogy, in the context of which a term like module is very useful and homology, revealing the fact that a division between unitary and modular organisms can only partly replace the distinction between plants and animals.

The field of research that is most likely to benefit from these new views is the field of evolutionary

ecology, with its bias towards unitary organisms. This book is a worthy contribution towards rectifying this imbalance and also clearly demonstrates that concepts, primarily used for developing the population biology of plants, now prove their more general applicability and their capacity to carry evolutionary theory into new fields of research. I can therefore warmly recommend this book to anybody interested in these new developments in the biology and evolution of modular organisms, botanists and zoologists alike.

J. M. VAN GROENENDAEL

J. L. HARPER, B. R. ROSEN and J. WHITE (Eds.): *Modular organisms: case studies of growth and form*. Papers relating to a discussion meeting on growth and form in modular organisms. The Royal Society, London, 1986. 114 pp., 9 plates. Limb cover £ 12.00 UK, £ 12.75 overseas. ISBN 0-85403-282-7. (*Proc. R. Soc. Lond. B* 228, No. 1159, 109–224, 1986)

This second volume of papers is a selection of posters presented at the Royal Society discussion meeting on growth and form of modular organisms and originally published in the Proceedings of the Royal Society of London, and should be read in conjunction with the main volume reviewed above. The rationale for publishing these posters in a separate booklet, was that they formed a significant contribution to the main theme of the meeting. Unlike the main volume, this selection of papers is more strongly biased towards clonal animals and towards morphological description. The three botanical papers in it are interesting in itself, especially the paper by Waller and Steingraeber, who critically examine the paradigm of constancy in branching patterns in trees.

In general, this second more specialised volume of case studies suffers from being second. After the main volume the reader more generally interested in modular growth will be satisfied to know that his library subscribes to the Proceedings of the Royal Society.

J. M. VAN GROENENDAEL

S. J. TER BORG (Ed.): *Biology and control of Orobanche*. Proceedings of a workshop in Wageningen, The Netherlands, 13–17 January 1986. LH/VPO, Wageningen. VII + 206 pp., 1986 ISBN 90.6754-079-X/CIP. Hfl 25,-, postage included. Copies may be ordered from S. J. ter Borg, Department of Vegetation Science, Plant Ecology and Weed Science, Agricultural University, Bornsesteeg 69, 6708 PD Wageningen, The Netherlands.

Orobanche species are holoparasitic plants which cause serious problems around the Mediterranean, in S. E. Europe, the Middle East and some other areas. They absorb solutes and water from their hosts which include important crop plants. After several conferences on *Striga* species, parasitic flowering plants belonging to a closely related family and bringing about devastating effects on crops in semi-arid areas of Africa and some other areas, the workshop in Wageningen was focussed on *Orobanche*. Papers on *Striga* were included in the workshop discussing some special topics.

Practically all international experts in this field of research were participants in the workshop (among others, J. I. Cubero, R. Jacobsohn, L. J. Musselman, C. Parker, A. H. Pieterse, A. R. Saghir, P. J. Whitney).

In the general introduction three contributions can be found: Taxonomy of *Orobanche* (L. J. Musselman), Scope of the Agronomic Problems Caused by *Orobanche* species (C. Parker) and Broomrape Avoidance and Control: Agronomic Problems and Available Methods (R. Jacobsohn).

In the next part of the book, much attention is paid to dormancy and germination of seeds (e.g., the search for natural and synthetic germination stimulants). Work related to The Search for New

Germination Stimulants of *Striga* spp. (B. Zwanenburg and coworkers, Department of Organic Chemistry, Nijmegen, The Netherlands) and Regulation of Early Development in Witchweed (*Striga asiatica*) and other Parasitic Plants (J. L. Riopel, Department of Biology, Charlottesville, U.S.A.) represents a very interesting line of research with *Striga*.

Eight contributions pay attention to Growth and Development (including Physiological Aspects of the Parasitic Relationship) and Population Studies; among others, two contributions of Stewart and coworkers (*Striga* Research Group, London, U.K.) have to be mentioned (The Parasitic Habit: Trends in Morphological, Ultrastructural and Metabolic Reductionism). In this part of the book, much attention is also paid to the parasitic relationship between *Orobanche crenata* Forsk. and faba bean (*Vicia faba* L.).

A number of 10 papers is presented on Breeding and Control (e.g., breeding for resistance; among others, contributions of J. I. Cubero, R. Jacobsohn, K. Petzoldt, J. Sauerborn and A. H. Pieterse). In the last chapter, S. J. ter Borg presents a review of the 'state of the art' with respect to *Orobanche* biology and control, entitled Present and Future of *Orobanche* Research; Summary and Conclusions (8 pages). This is followed by a list of participants (a number of ca. 40).

For people working in this field of research and/or agricultural practice where general botanical science and applied agricultural research are nicely mixed; the Proceedings of the workshop present a valuable survey of recent developments. However, several chapters of the book may also stimulate a larger group of scientists, such as teachers at universities. The lay-out is attractive and the book is cheap.

P. WOLSWINKEL

T. E. TIMELL. *Compression Wood in Gymnosperms*. Springer Verlag, Berlin, Heidelberg, New York, Tokyo 1986. xxxiii + 2150 p., ill., tables. DM 998,- (cloth, three volumes). ISBN 3-540-15715-8.

Compression wood is formed in Gymnosperms at the lower side of leaning stems and branches in order to effectuate orientation movements and maintain more or less straight growth and constant branch angles (with respect to the forces of gravity, not with respect to the stem). A similar function is carried out by tension wood in woody Angiosperms, formed at the upper side of leaning stems and branches. Jointly compression wood and tension wood are called reaction wood. It is hard to overestimate the biological significance of reaction wood for the evolutionary success of woody plants: it enables the maintenance of effective exposure to light of the crown and the mechanical integrity of trees and shrubs; it allows lateral shoots to replace the leader after its apex has been damaged (a very common phenomenon due to insect predation, etc.), and can even straighten mature trunks which have become displaced for some reason or another (e.g. wind or landslides).

The study of reaction wood has fascinated generations of botanists and wood scientists for a diversity of reasons. Structure, differentiation and morphogenesis invited detailed comparisons with the 'normal' condition, and the elusive causes of reaction wood formation have induced some of the most elegant experiments in tree biology. The role of compression wood in the living tree as well as its nuisance value wood in commercial timber and pulp and paper also needed to be understood in terms of its deviating structure and chemistry.

These and many aspects are comprehensively discussed for compression wood in Gymnosperms by T. E. Timell in the three volume treatise reviewed here. The 2150 pages of this intentionally encyclopaedic survey may be compared with earlier reviews by Westing (1965, 1968) covering about 120 pages and other yet shorter ones. However, the reader does not have to fear for superfluous detail or unnecessary repetitiveness in the present volumes. This treatise is a truly scholarly synthesis of well over a century of compression wood research and as such of tremendous scientific and practical value. I know of no other recently published book in tree biology or wood science which is so well written and which contains so much pertinent information.

In 21 chapters, drawing from 8100 published studies and many original observations, the author deals with the following aspects: historical background; designation, general characteristics and

determination; structure (going from the macroscopic down to the ultrastructural level); chemistry; physical properties; origin and evolution; formation; incidence and occurrence; causative factors; gravitropism; physiology of compression wood formation; inheritance; ecology; silvicultural influences; the mechanism of compression wood action; the effects on lumber, plywood, board and pulp and paper manufacture; compression wood induction in firs by the balsam wooly aphid; and opposite wood (i.e. the wood formed in gymnosperms at the upper side of leaning stems and branches). All chapters are admirably illustrated.

A major key to the understanding of compression wood action and properties lies in the (ultra-)structure and chemistry of the compression wood tracheid. Karl Gustav Sanio was the first to give a detailed light microscopical description of compression wood in 1860, soon followed by Schacht (1862) who was traditionally been credited for this. All crucial deviating features: rounded shape in cross section, occurrence of intercellular spaces at the tracheid corners, deviating wall layering and helical cavities in the S2 were already understood by Hartig (1896, 1901), to be confirmed and studied in greater detail in recent decades with transmission and scanning electron microscopy. The amazing forces generated by (developing) compression wood are most probably due to swelling of the tracheid during deposition of lignin between the low pitch cellulose microfibrils of the S2, which is thicker and more highly lignified than in normal wood.

Although the causes of compression wood formation have been the subject of many experimental studies, they are still poorly understood. However, a primary role must be ascribed to gravity, a stimulus probably directly perceived by the developing tracheids or even the cambial cells at the lower sides of leaning stems and branches.

The 334 page chapter on the ecology of compression wood formation is the first review on this subject. It offers fascinating information on the many factors in a forest ecosystem which can directly or indirectly stimulate compression wood formation. Any damage to the leader invites its replacement by a lateral branch, and this is made possible through the development of compression wood; no wonder that insect and other animal predation, and microbial pathogens affecting buds, play such an important role. The correction of lean, caused by landslides, often leading to overcorrection which then is compensated for by the development of compression wood on the opposite side of the trunk, belongs to the more spectacular examples of the influence of abiotic environmental factors. In fact the incidence and distribution of compression wood in trees from mountain slopes can and has been used to accurately date landslides from the past. Wind and snow are more common agents influencing compression wood formation.

It is impossible to do full justice to the contents of these three volumes in a review like this. Suffice it to say that 'Compression Wood in Gymnosperms' is an excellent publication which will remain unrivalled for many years to come. It is inconceivable now to study any aspect of compression wood, without reading Dr. Timell's treatise first. The reader will find much help and inspiration for such future studies, because the remaining problems have been clearly indicated in each chapter. I deliberately refrain from criticising very minor imperfections, which are of such low frequency that to mention them separately would disproportionately detract from the unusually high quality maintained throughout the 2150 pages of wellillustrated text. Congratulations are due to author and publisher for this remarkable achievement.

P. BAAS

P. JAKUCS (Ed.): *Ecology of an oak forest in Hungary. Results of 'Sikfökút Project'*. Akadémiai Kiadó, Budapest, 1985. XVI + 546 pp., ill. Cloth. \$ 49.00
ISBN 963-05-3370-7 (Series); ISBN 963-05-3371-5 (Vol. 1).

The book is based on research, carried out as part of the Man and Biosphere Programme in the oak forest *Quercetum petraeae-cerris* in Hungary. Principally, however, it takes up the same research topics, as the International Biological Programme. The book has nine chapters. After a short description of the research goals, the introductory chapters give a survey of the landscape history, the climate and the soils of the research site and describe the structure and phenology of the oak forest.

The most interesting and relevant data, based on detailed measurements over many years, are listed in chapters 5 to 9. They are dedicated to phytomass, primary organic matter production, leaf growth of trees, data on chlorophyll, energy, and nutrient content, nutrient flow and litter decomposition. As in most IBP and MAB studies, there is a strong emphasis on the mean of the species without recognizing life history dependent differences within the local population. Despite a high dedication to careful analysis, the small sample size (1 tree of each oak species, 5 individuals for each shrub species) completely neglect the advances in population biology of the last decade. Due to this omission, this book contributes to the mass of so-called ecological publications on the idealistic mean as autoreplication of one individual. I hope that in the next volumes there may be more attention to the ecological importance of variability within populations for the survival of the species. Otherwise it will not be possible to judge on the population genetic changes, caused by man-made pollutants.

W. H. O. ERNST

E. FERRARINI, F. CIAMPOLINI, R. E. G. PICHI SERMOLLI and D. MARCHETTI: *Icognographia Palynologica Pteridophytorum Italiae*. *Webbia* 40(1): 1–202, 1986. 71 plates. Published by the Botanical Museum of the University of Florence, Via La Pira 4 – 50121 Firenze, Italia. ISSN 0083-7792

In the present volume all spores, micro- and macro-, of the Pteridophyta native in Italy are illustrated by Scanning Electron Microscope micrographs. Many of these taxa also occur in other parts of Europe and therefore the publication is of far more importance than local interest.

The name of Pichi Sermolli, the well-known Italian pteridologist, guarantees that taxonomy as well as nomenclature are up to date. The SEM-micrographs taken by Ferrarini, are of excellent quality and the editors have to be praised for avoiding the pitfall to economize on the number of pictures. The scores on the spores of every taxon are shown from several sides and also a micrograph with details of the surface in high magnification is given. By this large number of pictures a good impression is given of the ornamentation of the outermost surface. The descriptions of the micro- and macrospores are from the hand of Ciampolini; they are short and sufficient.

In addition to the descriptions of the spores information is given on the chromosome numbers of Pichi Sermolli and on the distribution of the taxa inside and outside Italy by Marchetti. By this information the paper is not only of interest for palynologists, but also for others interested in European Pteridophyta. In fact I have the impression, that it is of main interest for plant taxonomists, although the title of the paper suggests palynological information only.

It is a pity that the authors neglected the light-microscopical information. As so often, when taxonomists use palynological data for a taxonomical purpose, the spectacular SEM-micrographs are presented as the most valuable data available. However, palynology is mostly done with a common light-microscope and SEM-information is often of minimal use, being very difficult to translate in LM-pictures.

On the other hand, it is clear, that this publication will be welcomed by many people by its thoroughness and excellent quality.

W. PUNT

J. P. GUSTAFSON, G. L. STEBBINS & F. J. AYALA (Eds.): *Genetics, development, and evolution*. 17th Stadler Genetics Symposium. Plenum Press, New York and London, 1986. XII + 361 pp., ill. Hard cover US\$ 49.50 ISBN 0-306-4226-9

This book is a collection of contributions to the 17th Stadler Genetics Symposium (Columbia, Missouri; 1985). Its 15 chapters (not numbered) are written by reputed scientists.

Chapter 1, by G. M. Edelman deals with the problem of storage of 3-dimensional information

in the linear genetic code. The following 5 chapters (Gene Action and Morphogenesis in Plants by G. L. Stebbins; Mobile Elements in Maize: A Force in Evolutionary and Plant Breeding Processes by P. A. Peterson; Mutation, Apical Meristem and Developmental Selection in Plants by E. J. Klekowski et al.; Properties of Mutable Alleles Recovered from Mutator Stocks of *Zea mays* L. by V. Walbot et al.; Plant DNA Variation and Stress by C. A. Cullis) are dedicated to the relation between genetic information/mutation and morphogenesis/evolution in plants.

Chapter 7, *Conditio sine qua non* for *de novo* emergence of new genes and the concept of primordial building blocks by S. Ohno et al., deals with the problem of quick genomic responses to environmental changes. Besides gene duplication the emergence of new genes from very primitive repetitive base oligomers is discussed in detail, including the possibility of the occurrence of complete new polypeptides by using alternative open reading frames within a certain chromosome region. The next three chapters by resp. D. Bennett, A. Garcia-Bellido and M. Shankland & G. S. Stent, deal with the relation between genome and development in animal systems. Chapter 11 by J. Capello et al., describes the open reading frame DIRS-1 in Dictyostelium. Chapters 12 and 13 (Developmental Constraints and Evolutionary Saltations: A Discussion and Critique by J. S. Levington; Intraspecific Genomic Variation by R. J. Britten) discuss genome organization in relation to evolutionary problems. Chapter 14, Structure and function of the human retroviruses by L. Ratner & R. C. Gallo, deals with the human retro-virus, including the HTLV III, which causes AIDS. The last chapter by J. Schell deals with the T-DNA genes of *Agrobacterium* plasmids. Their complex evolutionary origin and the consequences for the relation between the bacterium and its host are discussed.

Most of the contributions are very interesting. However, the book suffers from a heterogeneity inherent to all symposia proceedings. Moreover, most chapters have to be read as an isolated entity. As a consequence the contributions are sometimes too specific for biologists with a general interest, whereas they may be of little importance to those working in the particular field dealt with.

The impact molecular genetics has gained on developmental biology is obvious. However, from the chapters 2–6 and 15, which are of particular interest for botanists, it is clear that developmental botany has not reached that stage yet.

J. DERKSEN

S. BLACKMORE and I. K. FERGUSON (Eds.): *Pollen and Spores. Form and Function*. Papers presented at an International Symposium, organized by the Linnean Society of London and the Systematics Association, London. 27–29 March 1985. Linnean Society Symposium Series, Number 12. Academic Press, London, 1986. XVI + 443 pp., ill. Hard cover £ 60.00 (US\$ 92.50) ISBN 0-12-103460-7

The book is based on papers presented at an international meeting of palynologists on form and function of pollen and spores. This meeting was, in a way, a continuation of the meeting on the evolutionary significance of the exine, also organized by the Linnean Society in 1975. At that time evolution and phylogeny were the main topics of interest, whereas at this meeting adaptations of pollen and spores in relation to evolution were the central themes.

There is a total number of 28 contributions with the lectures as base and, in addition, 9 papers on selected posters. A number of these papers is dedicated to ontogeny. Authors like Dickinson, Rowley, Hideux, Dahl, Lugardon, Soutworth and Barnes are the leading scientists in ontogeny at this moment and they give valuable information on their respective specializations. In this connection the paper by Soutworth on the substructural organization of pollen exine has to be memorized especially.

A second part of papers comprises chapters dealing with functional features influencing pollen form. Important papers on this subject concern harmomegathy (Blackmore) and wind-dispersion (Crane). In fact, these two papers represent the central themes of the Symposium and the results given in them are often quoted in other papers of the volume.

Of course, contributions on palynology as a tool for understanding the evolution of Angiosperms

are abundantly present. Fossil pollen grains from the Early Cretaceous are considered by Walker and Walker and also Batten with the remarkable Late Cretaceous Normapolles pollengroup used their information to reconstruct evolution of pollen grains. Also recent material was used for phylogenetic interpretations. Examples in this field are the publications on *Bauhinia* (Ferguson and Pearce), Araceae (Grayum), *Heliconia* (Kress), Annonaceae (Le Thomas), *Lagerstroemia* (Paccini and Bellani) and not to forget the impressive survey on spores of Pteridophyta by Tyron.

Many other communications, not mentioned here, are of equal interest and it is remarkable that in a book like this with such a diversity on palynological subjects, the quality of the papers is so high. This result is certainly due to the editors who in the first place were responsible for the organization of the Symposium. Their skill to select interesting topics and especially their policy to restrict the number of lectures to invited specialists has resulted in this book with papers of high quality.

The book is recommended to all botanists with a broad interest and is indispensable to all palynologists. Its price is high, but it ought to be present in all botanical laboratories engaged in research in pollen and spores.

W. PUNT

E. A. CURL & B. TRUELOVE: *The rhizosphere* (Advanced Series in Agricultural Sciences, Vol. 15). Springer Verlag, Berlin, Heidelberg, New York, Tokyo, 1986. X + 288 pp., 57 figs. Hard cover DM 228,- ISBN 3-540-15803-0

The subject of this book is rather broad and many specialisms are involved. In only 251 pages a broad coverage is given of the whole subject, followed by 29 pages with references. As is stated in the preface the book is not meant to be a mere literature review, but a comprehensive treatment of the state of our knowledge of the rhizosphere, and much good work is therefore not cited. The authors have drawn their inspiration in large part from 10 years of cooperative rhizosphere research with leading scientists in the Southern U.S.A. The book is intended for the young scientist and technologist as well as for the established professional researcher and teacher. A prime objective is a contribution to the generation of new ideas, approaches and methods.

On reading the book one can only have admiration for the way the authors have succeeded in producing a book that treats this complicated subject in such a concise and yet very clear and complete way. The book starts with the history of the conception of the term rhizosphere by Hiltner in 1904. For many readers the second chapter on structure and function of roots (46 pp.) may be redundant but a good knowledge and understanding thereof is indispensable. Subsequent chapters successively deal with 'root exudates' (38 pp.); 'rhizosphere populations' (47 pp.); 'microbial interactions' (27 pp.); 'relation to plant nutrition and growth' (24 pp.); 'relation to plant diseases' (44 pp.); 'current trends and projected emphasis' (17 pp.). The subject matter of these chapters has been conveniently arranged in numbered sections and subsections. This makes looking up a particular topic in the table of contents very easy. A particular asset is the extensive table on selected methods used for collection and analysis of root exudates (11 pp. in ch. 3).

The typography of the book is excellent. In view of the kind of book that the authors say to have had in mind they did succeed very well. It seems quite unlikely that a second book on this subject will appear soon. When it does it will most likely be in the form of a symposium. This book of Curl & Truelove probably remains an important source of reference for quite a few years. Besides it is excellent reading for anyone whose field of interest touches somehow on that of the rhizosphere.

T. LIMONARD

W. J. BROUGHTON and A. PUHLER (Eds.): *Nitrogen fixation. Volume 4. Molecular biology*. Clarendon Press, Oxford, 1986. X + 321 pp., many figs. Hard cover £ 35.00. ISBN 0-19-854575-4

About fifteen years ago the study of biological nitrogen fixation has been considerably stimulated. This was caused by the increasing costs of industrial fertilizers and exciting suggestions about the possible extension of nitrogen fixation thanks to the applications of molecular genetics. Though these suggestions sometimes were rather 'science fiction'-like speculations which are now brought into a more realistic sphere, progress in this field is considerable. This progress makes it impossible to publish one comprehensive book which comprises all important information. On the other hand there certainly is a need for good surveys of the present state of our knowledge for those who want to be introduced in this field at a fully authoritative level. This is the purpose of a series of books on nitrogen fixation edited by W. J. Broughton and co-editors. After volumes on 'ecology', 'Rhizobium' and 'Legumes' the fourth volume, edited by W. J. Broughton and S. Pühler, is devoted to the molecular biology of nitrogen fixation.

Certainly this volume is a welcome addition to the series as especially in the field of molecular biology the most exciting developments occur. These developments are discussed in 11 chapters; enzymology in free-living diazotrophs by R. R. Eady, biochemical physiology of *Rhizobium* dinitrogen fixation by R. A. Ludwig and G. E. de Vries, electron transport to nitrogenase in diazotrophs by H. Haaker, transcriptional analysis of the nitrogen fixation region (*nif*-region) of *Klebsiella pneumoniae* in *Escherichia coli* by W. Klipp and A. Pühler, *Azospirillum* by Cl. Elemerich, *Azotobacter* biology, biochemistry and molecular biology by B. E. and E. Terzaghi, Cyanobacterial nitrogen fixation by R. Hasselkorn, genetics and molecular biology of symbiotic nitrogen fixation by *Rhizobium* sp. and *R. japonicum* by C. E. Pankhurst, plasmid molecular genetics of *Rhizobium leguminosarum*, *Rhizobium trifolii* and *Rhizobium phaseoli* by R. J. M. van Veen, R. J. H. Okker, P. J. J. Hooykaas and R. A. Schilperoort, molecular biology of symbiotic nitrogen fixation by *Rhizobium meliloti* by A. Kondorosi and host specific gene expression in legume root nodules by T. Bisseling, R. C. van den Bos and A. van Kammen.

Most authors succeeded in giving a clear and representative survey of our present knowledge. Nobody can blame them that progress in certain fields is so rapid that the time lag between writing the articles and publishing the book is sufficient to exclude some exciting very recent progress like e.g. the discovery of plant factors which induce the expression of certain nodulation genes. Some chapters give a really comprehensive review on all important aspects in their field, other chapters mainly or exclusively stress the work of the own group. This is no disadvantage since in this way not only the general progress is outlined but some insight in certain front-lines of research is given as well. The limited scope of the book and its place in the series, where important aspects already were discussed elsewhere, makes it unavoidable that certain topics are not or only shortly mentioned. We might have welcomed an as good survey of phototrophic bacteria other than the Cyanobacteria which are so well covered. The Actinorhizae are fully absent though a start with their molecular approach has been published. More pages could have been devoted to the function of leghemoglobins and the molecular studies of the lectin hypothesis. These remarks only emphasize the many other topics which are covered so well in this welcome addition to the vast amount of literature on biological nitrogen fixation..

A. QUISPTEL

O. MAYO: *The Theory of Plant Breeding*. Second edition. XIII + 334 pp., ill. Clarendon Press, Oxford, 1987 Paperback (ISBN 0-19-854171-6) £ 15.00; Hard cover (ISBN 0-19-854172-4) £ 30.00

Only seven years have passed since the first edition of this book. Nevertheless the author, Oliver Mayo from the Waite Agricultural Research Institute, University of Adelaide, Australia, preferred to produce a second edition in stead of a reprint. This is a little surprising because the differences

between the first edition and the second are relatively small. In some cases they consist of a different division of the same text over the chapters. Indeed, the lay-out has been improved; especially that of the tables.

According to the author the book has three aims: Firstly to give an account of plant breeding theory that is accessible for plant breeders and geneticists. Secondly to discuss shortcomings of this theory and, thirdly, to show aspects of plant breeding expected to be particularly fruitful in the future.

In the first edition it was stated that cell biology was largely outside the scope of the book. The second edition recognizes modest contributions of 'genetic engineering' to plant breeding and accordingly a chapter (12 pages) on molecular and cellular biology has been incorporated. Nevertheless, the author states on the last page: 'I began this book by suggesting that the next major advances in crop production are unlikely to come from quantitative genetics, but rather from molecular biology. The passage of seven years since I made this suggestion in the first edition has not made it any less true, but the contribution of genetical engineering to crop production remains modest'. All this means that the third aim of the author is hardly elaborated. In accordance with the title the book is mainly on plant breeding theory.

Broadly speaking, the book covers the following topics. After two introductory chapters methods for field experimentation are dealt with. Recent developments are briefly indicated; e.g. local control by check plots or moving means, use of analysis of covariance. The chapter on basic quantitative genetics, with 47 pages the biggest chapter, covers a range of topics including doubtful subjects like the analysis of a diallel cross by the so-called W_r - V_r regression analysis or the estimation of the number of loci segregating for some trait. Especially the chapters Variation, Interaction between genotype and environment, Response to selection and Heterosis show the author's preference for describing processes in mathematical language. However, this quantitative approach is dedicated to situations like population genetical and quantitative genetical consequences of mating systems or consequences of selection, which are of relevance in practical breeding. The theory is not an aim in itself, but is dealt with because 'nothing is more practical than a good theory'. Quite often examples are included for experimental verification and many references to such studies are made. (In this sense I appreciate this book more than Wricke & Weber's book of 1986, titled: Quantitative genetics and selection in plant breeding).

The chapter on selection methods for self-fertilizing crops (16 pages) is relatively short. Little attention is given to comparison of methods. A similar separate chapter for cross-fertilizing crops is not included.

The last chapters are titled: Induced mutation (8 pages), Disease resistance (10 p.), Cytogenetical manipulation (8 p.), Perennial crops (8 p.), Conservation of germplasm (7 p.) and Plant breeding strategy (16 p.).

Finally the book contains a glossary (15 p.), an extensive bibliography (13 p.), a detailed subject index (14 p.) and an author index (8 p.).

In summary, the book is, I believe, a valuable property for advanced students in plant breeding, for their teachers but also for highly trained professional breeders. For its price the paperback edition is a good purchase.

I. Bos

T. W. KUYPER: *A revision of the genus Inocybe in Europe. 1. Subgenus Inosperma and the smooth-spored species of subgenus Inocybe.* Persoonia, Supplement Volume 3, 1986 VIII + 247 pp., 200 figs., table. Paperback Df. 100,- (if paid into postal account 111768 of the Rijksherbarium, Leiden, Netherlands). Rijksherbarium, Leiden, 1986. ISBN 90-71236-02-1.

About fifty years ago the smooth-spored species of the genus *Inocybe* (Dutch: 'Vezelkoppen') represented one of the most difficult groups of Agaricales with respect to the determination of species. The application of some microscopical characteristics (spore shape, presence of peculiar cystidia,

etc.) clarified many problems and also laid a base for delimitating infrageneric groups. The European species were monographed by Heim (1931). Many new species were described by Kühner (1953), who supplied a clear-cut infrageneric arrangement. Many new species were also discovered by local workers, in The Netherlands especially by Huysman.

After this period of exploratory work, a critical revision of the genus is needed and we must applaud the author's endeavour, even when only part of the *Inocybe* species have been treated. Besides the nodulose-spored species, the *I. dulcamara* group was excluded, the latter constituting, according to the author, a separate subgenus by virtue of the necropigmented basidia.

The most striking feature in the present taxonomic treatment is the abandonment of the usual subgenera: smooth- and nodulose-spored species. Kühner already observed (1980), on account of an electron micrograph by Capellano (1976), that the gibbosity of the spores is not based on a structural divergence; moreover, there are transitions between the two kinds of spores. The presence or absence of thick-walled pleurocystidia (the author does not use Singer's term 'metuloids') now becomes the most important infrageneric criterion. Much value is also attached to the distribution of the caulocystidia over the stipe. Ontogenetic research on nodulose-spored species by Reijnders (1963, 1974) has revealed that the caulocystidia are absent where the veil covers the stem. So the length of the cystidiate part of the stipe depends on the insertion of the veil. Though smooth- and nodulose-spored species may be closely related, an ontogenetic examination of some more (smooth-spored) species would be desirable, the more so as the author mentions exceptions which require an auxiliary hypothesis. A similar extrapolation is the author's for the rest quite interesting attempts to draw a phylogenetic scheme by cladistic analyses, using solely the characters of some smooth-spored species of subgenus *Inocybe*.

The systematic part seems to be well-balanced. Having studied a lot of material, exiccata as well as living material in different countries, the author recognizes 112 taxa, 93 at species level. As many species had been described more than once, some have been combined. Ten new species and six varieties have been distinguished. Some current names have been changed according to the rules of nomenclature.

This monograph is of great value, in the first place by the general conception of the genus and also by the amount of meticulous work invested in each species. One can but hope that the author will be enabled to complete his work on *Inocybe* and to extend it to other genera.

A. F. M. REIJNDERS

S. T. Moss (Ed.): *The Biology of Marine Fungi*. Cambridge University Press, Cambridge, 1986. XVI + 382 pp, ill. Hard cover £ 27.50 (US\$ 49.50). ISBN 0-521-30899-2.

Eleven years have elapsed since the publication of 'Recent Advances in Aquatic Mycology' (Ed. E. B. Gareth Jones) with a major section on marine fungi, and seven years since that of Jan and Erika Kohlmeyer's treatise of the higher marine fungi, so that the publication of a new summarizing treatment was overdue.

The book contains thirty review papers presented at the 4th International Marine Mycology Symposium held at Portsmouth in August 1985 with updates of the references to the end of 1985.

Most renowned experts in the field (with the exception of A. Gaertner) are represented. The somewhat heterogeneous contributions cover most of the field of marine mycology. The contents can roughly be divided as follows: Eleven papers deal with ecology and distribution, nine with physiology, eight with taxonomy and morphology and four with pathology. The delimitation between lower and higher fungi is rather sharp: 21 papers deal with higher, five exclusively with lower fungi and four with both groups.

The taxonomic chapters contain some noteworthy data: Biology and phylogeny of the Labyrinthulales and Thraustochytriales (not Fungi properly speaking) are reviewed by Moss (with fine TEM photographs). New approaches to the taxonomy of these groups are introduced by Bahnweg and Jäckle, using nutritional characters, sugar composition of the cell wall, GC content of the DNA

and DNA-DNA hybridization. Kohlmeyer tries to subdivide the marine ascomycetes into primary and secondary marine fungi. Deliquescent asci and hyaline ascospores would characterize the primary ones. Further papers deal with various aspects of the Halosphaeriaceae, viz. general classification (Jones et al.), electron microscopy (Farrant), peridial structure of the ascoma (Nakagiri and Tubaki), teleomorph-anamorph connections (Shearer) and evolutionary trends (Kirk).

As a selection of the contents the following can be cited: Most physiological data concern higher fungi, amongst which *Dendryphilla salina* is the most thoroughly treated (Jennings; Gibb et al.). The Halosphaeriales are much less investigated (exoenzymes treated by Schaumann et al., secondary metabolites by Miller). The physiology of the yeast *Debaryomyces hansenii* is dealt with separately by Adler. An overview of mycoses of marine organisms is given by Porter. Fungal diseases of marine animals, mainly caused by lower fungi, may be of economic importance (Alderman and Polglase). The chapter on biogeography by G. C. Hughes is particularly well documented and viewed in a broad frame but provides rather few new data. Marine fungi range from the tropics (Hyde) to Antarctica (Pugh and Jones). Aspects of applied mycology include the fouling of wood (Mouzouras), and wood preservation (Eaton).

The texts are carefully edited and printed from well-prepared typescripts. The volume will become an indispensable base of reference to all those working on marine fungi.

W. GAMS

R. NEUHÄUSL, H. DIERSCHKE and J. J. BARKMAN (Eds.): *Chorological phenomena in plant communities*. Advances in Vegetation Science 5. Dr. W. Junk Publishers, Dordrecht, Boston, Lancaster, 1985. IV + 270 pp. Cloth Dfl. 225.00, US\$ 75.00, £ 62.50. ISBN 90-6193-515-6

This book contains 24 papers of a symposium, devoted to various aspects of the distribution of plant communities, especially in Europe. The two non-European contributions are concerned with the phytogeography of the Yukon-Territory and with floristic changes in *Castanopsis cuspidata* forests in Japan. The vegetation types treated range from aquatic communities and various types of grassland up to beech and pine forests.

Despite the high diversity of approaches, most of the contributions have in common that an understanding of changes in species composition is tried to achieve by only descriptive presence/absence patterns. Fortunately, there are some papers trying to stimulate chorological research by new approaches, such as the comparison of leaf areas indices (Fliervoet & Werger) or hydrochemical comparison of waterplant communities (Pietsch). In most of the contributions relevant ecological aspects such as the factors determining absence or vicariance of important species or the high persistence of other species on a continental scale (ecotype differentiation) are not presented. Correlations of the distribution of plant communities with general climatic and/or soil gradients may be very suggestive, but they do not elucidate the real process. At its best, certain publications may be a basic data collection for testing chorological phenomena. Real progress in vegetation science will not be achieved by chorological studies of this kind. The price of the book is not in agreement with the content.

W. H. O. ERNST

H. ELLENBERG, R. MAYER and J. SCHAUERMANN (Eds.): *Ökosystemforschung. Ergebnisse des Sollingprojekts 1966–1986*. Eugen Ulmer Verlag, Stuttgart, 1986. 507 pp., 233 figs., 145 tables. Hard cover DM 120,- ISBN 3-8001-3431-4

As the subheading 'Results of the Solling project' indicates, Ellenberg and co-authors summarize the contribution of the Federal Republic of Germany to the International Biological Programme.

Primarily, three vegetation types had been selected: a beech (*Fagus sylvatica*) forest, belonging to the plant association Luzulo-Fagetum, a Norwegian spruce forest, and a fertilized grassland (Poo-Lolietum). Main emphasis of all investigations, with the highest research activity between 1966 and 1974, was given to the forests.

The text of the book is blocked in 9 chapters. After a short survey of various IBP-projects and ecosystem models, the landscape, climate, geology and history of the research site, chapters 3 to 5 are summarizing the productivity of and the energy flow in plants, important (soil) animals, bacteria and fungi. Chapters 6 to 8 consider the budgets of energy, water and chemical elements, the latter being characterized by an enormous variation between years. Despite some experiments on the ecological effects of secondary plant metabolites, the aspects of phenolics are underestimated. The same holds for the population dynamics and population genetics. In chapter 9 Ellenberg highlights various aspects of the Solling project. Those readers, hesitating to read the 440 pages, should start with the 21 pages of this chapter, which will encourage them to consume the remnant 420 pages. There is a wealth of information compiled here. It demonstrates that only a consequent study of all relevant processes in an ecosystem will help to understand the ecosystem itself. The most notable achievement of this excellent book is that it shows that animal populations are more sensitive to abiotic factors than generally accepted in books on animal ecology and that ectomycorrhizal relationships are very dynamic.

A well selected bibliography, a good index of species and subjects serve its purpose. This book is a 'must' for all ecologist; hopefully, the announced English translation will soon appear.

W. H. O. ERNST

J. A. BAILEY (Ed.): *Biology and Molecular Biology of Plant-Pathogen Interactions*. NATO ASI Series. Series H: Cell Biology. Vol. 1. Springer Verlag, Berlin, Heidelberg, New York, Tokyo, 1986. X + 415 pp. Hard cover DM 178,- ISBN 3-540-16799-4

This book is a collection of 38 papers, presented at a NATO Advanced Research Workshop, held at Ilminster, UK, from 1-6 September 1985. The topics of this workshop, the biology and molecular biology of plant-pathogen interactions forms a fascinating, rapidly developing field of research.

Until recently the mechanisms used by plants to defend themselves and those by pathogens to achieve infection were ill understood, but nowadays new approaches to elucidate these mechanisms become available. Methods for the manipulation and transfer of genes offer the possibility to study the structure and function of genes in the host plant as well as in the pathogen, and to elucidate the very early events in the host-parasite relation which determine susceptibility or resistance. In an introductory paper R.K.S. Wood discusses the hypotheses of induction of resistance or susceptibility, paying attention to race-specific as well as non-host resistance, and to the possibilities of recombinant DNA technology.

The other articles are placed under the following headings: Biology of plant-fungus interactions, biology of plant-bacterial interactions, mechanisms of resistance, elicitors of resistance, molecular biology of plant response, molecular biology of bacterial pathogenesis and molecular biology of fungal pathogenesis. All articles are written by leading specialists in the fields of plant pathology, molecular biology, biochemistry and cytology.

This book provides an excellent state of the art in this area of plant pathology with an appropriate citation of the literature. It should be consulted by all research workers and people who want to follow the developments in this field, and certainly also by teachers at the academic level. The book is carefully edited and attractively illustrated.

J. DEKKER

A. ARBER: *Herbals. Their origin and evolution. A chapter in the history of botany 1470–1670*. Third edition. With an introduction and annotations by William Stearn. Cambridge University Press, Cambridge, 1986. XXXII + 358 pp., 131 figs., 26 plates in text. Paperback £ 15.00 (US \$ 24.95) ISBN 0-521-33879-4.

To those interested in the history of botany Agnes Arber's "Herbals" is a well known classic. The first edition dates from 1912 already, the much revised second edition from 1938. As to the main text, the present third edition is a reprint of that second edition.

On rereading it I realized anew what a fascinating book this is. It makes the impression of being the result of a lifelong study, actually it was the first major publication of a scientist in her early thirties, a scientist who spent most of her further life in morphological and taxonomic studies. But even now it is not just a classic you ought to have read and that luckily is well written and interesting; nearly 50 years after the second edition came out it is still a very useful introduction to its own field, the history of botany as reflected in the printed herbal from the beginning, ca. 1470, to about 1670.

A short introductory chapter on botany in the classical times and the Middle Ages, the manuscript period, precedes the main body which consists of three chapters on the history of the printed herbal in its first two centuries. After this come some more specialized chapters, on the development of plant description, on the evolution of plant classification, on the art of botanical illustration, and a final chapter on that miraculous and still ineradicable field of the doctrine of signatures and of astrological botany, respectively. This, richly illustrated, is the well known classical text. To this were added three Appendixes of which especially the first one, "A chronological list of the principal herbals and related botanical works published between 1470 and 1670", is still of great practical value.

Like usual in reprints of a classic its value is heightened, sometimes considerably so, by some additions. These are in the first place reprints of two later papers by Ms. Arber, of which especially the first one, on the colouring of sixteenth-century herbals, is of interest. The second one, "From medieval herbalism to the birth of modern botany", provides in many respects a summary of the book itself. Like so often in a reprint of a historical botanical text, Dr. W. Stearn is responsible for some more additions. The most valuable one is in my opinion Appendix II, the bibliography, which he made up to date by adding some 100 titles to the original c. 300 ones. Among his further contributions special mention should be made of the introductory chapter, as a matter of course including a short biography of the author.

Summarizing, a still valuable book, nicely executed and reasonably priced.

P. W. LEENHOUTS

E. E. CONN (Ed.): *Recent advances in phytochemistry. Vol. 20. The Shikimic Acid Pathway*. Plenum Press, New York and London, 1986. VIII + 347 pp., ill. Cloth US \$ 55.00 ISBN 0-306-42283-2.

The shikimic acid pathway is one of the central metabolic routes characteristic for the Plant Kingdom in its widest sense: for lower and higher plants, prokaryotes as well as eukaryotes. Although at present our knowledge of the parts of the pathway that lead to the primary aromatic end-products tyrosine, phenylalanine and tryptophane seems almost "complete", side branches of the reaction sequences – leading to important groups of secondary metabolites – are being discovered in increasing numbers. Research in these areas is rapidly expanding.

Of the shikimate derivatives treated in this volume the flavonoids and lignins were excluded since they have been the subject of other recent symposia. Chapters are devoted to an overview of the shikimate pathway (FLOSS); to regulation and subcellular location (JENSEN); to specific inhibitors (AMRHEIN); to the synthesis of inhibitors and intermediates (BARTLETT); to indoleacetic acid (KOSUGA & SANGER); to hydroxybenzoic acids and gallic acid (HASLAN); to lignans (PELTER); to the biosynthesis of quinones (LEISTNER); to quinones as bioreductive alkylating agents (MOORE & KARLSON); to plant coumarins (BROWN) and their biosynthesis (DRYER).

This volume of "Recent Advances in Phytochemistry" ought to be present in each laboratory where phytochemists and botanists work on secondary plant metabolism simply because of the central position the shikimate pathway occupies in this field of research. Moreover it is a source of clearly written up to date knowledge and not very expensive.

J. VAN DIE

J. J. BARKMAN and PH. STOUTJESDIJK: *Microklimaat, vegetatie en fauna*. Pudoc, Wageningen, 1986. 223 pp., ill. Paperback Df. 50.00. ISBN 90-220-0917-3.

This book is obviously based upon lecture notes compiled for a students course. This has its advantages and disadvantages: advantages because the theoretical part of the book is very clearly written with numerous examples from field situations; disadvantages because the practical part is rather underdeveloped; just one comparatively small chapter is devoted to practice. This is unfortunate because the book would have gained from practical advice. In the last chapter of the book the authors give a series of good advices, but it could have been more elaborate. To call these advices banalities, as the authors do, is an injustice to the chapter and the authors themselves.

Although the book gives a nice survey of the microclimatology, a number of critical statements has to be made. First of all it is a pity that the book is written in Dutch. It decreases the number of potential readers tremendously. Although a few basic books do exist in the English language (LOWRY 1967; UNWIN 1980) a book combining theory and a wealth of realistic examples would have found a market.

Secondly the book has a substantial number of editorial shortcomings. The references are a mess: a number of references does not appear in the reference list, or the year of publication differs, or the order of the authors is mixed up. This occurs irritatingly often. Other editorial "dont's" are: different labelling in a table and a figure (resp. 38 and 52) dealing with the same matter; the consistent use of "h" for hour or rather "o'clock" although the proper Dutch abbreviation is "u."; referring in the caption of a figure to the caption of another figure which in turn refers to the caption of a third figure; the use of jargon: the Aucon, the Vaisala etc. These mistakes could have been easily avoided.

Thirdly the book deals not or extremely briefly with some important pieces of research in the field of the micrometeorology. The work of the scientists united in the Swedish Coniferous Forest Project is not mentioned at all, which is in a book so rich in examples a serious omission. The work of GOUDRIAAN (1977) is mentioned briefly and called too tedious and too difficult: an injustice to the highly qualified work of Goudriaan and colleagues.

In short: a nice clearly-written book which needs a revised edition to get rid of the bugs, but because of the language the market will be too small to make that economically feasible.

GOUDRIAAN, J. (1977) *Crop micrometeorology: a simulation study*. Pudoc, Wageningen. 249 pp.

LOWRY, W. P. (1967): *Weather and life. An introduction to biometeorology*. Acad. Press, New York. XIII + 302 pp.

UNWIN, D. M. (1980): *Microclimate measurements of ecologists*. Acad. Press, New York. VII + 97 pp.

A. H. L. HUISKES.

K. WILSON and D. J. B. WHITE: *The anatomy of wood. Its diversity and variability*. Stobart & Son, Ltd., London, 1987.

V + 309 pp., 136 figs., appendix. Paperback ISBN 0-85442-034-7 £ 12.50; Bound ISBN 0-85442-033-9 £ 20.00

"The Anatomy of Wood" is the successor, not a new edition, of Jane's "The Structure of Wood" which the authors fully revised in 1970 and has since sold out. Like its predecessor this book is primarily intended for students of timber technology, while students of botany are also considered as potential users.

The book has ten chapters. Following a general introductory chapter on the sources of timber, the structural organisation of trees at the macroscopic level is discussed. Chapter 3, "Tree growth at the cellular level" describes the developmental processes which are essential to understand wood structure. Chapters 4 and 5 review the anatomy of softwoods and hardwoods in appropriate detail. Chapter 6 accounts for ultrastructural aspects, with emphasis on its importance for the understanding of wood properties. Chapter 7 discusses wood surfaces and their underlying structure. Variability of wood is the title of chapter 8 which includes a number of topics such as differences between stem- and rootwood, between adult and juvenile wood, within growth rings, heartwood formation, effects of growth rate, traumatic structures, etc. Reaction wood is treated in chapter 9, and the final chapter is on wood identification.

In general, a high level of quality is maintained throughout the text. However, the anatomical part contains some inaccuracies. For instance, the totally incorrect generalisation on p. 99 that hardwood fibres "usually" lack bordered pits, the ambiguous definition of semi-ring-porosity on p. 106, and the inclusion of figure 59 which portrays vasicentric parenchyma instead of scanty paratracheal parenchyma as mentioned in the legend. Another criticism one could voice is that in some fields the latest developments have not been incorporated (e.g. on timber defects caused by modern forestry practice, and on current uses of computer-assisted wood identification). For a botanical curriculum the subjects of evolutionary, ecological and functional wood anatomy receive too little attention. On the other hand some of the chapters are very good (e.g. on reaction wood) and could be used for specialised seminar courses.

Teachers of wood anatomy should certainly purchase this new textbook; whether they will recommend it to their students in preference to other available texts will very much depend upon their specific needs.

P. BAAS

M. G. M. VAN ROOSMALEN: *Fruits of the Guianan Flora*. Institute of Systematic Botany, Utrecht, University, Utrecht and Silvicultural Department of Wageningen, Agricultural University, Wageningen, 1985.

XLI + 483 pp., 8 color plates, 158 plates with numerous line drawings. ISBN 90-9000987-6 (bound) Dfl. 90,- ISBN 90-9000988-4 (cloth) Dfl. 75,-.

The identification of tropical plants usually depends on the presence of flowers, as the keys in floras are largely based on floral characters. However, flowers are far more ephemeral than fruits that take a long time to ripen and, moreover, are often to be found on the forest floor.

That a field research on the ecology of Surinam monkeys was the incentive to produce a book describing and depicting the fruits of 1727 woody species of the Guianan flora should put a blush on the faces of all botanical taxonomists: apparently we did not make our knowledge available in "user-friendly" ways.

The achievement of Marc van Roosmalen is quite impressive, especially in comparison with the time he (and his devote collaborators) could spend on it. The descriptions are concise and the line-drawings are clear. A glossary is included and a "provisional key to the families treated" is added separately.

This book is not only a necessity for biologists working in Guianan forests, but it is also of general botanical interest as it gives an overview of the fruit characters of almost a whole tropical flora.

W. VINK

J. HENIGER: *Hendrik Adriaan van Reede tot Drakenstein (1636–1691) and Hortus Malabaricus. A contribution to the History of Dutch colonial Botany*. A. A. Balke-ma, Rotterdam/Boston, 1986. XVI + 295 pp., 85 figs. Hard cover. US \$ 75.00. ISBN 90-6191-681-X.

For a botanist, the Dutch East India Company (VOC) is connected with the two classics on the flora of the Asian tropics, the *Hortus Malabaricus* by Van Reede tot Drakenstein (1678–1693) and Rumphius' *Herbarium Amboinense* (1741–1755). It is surprising that it were not the physicians, nor the chemists stationed by the VOC everywhere in their territories who ventured in writing a large flora of their area, but two amateur botanists, a governor of the Malabar Coast in India and a merchant on the Island of Ambon, Moluccas.

Contrary to Rumphius who as a man is probably better known than this work, Van Reede tot Drakenstein was up till now mainly a name, the author of a book, or may be even only its editor. We are greatly indebted to Dr. Heniger from the Biohistorical Institute, Utrecht, for calling attention now to the man behind the book. Heniger deserves praise for the patience and the perseverance with which he has dug up, mainly out of the very rich VOC archives, a surprising wealth of data, which became the building stones of a still well readable biography. From this biography comes forward a very interesting and apparently very able man. As a young man, member of an impoverished family of the Utrecht nobility, he went to the East as a soldier. Notwithstanding his apparently poor education, but thanks to his ability, his reliability and his talent for organization he made a career rather quickly, became a diplomat and finally a governor. Moreover, he showed a great interest in the land, its people, their languages, history, religions, and the organization of their society. His main interest seems to have been in the plant world, however. Or was it the VOC's interest in indigenous medicinal herbs that led to the compilation of the *Hortus Malabaricus* and was Van Reede tot Drakenstein again only the able organizer of a team of specialists who were the actual writers?

Apart from the biography of Van Reede tot Drakenstein and from a bibliographic analysis of the *Hortus Malabaricus*, most valuable is the list of all plants depicted with references to pre-Linnean and some post-Linnean names. Furthermore, special attention has been paid to the least known of the botanists connected with the *Hortus Malabaricus*, Van Reede's Italian predecessor and collaborator Father Matthew of St. Joseph and his *Viridarium Orientale*.

Two final remarks: The "Malabaarse Kruidhof" is mentioned only as a Dutch translation of the first two volumes by Abraham van Poot. This is not completely true: in the 2nd volume are some additional new remarks by Jan Commelin referring either to new literature or to plants treated in later volumes. And the edible birds' nests depicted in fig. 33 and 34, p. 110, must have been tough eating for it are the nests of weaver birds!

The book is well produced and the price seems reasonable.

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