

Book Reviews

The Hepaticae of South Greenland

R.M. Schuster and J. Cramer.
Borntraeger, Berlin. 1988. iv + 255 pp.
Illustrated, paperback. DM170.00, US\$98.00.
ISBN 3-443-51014-0.

This publication is based largely on collections made by the author in southern Greenland in 1982. The book begins with 21 pages of introductory material, including aspects of the biology of arctic hepatics, and geography and climate of the southern Greenland area. The not insignificant problems of working on arctic plants are emphasized. The body of the publication is a detailed treatment of 135 species of hepatics that have been found in southern Greenland. Critical specimens are listed for each species, followed by a discussion of the problems associated with the species or species group. The discussions are very good, with comparisons made to taxa that could be confused. Although keys are given for a few groups of species, in general no keys are provided. There are 27 plates of drawings, some of these illustrating taxa recently described by the author and K. Damsholt; others showing critical features such as oil bodies. These drawings for the most part complement the illustrations in Schuster's *Hepaticae and Anthocerotae of Eastern North America*. The memoir ends with an index to taxa and an appendix of localities where specimens were collected.

This work presents many data from an area where little critical work has previously been done on hepatics. On the critical side, I would have liked to have a general key to the species included, and in the cases of the recently described taxa, careful comparison to the author's previous work, especially to keys. This criticism is aimed only at usability, and does not in any way detract from the impressive morphological data set given here. The author's ability to synthesize structural modifications in relation to the environment makes this work one that will be invaluable to future hepatic taxonomy. This is a book that anyone dealing with arctic cryptogams should have on their shelves and one that must be in all major libraries.

D.H. VITT

Structural and Functional Responses to Environmental Stresses: Water Shortage

K.H. Kreeb, H. Richter and T.M. Hinckley (eds).
SPB Academic Publishing, The Hague. 1989.
xiv + 308 pp. Illustrated, paperback. Dfl.95.00,
US\$50.00. ISBN 90-5103-027-4.

This book brings together a collection of papers presented at the XIV International Botanical Congress in

Berlin (1987) on water shortage as an environmental stress. The editors have grouped the 26 rather diverse contributions under five themes, each of which are provided with a concise and helpful introduction: (1) Flow through the soil-plant-atmosphere continuum (three chapters); (2) Components and measurement of cell and organ water relations (five chapters); (3) Responses of processes to water shortage (eight chapters); (4) Interactions of genes and the environment in the response of organisms to water shortage (five chapters); (5) Strategies of response to water shortage (five chapters). There is a good balance between review papers and original research reports. The former include contributions by Pallardy on hydraulic architecture and conductivity; by Savage and Wiebe on the methodology of leaf water potential measurements; by Oertli on plant cell resistance to negative turgor pressure; by Nishizawa *et al.* on desiccation-induced heterophagy in plant root cells; by Richter and Kikuta on osmotic and elastic turgor adjustment in stressed leaves; by Plaut on photosynthetic responses to water and salt stress; by Gaff on responses in so-called 'resurrection' plants; and by Ludlow on various response strategies of plants to water stress.

The book gives a welcome cross-section of an important and fascinating field at the interface of plant physiology, ecology and plant anatomy.

P. BAAS

Progress in Botany. Vol. 50

H.-D. Behnke, K. Esser, K. Kubitzki, M. Runge and H. Ziegler (eds).
Springer-Verlag, Berlin. xxi + 386 pp. Illustrated,
hard cover. DM258.00. ISBN 3-540-50289-0

With volume 50 the lay-out of *Progress in Botany* (formerly *Fortschritte der Botanik*) has been changed from typewritten to a more attractive laser reproduction of the manuscripts. A short preface gives an overview of the history of the series. The division of the field of botany into five sub-groups, each edited by a specialist, has been maintained: a wealth of information on diverse subjects related to the sections (A) structural botany, (B) physiology, (C) genetics, (D) taxonomy and (E) geobotany is provided; in the present volume supplemented with a special section (F) on floral ecology, comprising a total of 22 chapters. The volume is concluded with a subject index. The literature covered in the individual chapters ranges mainly from 1985 to 1988, although some authors also refer to much older publications.

In this series the field of botany has always been broadly interpreted to include fungi and prokaryotic

organisms as well. In the present volume this has led to some inconsistencies. Some chapters are mainly (section A, ch. II, F. Mayer) or entirely (section C, ch. I, R. Eichenlaub) on non-photosynthetic bacteria. In section C, ch. II (H. D. Osiewicz & U. Heinen): 'Cyanobacteria are included because it is well accepted that chloroplasts of higher plants have evolved from this group of photosynthetic prokaryotes' (p. 174). Section D, ch. I: Systematics and evolution of the algae (M. Melkonian) deals with a variety of algal groups, including cyanobacteria and colourless (= plastidless) euglenoids; the class Bicosoecophyceae, however, is not treated because they lack plastids.

Despite this minor point of criticism the present volume is a recommendable, concise and up to date source of botanical literature.

F.A.C. KOUWETS

Advances in Botanical Research Vol. 16

J.A. Callow (ed.).

Academic Press, London. 1989. xii + 273 pp.

Illustrated, hard cover. £44.00. ISBN 0-12-005916-9.

Progress in Botany. Vol. 51

H.-D. Behnke, K. Esser, K. Kunitzki, M. Runge and H. Ziegler (eds).

Springer-Verlag, Berlin. 1990. xv + 419 pp.

Illustrated, hard cover. DM298.00. ISBN 3-540-51785-5.

The more or less simultaneous appearance of Volume 16 of *Advances in Botanical Research* and Volume 51 of *Progress in Botany*, provides a welcome opportunity for comparison of two authoritative series with the same aim: providing concise and up to date information on recent developments in botanical research. However, both series use different formulas to achieve this. At the same time it creates an excuse for not reviewing the contents of each book critically: by the multidisciplinary nature of these series' this has become virtually impossible for a single reviewer.

In *Progress in Botany* (formerly the subtitle for *Fortschritte der Botanik*, now its superheading) recent literature (mainly 1985–1988) on specialized aspects of structural botany, physiology, genetics, taxonomy, geobotany and mycorrhizal symbiosis is reviewed and abstracted in a concise (23 chapters), more or less encyclopaedic manner by specialists. Although some chapters are quite readable as independent reviews, others are less so and the main function is to guide the reader to the relevant literature.

In *Advances in Botanical Research* only a limited number of topics are treated per volume. In volume 16 only four: Lipid metabolism in algae (J.L. Harwood & A. Lesley Jones); The alternation of generations (P.R. Bell); the formation and interpretation of plant fossil assemblages (R.A. Spicer); and Primary productivity

in the shelf seas of North-West Europe (P.M. Holligan). Although emphasis is on recent progress, coverage of the literature spans a couple of decades rather than a few years. The result is that the individual chapters at the same time survey recent progress and provide comprehensive, in-depth reviews of the topics treated.

Both approaches have their pros and cons. *Progress in Botany* covers much more ground per volume, and is useful for researchers in poorly stocked libraries to keep up to date with recent developments. As most individual specialized topics are treated every 2 or 3 years, access to a number of 'Progress' volumes enables the reader to build a fairly complete picture. It should be realized, however, that literature coverage is far from complete for some aspects. *Advances in Botanical Research* with its much greater limitations per volume but greater depth per chapter serves the same purpose for small groups of specialists but can also be recommended for advanced specialized teaching.

Both series' deserve their place on library shelves of botany departments as complementary sources of information. If one has to choose between one of them for budget reasons, one has to keep in mind their different approaches and not just the price per page of information which, predictably, is higher for the Springer than for the Academic Press series.

P. BAAS

De Nederlandse breedbladige Fonteinkruiden (The Dutch Broadleaved Pondweeds) (Wetensch. Meded. KNNV 195)

D.T.E. van der Ploeg.

St Uitgeverij KNNV. Utrecht. 1990. 99 pp.

Illustrated, paperback, Dfl 26.50 (including postage, and to be ordered from St Uitgeverij KNNV, Burg. Hoogenboomlaan 24. 1718 BJ Hoogwoud, The Netherlands). ISBN 90-5011-036-3.

This book is a floristic monograph of the Dutch broad-leaved *Potamogeton* species (WM 177 treats the narrow-leaved group). It contains descriptions, drawings and photographs, distribution maps and ecological notes of 11 species and four hybrids. The author attractively displays his rich experience with living plants of this diverse and allegedly difficult group. General sections deal with the old floristic literature (by E.J. Weeda), ecology, threats and decline, infra-specific variation, hybrids and collecting. Unfortunately, a key was not included, and captions usually lack the name of the taxon involved (so that one has to glance through the text). Nevertheless, the book is a valuable help in identifying pondweeds, and it shows many interesting details of their natural history.

R.W.J.M. VAN DER HAM

The Biochemistry of Plants. Vol. 15. Molecular Biology

A. Marcus (ed.).

Academic Press, New York. 1989. xv + 707 pp.

Illustrated, hard cover. US\$150.00. ISBN
0-12-67415-2.

The series '*The Biochemistry of Plants*' was started in 1980 with eight volumes, each devoted to basic physiological processes or specific classes of chemical compounds. Since then, additional volumes have appeared to keep pace with the development of plant biochemistry into a discipline that forms the basis for structural, physiological and agricultural research. Thus, the present volume reflects the impact of the progress made by applying molecular-biological techniques for the study of nucleic acids and proteins, to physiological problems concerning the temporal and spatial regulation of gene expression as related to growth, development, and reactions to environmental conditions. Gene expression is governed by a multilayered network of *cis*-acting control elements and *trans*-acting regulatory factors that co-ordinate expression at both the transcriptional and post-transcriptional level. This complexity is only beginning to be understood as individual cloned genes or gene families are being analysed. Transformation of plants offers a powerful tool for studying the molecular biology of plant genes, especially the control of gene expression and the processing and translocation of synthesized proteins. Much regulation of gene expression occurs at the nucleic acid level, but in this volume special emphasis is also given to proteins wherever significant information was available. In this way, the book emphasizes recent developments and current problems, and demonstrates the enormous progress that has been made primarily within the past decade.

The book maintains the high standard of its predecessors. It is composed of 17 chapters, each written by experts in their fields, dealing with topics ranging from the regulation of plant gene expression: general principles, and transposable elements, to the genetic manipulation of plant cells. Much knowledge has been gained on organellar genes and gene products, and major aspects concerning chloroplasts and mitochondria are reviewed in four chapters. Proteins and their corresponding genes dominate the scene in chapters on seed storage proteins, stress-induced proteins, the thaumatins, cytoskeletal proteins, calmodulin, and hydroxyproline-rich glycoproteins. Attention is also paid to the regulation of protein degradation, as well as to the expression of foreign genetic material in DNA viruses and plasmids. The latter subject provides background information for the final chapter describing the current state and further potential of plant transformation. The chapters are invariably

informative and provide clear descriptions of the various subjects. In several cases, comparisons with animal systems are made, emphasizing the unity of the underlying principles. Inevitably, in a multi-authored treatise of this kind, individual contributions differ in style. Although the chapters vary greatly in length, this primarily reflects differences in accumulated knowledge rather than depth. All the chapters are quite detailed, but some are largely descriptive, whereas others emphasize principles or present critical accounts. Despite the wealth of structural information on plant genes, relatively little is known about their functions, let alone how development is integrated at the level of the whole plant. However, molecular analysis has only just begun and now provides us with tools to establish causal relationships where previously it was possible only to assess associations between factors and effects on growth, development and differentiation. This book is an excellent reference work of the state of the art up to 1988 and recommended information for any one interested in plant growth and development. Unfortunately, the price is such that few individuals will be able to purchase it.

L.C. VAN LOON

Antarctic Paleobiology. Its role in the Reconstruction of Gondwana

T.N. Taylor and E.L. Taylor (eds).

Springer-Verlag, New York. 1989. x + 261 pp.

Illustrated, hard cover, DM198.00. ISBN
3-540-97006-1.

Antarctic Paleobiology is a collection of papers presented during a workshop in Columbus (Ohio) in 1988, the primary aim of which was discussion of the state of affairs in Antarctic paleobiology and the inter-relationship of its fossil biota to those of other southern continents. Most of the contributions refer to plants, one deals with animals (Triassic terrestrial vertebrates, by W.R. Hammer), and two with physical parameters: geological history (J.W. Collinson) and paleoclimatology (J.T. Parrish). R.A. Spicer deals with the reconstruction of higher-latitude Cretaceous vegetation and climate, comparing Arctic and Antarctic data. G.T. Creber reflects on the possibility of estimating the production of fossil forests using ring-width patterns and diameters of tree stumps. Antarctic palynology is reviewed by G. Playford (pre-Mesozoic sequences) and E.M. Truswell (Cretaceous and Tertiary sequences). Megafossils (impressions/compressions) are considered by D. Edwards (Silurian-Devonian). S. Archangelsky (Paleozoic plant distribution in Gondwana) and M.N. Bose *et al.* (Gondwana floras of India and Antarctica). Structurally preserved megafossils are discussed by E.L. Taylor and T.N. Taylor (wood and peat) and K.B. Pigg and T.N. Taylor

(*Glossopteris* and *Dicroidium*). Two chapters focus on megafossils of antarctic seed plants: cycadophytes (T. Delevoryas) and conifers (R.A. Stockey). In the final contribution A.N. Drinnan and P.R. Crane reconsider the biogeographical significance of Antarctica. It is concluded that integration of paleobotanical angiosperm data from Antarctica and related austral areas could provide a relative time scale on the pattern of Gondwana fragmentation.

Throughout the book the available data are extensively reviewed, and comparisons with fossil floras from other southern continents are abundant. A comprehensive index and an elaborate bibliography of Antarctic paleobotany and palynology in which each of the 374 citations has a subject listing are added. As such, the book is an excellent introduction into the rapidly developing field of Antarctic paleobotany and palynology.

R.W.J.M. VAN DER HAM

Molecular and Genetic Aspects of Nitrate Assimilation

J.L. Wray and J.R. Kinghorn (eds).
Oxford Science Publ., Oxford. 1989. xv + 410 pp.
Illustrated, hard cover. UK£45.00. ISBN
0-19-857696X.

This book is based on lectures presented at the Second International Symposium on Nitrate Assimilation—Molecular and Genetic Aspects, which was held in St Andrews, Scotland, July 1987. It gives a good overview of assimilatory nitrate reduction. Two chapters on the dissimilatory *E. coli* system are a valuable addition. The material is grouped into the following six sections.

(1) Nitrate uptake (two chapters). Both chapters describe nitrate uptake in higher plants. Although little is known yet, a lot of new information may be expected in the near future.

(2) Nitrate reduction (12 chapters). This is the most extended section, also because the first chapters (dealing with *E. coli*, cyanobacteria, yeasts, filamentous fungi and algae, respectively) already discuss some of the data belonging to the next two sections. The remaining chapters describe structure, immunology and genetics of nitrate reductase from higher plants.

(3) Nitrate reduction (four chapters). This section reviews nitrite reduction in *E. coli* and higher plants. It contains detailed information about structure and function of spinach nitrite reductase, the cloning of its genes, and gives nucleotide and amino acid sequences.

(4) Regulation of nitrate assimilation (three chapters). From the fungi *Aspergillus nidulans* and *Neurospora crassa* many nitrate reduction mutants are known. To date, after isolation of fungal as well as higher plant nitrate reductase genes, induction and repression at the levels of enzyme activity, and mRNA synthesis and degradation can be studied.

(5) Applied aspects (two chapters). This section shows how the knowledge of nitrate assimilation can be used in fungal and higher plant biotechnology.

(6) Comparative aspects (one chapter). The last chapter describes the amino acid sequence relationship between bacterial, fungal and plant nitrate and nitrite reductase proteins.

In spite of the fact that most contributions show some (unavoidable) overlap and the research data presented are not very recent any more, the book provides a good overall background to the reader.

A.J. ANDRIESSE

Sieve Elements—Comparative Structure, Induction and Development

H.-D. Behnke and R.D. Sjolund (eds).
Springer-Verlag, Berlin. 1989. xiv + 305 pp.
Illustrated, hard cover. DM178.00. ISBN
3-540-50783-3.

This book contains the proceedings of the symposium commemorating the discovery of sieve elements by Theodor Hartig in 1837, held during the XIVth International Botanical Congress in Berlin 150 years later. Additional contributions have been incorporated to result in a comprehensive survey of current knowledge on sieve elements throughout the plant kingdom. Individual chapters are devoted to sieve elements or sieve-element like cells in algae, mosses, seedless vascular plants, conifers, cycads and gnetophytes, dicotyledons, and monocotyledons. A chapter on sieve elements in internodal and nodal anastomoses of *Dioscorea* analyses in clarifying detail a special case of bewildering complexity. Various induced sieve elements are described in chapters on phloem in tissue cultures, wound phloem and on phloem connections in graft unions. Sieve elements in haustoria of parasitic angiosperms, with special emphasis on the fascinating connections between *Cuscuta* and its host are the subject of a separate chapter, as are ultrastructure and biochemistry of phloem proteins and phloem evolution as appraised from the fossil record. All chapters offer well balanced and detailed information on all feasible attributes of sieve elements and their associated parenchyma cells such as Strassburger cells and companion cells. Thus a truly comparative basis is offered on ontogeny, histology and ultrastructure of cell walls, protoplasmic organelles and symplastic connections of sieve elements and their associates in different plant groups and experimental situations. I was particularly impressed by the use of specific sieve element plastids in tracing secondary connections between sieve tubes in graft unions of *Vicia* (with P-type plastids) and *Helianthus* (with S-type plastids). The deep-rooted nature (genetic basis) of sieve element plastids, so elegantly used for systematic purposes in numerous studies by Behnke, is also evident from the fact that sieve elements in callus and wound tissue derived from

non-vascular tissues produces the same type of sieve tube plastids as the normal sieve elements. It is amazing that the function of these plastids remains elusive.

Throughout, the well-written texts are complemented with superb TEM micrographs. The book can be recommended whole-heartedly as a standard reference for researchers and as an ideal text for advanced botany teaching.

P. BAAS

Plant Nitrogen Metabolism—Recent Advances in Phytochemistry. Vol. 23

J.E. Poulton, J.T. Romeo and E.E. Conn (eds). Plenum Press, New York. 1989. viii + 474 pp. Illustrated, hard cover US\$85.00. ISBN 0-306-43322-2.

Following a very good overview of nitrogen metabolism in higher plants (Blevins) the various aspects of nitrogen metabolism are treated in detail. For the progress in understanding the assimilation of ammonia (Rhodes, Brunk & Magalhães) and nitrate, the advantages of deficient mutants are highlighted (Kleinof, Warner & Melzer; Lea, Blackwell, Murray & Joyce). Further topics are the metabolism of l-aminocyclopropane-l-carboxylic acid in relation to ethylene synthesis (Yang), the metabolism of polyamine (Flores, Protacio & Signs) and polyhydroxy alkaloids (Fellows *et al.*), including an overview of elucidating the biosynthesis of reticulon and berberine using plant cell culture techniques (Zenk). With regard to the legume-Rhizobium interaction, Verma reports on the progress of plant genes involved in carbon and nitrogen assimilation in root nodules, and Pate on the transport and utilization of the products of this symbiotic nitrogen fixation. As applied topics, Shanter treats the sites of action of herbicides in amino-acid metabolism and Okita *et al.* molecular aspects of storage proteins in cereals.

Due to the high standard and the selective use of diagrams, these advances can be highly recommended to every library and to plant physiologists, geneticists and experimental ecologists. The strength of presentation also makes it very suitable for graduate teaching.

W.H.O ERNST

Patterns in Plant Development

T.A. Steeves and I.M. Sussex. Cambridge University Press, Cambridge. 1989. xv + 388 pp. Illustrated, hard cover: UK £27.50, US\$44.50; paperback: UK £9.95, US\$14.95. ISBN 0-521-24688 and 0-521-28895-9.

This is a revised version of a book that was published in 1972. The authors describe the phenomena of development in vascular plants, ferns to seed plants, from a structural point of view. According to the authors emphasis is given to the experimental approach.

Developmental biology nowadays is also studied at the cell and molecular level. To interpret the data obtained with cell and molecular biological techniques in relation to whole plant development, however, a thorough knowledge is needed of structural aspects of development such as described here.

There are only a few references from 1980 to 1986, and references on tissue culture and ultrastructural aspects especially should have been updated.

I was very disappointed in reading a chapter on carrot somatic embryos without reference to the exciting cell and molecular biological results obtained in the last 10 years that are of concern for developmental pathways.

Although a book on structural aspects of plant development would be welcome, it would be better appreciated by plant anatomists and by plant cell and molecular biologists if recent research had been incorporated.

A.M.C. EMONS

The Identification of Flowering Plant Families, 3rd ed.

P.H. Davis and J. Cullen.

Cambridge University Press, Cambridge. 1989. x + 133 pp. Illustrated, paperback: UK£6.95, US\$11.95; hard cover: UK£20.00, US\$29.95. ISBN 0-521-29359-6 and 0-521-22111-0.

For people who have to deal with flowering plants it is sometimes very difficult to name a foreign species. Knowing its family narrows the scope of the search. Few manuals are available. Next to Thonner's and Hutchinson's general keys Davis and Cullen's booklet deals primarily with the Northern hemisphere above 30° N, but includes cultivated representatives of some other families as well. The arrangement of families has been changed to Engler and Prantl's order. Recently recognized 'split families' most likely to be encountered are included in keys under the telegraph-style family diagnoses. An important chapter is the one on the usage of terms, which are significantly different in the various manuals. In the glossary I missed 'adventitious' (used in couplet 1 of the Key to Groups), 'epipetalous', 'hypanthium' ('perigynous zone' on p. 5, Fig. 1). As usual, strictly male or female plants pose problems. In conclusion, a very useful manual because of its relative simplicity, convenient size, and clear outlay.

J.F. VELDKAMP

Plant Pigments

T.W. GOODWIN (ed.).

Academic Press, London. 1988. x + 362 pp. Illustrated, hard cover. £35.00. ISBN 0-12-289847-8.

The variation in plant pigmentation is a challenge for many scientists to elucidate the structures of the com-

pounds involved. Goodwin and his assisting authors describe the chlorophylls, carotenoids, phytochromes, and flavonoids as the most significant plant pigment groups. The present work can partly be considered as a supplementary volume to *The Chemistry and Biochemistry of Plant Pigments* (T.W. Goodwin (ed), 1965 and 1975). The overwhelming amount of available new literature data forced the editor to a very strong selection. As a consequence some minor pigment groups, which were described in the previous works, were left out. The result is a compact introduction to, and a review of, the basic structures of the pigments, their chemical analysis, their structural variation principles, their biosynthesis, their biological significance, their spectral and other physicochemical properties, and their plant taxonomical relevance. Recently developed analytical techniques are described. Interesting aspects of their involvement in photosynthesis, photomorphogenesis and flower pigmentation are mentioned and, if possible, explained. Pigment finds for different plant species are not listed, but relevant literature is mentioned. The subject index, which uses 5% of the total number of pages, is well structured. Reference lists point to many detailed research communications as well as review papers and specialized books.

This book is essential as an introduction or as handbook for anyone who is interested in plant pigment research, especially as Goodwin draws one's attention to recently developed fields. It may serve research and education for many years, especially in plant physiology, phytochemistry, biophysics and plant breeding. This book is highly recommended for libraries which cover these fields of research.

H.H. VAN GENDEREN

Lindenmayer Systems, Fractals, and Plants. Lecture Notes in Biomathematics. Vol. 79

P. Prusinkiewicz and J. Hanan.
Springer-Verlag, New York. 1989. v + 120 pp.
Illustrated, paperback. DM36.00.
ISBN 3-540-97092-4.

This booklet is a (simple) introduction to 'rewriting' (production) systems from a computer graphics point of view. It focuses mainly on Lindenmayer systems (L-systems), i.e. parallel string rewriting systems introduced by Lindenmayer (*J. Theor. Biol.* 1968, 18: 250-315) for description of the development of filamentous algae, and to a lesser extent on the two dimensional generalizations thereof (map L-systems).

L-systems have been studied extensively from a mathematical point of view, but this theory is not treated in the book. Instead, the book shows how one can use L-systems to draw 'realistic' pictures of plants, or other objects, and points out that L-systems can be used to generate fractals (although it ignores the care-

ful analysis of the relationship between L-systems and fractals as given by Smith (*Siggraph* 1987). Unlike previous use of L-systems in computer graphics, in which the graphic interpretation step is purposely kept separate from the string generation step (Smith, *Computer Graphics* 1984, 18: 1-10), Prusinkiewicz includes LOGO-style 'turtle' instructions in the strings carrying instructions for the graphics interpretation. Unlike the original work on graphical representation of L-systems (Hogeweg and Hesper, *Pattern Recognition* 1974, 6: 165-179; Smith, *Computer Graphics* 1984, 18: 1-10), the turtle algorithm used, in many cases generates only a degenerate representation of the string, in which many substrings are mapped on top of each other and are therefore invisible.

In view of the publication of the booklet in the series *Lecture Notes on Biomathematics*, my severest criticism of the book is that a picture of a plant is simply equated with a (realistic) model of a plant, or even with a plant. As an extreme example, the generation of surfaces by filling polygons generated by L-systems, is introduced as a way of 'modelling' leaves (they can grow). This might be a useful notion of modelling in computer graphics, it surely is not what we mean by modelling in biology. Nevertheless the pictures are pleasing to the eye, and for those not familiar with the power of simple rewriting rules to generate complex patterns the booklet may be enlightening.

P. HOGEWEG

Biotic Diversity and Germplasm Preservation, Global Imperatives

L. Knutson and A.K. Stoner (eds).
Kluwer Academic Publishers, Dordrecht. 1989.
xxii + 530 pp. Illustrated, hard cover. Dfl 250.00,
US\$129.00, UK£79.50. ISBN 0-7923-0178-1.

As the title of the book implies, biotic diversity and germplasm preservation has become a matter of global concern. The present book is the proceedings of the 1988 Beltsville Symposia on Agricultural Research devoted to this topic. The following subjects are dealt with in five sections: I. Introduction and Delineation of Issues; II. Basic Research and Germplasm Status; III. Frontiers in Germplasm Utilization; IV. Germplasm Collection and Data Management and V. International Issues and Linkages.

While 'Global Imperatives' is indicated in the title, most of the issues are dealt with by American authors and tend to be addressed from a rather USA-biased perspective. In its authority, however, the book provides a good overview of some current thinking with emphasis on crop species. In section I, one would have liked a rather more thorough discussion of biosystematics as it relates to genetic resources conservation. Much classical taxonomy is still required to provide a sound basis for the understanding of species diversity

which is essential for collection strategies and *in-situ* conservation. Worth reading is a chapter on ethical and policy implications (Busch *et al.*). It is correctly stated that in spite of all the rhetorics on biodiversity and the need for conservation it is easier to raise public concern (and financial support) over declining whale populations than to create awareness over the loss of genetic variation in plants. Section II, supposed to cover basic research, deals primarily with actual and rather routine management of *ex-situ* genebanks (in the U.S.A. and China) and a general overview of global activities of the International Board of Plant Genetic Resources (IBPGR). The exception is an excellent paper by Namkoong on population genetics and the dynamics of conservation. It deals perceptively with population genetics principles as a basis for conservation strategies. Section III (Frontiers in Germplasm Conservation) also seems to promise more than it delivers. Reviews are given on animal genetic resources, microbial germplasm, gene transfer in plants, enhancement of germplasm to facilitate use and the possible (and future) impact of biotechnology on conservation if all goes well. Rather common aspects of *ex-situ* conservation techniques are reviewed in section IV, including access and exchange between genebanks. Information technology, of obvious general importance in handling large collections, is dealt with by a description of the Germplasm Resources Information Network (GRIN) in the U.S.A. More efficient relational database systems have been developed since which are not discussed. Section V (International Issues and Linkages) provides a review of international activities in which the U.S.A. is involved, a rather superficial and uncritical contribution on the very controversial topic of legal ownership (including industrial patenting of genes in plants and animals) and a plant breeders' view on the use of genetic diversity in crop improvement.

All in all, few papers go beyond stating what is generally well known. The merit lies primarily in putting together some present thinking in a rather textbook fashion. Some chapters have extensive literature references that are useful. The book is well produced and should be available in libraries rather than bought by individual scientists.

J.J. HARDON

Numerical Syntaxonomy (Advances in Vegetation Science 10)

L. Mucina and M.B. Dale (eds).
Kluwer Academic Publishers, Dordrecht. 1989.
v + 215 pp. Illustrated, hard cover. Dfl 250.00,
US\$129.00, UK£82.50. ISBN 0-7932-0388-1.

This book, with contributions from different schools, presents a wide range of available methods and theoretical concepts. The book starts with an overview of the last two decades of numerical syntaxonomy (Mucina

and van der Maarel). After this introductory paper, six theoretical studies are presented. Three of these studies are rather classical. Fischer and Bemerlein discuss an outline for data analysis, Moravec discusses the influences of the individualistic concept of vegetation on syntaxonomy, and Wildi presents a new numerical solution to traditional phytosociological tabular classification. The other three theoretical papers present more or less new ideas. Dale presents a general framework for similarity measures, and discusses the use of grammar (with Barson). Podany presents two new combination clustering methods using SAHN classificatory strategies.

The remaining 11 papers are case studies on a wide variety of phytocoena. The book is worth reading by numerical syntaxonomists and taxonomists, as well as phytosociologists. However, the price of this book (US\$129.00) is far too high to recommend it for private collections.

O. VAN TONGEREN

Causes and Consequences of Variation in Growth Rate and Productivity of Higher Plants

H. Lambers, M.L. Cambridge, H. Konings and T.L. Pons (eds).
SPB Academic Publishing, The Hague. 1990.
x + 364 pp. Illustrated, hard cover. Dfl 175.00,
US\$90.00. ISBN 90-5103-033-9.

The book presents 21 papers resulting from a workshop held in Utrecht in 1988. Although the title is broad, the editors' preface restrict 'the causes in growth and plant productivity' to carbon and nitrogen. The contributions include a variety of approaches, from the subcellular level of photosynthesis and nitrogen partitioning (J.R. Evans) to leaf nitrogen allocation for photosynthesis in the canopy (J.T. Pons *et al.*). Most authors concentrate on the comparison at the species level, only a few demonstrate variation at the population (P. Dijkstra; E. Kraus *et al.*; van Andel and Biere) and cultivar level (R.J. Ceulemans; A.J. Barneix). The editors have missed the opportunity to present their models in this perspective of variation. Consequently it is not surprising that F. Berendse and W.Th. Elberse have no problems characterizing species with an enormous ecological range, e.g. *Festuca rubra*, by one nutrient index value. The most confusing is the chapter on secondary plant compounds (W.J. Baas).

Despite some very interesting papers I finished reading the volume with a sense of disappointment. Although authors are aware that 'availability of light is not the only factor controlling the allocation of leaf nitrogen' (Pons *et al.*), there is no perspective of elaborating these factors in the great numbers of models and functions.

There is no doubt that plant physiologists and ecologists will refer to particular chapters in this well produced book.

W.H.O ERNST

Flower Artists of Kew

W.T. Stearn

Herbert Press, London, and Royal Botanic Gardens, Kew. 1990. 159 pp. Including 56 colour plates, hard cover. £18.95. ISBN 1-871569-16-8.

The Royal Botanic Gardens at Kew have for many years been able to attract the finest botanical artists to illustrate publications such as Curtis's *Botanical magazine* (now the *Kew Magazine*). Headed by the renowned senior botanical artist, Mary Grierson, a selection team picked 56 of the very best contemporary paintings by 19 different flower painters; W.T. Stearn, erudite botanist and biohistorian with a gifted pen, has written a captivating treatise on the history of

botanical illustration and its current 'state of the art', 56 concise botanical pen portraits of the pictured plant species, and 19 short biographies of the artists; the result is a beautiful book which is not just another coffee table specimen with fine pictures, but an album of superb paintings which is highly informative at the same time. Full credit must go to the artists Mary Bates, Marjorie Blamey, Jill Coombs, Barbara Everard, Ann Farrar, Mark Fothergill, Victoria Goaman, Mary Grierson, Josephine Hague, Christabel King, Joanna Langhorne, Cherri-Ann Lavrih, Margaret Mee, Valerie Price, Rodella Purves, Pandora Sellers, Margaret Stones, Wendy Walsh and Ann Webster, whose paintings are excellently reproduced. Kew Gardens should be grateful to them for approving of the label 'Flower Artists of Kew'. Many only incidentally worked on commissions for Kew and earned their reputation completely in their own right.

P. BAAS