

## Book Reviews

### **Biominingeralization in Lower Plants and Animals**

B.S.C. Leadbeater and R. Riding (eds) (The Systematics Association, Special Volume No. 30). Clarendon Press, Oxford, 1986. xii + 401 pp. Illustrated, hard cover, £45.00. ISBN 0-19-857702-8.

Biominingeralization, as understood in this volume, is the capacity of organisms to secrete mineral skeletons or shells, or otherwise to precipitate minerals. Biologists, chemists and geologists are involved in the interdisciplinary study of biominingeralization.

The present volume contains the proceedings of a conference held at Birmingham in 1985, sponsored by the Systematics Association. It concentrates on biominingeralization by bacteria, cyanobacteria, algae, lichens and protozoans. The present work succeeds a volume with the accent on biominingeralization and biological metal accumulation (Eds P. Westboek and E.W. de Jong, D. Reidel, Dordrecht, 1983). The editors endeavour to give an all-round picture of recent progress in the knowledge of the processes involved, the products and their functional significance. The contributors give a good representation of the international scene of biominingeralization research. Among 41 authors, 14 are from the UK, 9 from The Netherlands, 5 from the FRG and four from the USA.

After four broader chapters on the mineralization processes, their chemical perspectives and microbial biotransfer of minerals, the chapters are arranged according to organisms, namely cyanobacteria, crustose lichens, Chlorophyceae, Charophyceae s.l., calcified Rhodophyceae, Prymnesiophyceae and Coccolithophorids (four chapters), Foraminifera and diatoms (three chapters each), Chrysophyceae, choanoflagellates, heliozoa, and radiolaria.

The editorial work (assisted by referees), including a differentiated index, is of high quality. An attractive typeface has been used. Thus, the volume is a standard text for the topic concerned.

W. GAMS

### **Microbiology of the Phyllosphere**

N.J. Fokkema and J. Van Den Heuvel (eds) Cambridge University Press, Cambridge, 1986. viii + 392 pp., illustrated hard cover £30.00 (US\$54.50). ISBN 0-521-32344-4.

The research workers engaged in phyllosphere studies have established a tradition of meeting every 5 years. The symposium held in Wageningen in 1985 was the fourth in the series. It was attended by the most rep-

resentative scientists in the field and the present book contains all the review-type papers presented.

The chapters are divided into five sections: New Techniques, Ecology of Epiphytic Fungi, Endophytic Leaf Fungi, Plant Pathogenic and Saprophytic Prokaryotes and Biological Control on Aerial Plant Surfaces. Novelty reported include some techniques of monitoring leaf epiphytes and theoretical concepts for colonization. C.E. Morris and D.I. Rouse report on the community structure, with emphasis on diversity, J.H. Andrews on the use of markers in microbial ecology, I.H. Parbery and J.F. Brown on sooty moulds and black mildews in extra-tropical rainforests of Australia. P. Dowding found leaf yeasts to be sensitive indicators of air pollution.

A section on endophytes of green plants is included for the first time. O. Petrini surveys the endophytes in various plant families so far recorded. The toxicity to sheep and cattle of grasses induced by endophytes has become a hot topic in recent years (K. Clay). G.C. Carroll collected data indicating a generally protective role of fungal endophytes to their host plant. This role is ascribed to toxic metabolites as shown for conifers by J.D. Miller.

The section on biological control is invariably of great actuality: two contributions (S.E. Lindow and N.J. Panopoulos) deal with the antagonistic actions of non-ice-nucleating bacteria on their ice-nucleating counterparts and the possibilities of introducing desired properties by genetic engineering. L. Sundheim reviews the possibilities of using mycoparasites against biotrophic plant pathogens and A. Tronsmo that of *Trichoderma* spp. in particular. F. Schönbeck and H.-W. Dehne introduce a new approach to induce resistance in plants against various pathogens by treatment with harmless microbial metabolites.

The book is printed from a carefully produced uniform camera-ready typescript. Editorial work leaves little to be desired. There is remarkably little overlap between the chapters. A differentiated index concludes the work. Like its predecessors, this volume will belong to the standard literature for phyllosphere work.

W. GAMS

### **On the Economy of Plant Form and Function**

T.J. Givnish (ed.) Cambridge University Press, Cambridge, 1986. xviii + 717 pp., illustrated hard cover £55.00 (US\$84.50). ISBN 0-521-26296-8.

This volume represents the proceedings of a symposium held at Harvard in 1984. An attempt is made

to quantify the role of morphological and physiological plant traits in the maximization of growth and competitive ability in various habitats. The first part focuses on the economics of gaseous exchange. Two alternatives are identified: the 'cost' of leaves with high versus low photosynthetic capacity, and the 'cost' for producing translocation systems to compensate for water loss during photosynthesis versus reduced photosynthesis due to low water potentials. The second part is devoted to the economics of support and treats allocation to productive leaf tissue and allocation to unproductive support tissue required to evade shading. The third part, on the economics of biotic interactions, is represented by only one, interesting, chapter on the cost of defense. Competitive interactions are treated in parts one and two.

Several well known authors have contributed to this volume. As in many proceedings of symposia, the differences between chapters are rather large. Some have a more theoretical and generalistic approach, others treat one or more case studies. The introduction by the editor to each part tries to link each chapter to the next. Although clear in themselves, the significance of some chapters, or parts of them, for the main objective is not always clear. Not surprisingly, the economy of form and function can be better indicated in several very interesting case studies than in the generalistic approaches, which can be vague and speculative. The latter sometimes provide only an insight into the subject. But, on the whole, the book can be warmly recommended to those working in the field of whole plant physiology and ecology.

T.L. PONS

### Plants in Danger, What Do We Know?

S.D. Davis *et al.* International Union for Conservation of Nature and Natural Resources, Gland, Switzerland and Cambridge, UK, 1986. xlv + 461 pp., seven maps, paperback, £15.00 (US\$21.00). ISBN 2-88032-707-5.

An editorial group based at the Threatened Plants Unit of the IUCN Conservation Monitoring Centre wants to answer the question 'Where can I find out about the flora of any country, which species in that flora are threatened, and who may be trying to save them?' In an alphabetical arrangement of countries and certain islands the reader obtains information on the area of the country and the number of its inhabitants, some general characteristics of flora and vegetation, references concerning checklists and floras, fieldguides, the addresses of voluntary organizations, botanic gardens, laws protecting plants and some references on vegetation, plant geography, botanical bibliographies, etc. The most important aspect should be the information on threatened plants. This essential

topic, however, is disappointing. It is restricted to some numerical summaries of extinct, endangered, vulnerable and rare species. The selected references on threatened plants of each country are very subjective, e.g. the special attention to the Region of Senne in the Federal Republic of Germany (why?). The comment on publications is sometimes misleading, e.g. it is said that Sukopp *et al.* (1978) give a detailed analysis of 2667 threatened plant taxa in the Federal Republic Germany. I have never seen a publication which states that *Bellis perennis*, *Senecio vulgaris*, *Stellaria* and some other hundred taxa are in danger; these authors only give an estimation on the status of 2667 plant taxa in the FRG. I cannot imagine for a reader in The Netherlands any benefit of the information that an unpublished report by 'IUCN, under contract to the EEC through UK Nature Conservancy Council' . . . 'included a data sheet on one Dutch plant, now extinct in the country'. The reader wants to know the name, not the way of the financial support.

In their conclusion for the future the editorial group states two needs: the first is for more botanists and the second is for more Red Data Books. The need for botanists, however, is immediately restricted to taxonomists, 'that in view of the argument six times more plant taxonomists than the present 3000 are necessary to examine 250 000 plant taxa, i.e. 14 taxa per taxonomist'.

I had hoped to read conclusions that would stimulate the necessary research on plants in danger. This book, however, missed the chance.

W.H.O. ERNST

### Ecological Systems of the Geobiosphere Vol. 2. Tropical and Subtropical Zonobiomes

H. Walter and S.-W. Breckle. Translated from the German by S. Gruber. Springer Verlag, Berlin, 1986. xiv + 465 pp., 330 figures, 116 tables, hard cover, DM184. ISBN 3-540-13793-9.

This volume is a translation from the German of the four-volume series which discusses and summarizes the knowledge about the ecological relationships of the World's biomes. It considers the subtropical and tropical zonobiomes with particular emphasis on plants and vegetation, and less emphasis on vertebrates and invertebrates. The authors give an excellent exemplified coverage of the topic with a high proportion of recent literature; more than 10% of the 850 references are from the early 1980s. Due to the clear diagrams and the numerous tables and photographs, the reader obtains a good impression of the ecology of the subtropical and tropical biomes. In view of the widespread and severe impact of man on the subtropical and tropical ecosystems, it would perhaps be worthwhile to indicate some of these problems and to

relate them to the natural climatic fluctuations, especially in the subtropical biomes.

Apart from some minor misspellings of Latin names, the volume is excellently produced. With this book the authors will certainly stimulate students and research workers engaged in the subtropics and tropics. I can warmly recommend it to ecologists and other tropical biologists.

W.H.O. ERNST

**The Family of Lemnaceae—A Monographic Study. Vol. 1. Morphology, Karyology, Ecology, Geographic Distribution, Systematic Position, Nomenclature, Descriptions**

E. Landolt. Veröffentlichungen des geobotanischen Institutes der Eidgenössischen Technischen Hochschule, Stiftung Rübel, Vol. 71. Zürich, 1986. 566 pp., illustrated paperback, Sw.Fr. 69.00 US\$50.00. ISSN 0254-9433.

This monographic study of the 34 species of the family Lemnaceae is a monumental treatise and can be considered as a veritable mine of information. E. Landolt began his studies on this family in 1953 and built up a collection of more than 1000 living clones. The bibliography of volume 1 is published in volume 2 and contains more than 3000 titles. Volume 1 has a varied contents and is a book that will appeal to many different readers in different ways. It is therefore best to start by running briefly through some of the chapters.

The first chapter examines the structure and organization of the plants, growth and ageing of the fronds, characteristics of turions, and of resting, flowering and fruiting fronds. The text is abundantly illustrated with fine line drawings and good black and white photographs. High light intensity, addition of sucrose, high CO<sub>2</sub>-content, low temperature, especially during the night, and shortage of nutrients appear to favour the formation of turions (resting fronds that are morphologically different from normal and that sink to the bottom of the water). The scanning electron microscope photographs of pollen grains and of the complete flower of *Lemna aequinoctialis* are of excellent quality and deserve special mention. The flowering and fruiting percentages of the Lemnaceae species in nature show large differences: from less than 1% up to 48% of the samples studied. Crowding effects, light intensity, duration of light and temperature appear to play a role in flowering and fruiting. The spiny surface structure of the pollen grains provides an argument for zoogamy by snails, small insects (flies and aphids) and mites. Most species are protogynous. Probably some species are partly or completely self-sterile.

The exceedingly small chromosomes of these tiny plants have been intensively studied by Urbanska-

Worytukiewics. Aneuploidy, polyploidy and intraspecific cytological variation have been observed. Habitat demands and ecological behaviour are outlined in the fourth chapter.

There are interesting sections on the significance of optimum and maximum temperatures, light condition and chemical composition of water. The distribution patterns of all species are characterized in meticulous detail and are based on the studies of over 25 000 herbarium specimens. Landolt is inclined to place the family of Lemnaceae in the vicinity of Alismatiflorae and not of the Ariflorae. In his opinion, a close relationship between Pistia (Araceae) and Lemnaceae does not seem to exist.

The concluding chapter gives a description of the family with keys to the subfamilies, genera and species. Excellent black and white photographs and colour photographs of the species are added. This monograph is to be strongly recommended. It is one of the best if not the very best in this field.

T.J.W. GADELLA

**The Family of Lemnaceae—A Monographic Study. Vol. 2. Phytochemistry, Physiology, Application, Bibliography**

E. Landolt and R. Kandeler. Veröffentlichungen des geobotanischen Institutes der Eidgenössischen Technischen Hochschule, Stiftung Rübel, Vol. 95. Zürich, 1987. 638 pp., illustrated paperback Sw.Fr. 64.00, US\$48.00, according to rate of exchange. ISSN 0254-9433.

In this second volume of the monographic study of the Lemnaceae, E. Landolt and the co-author, R. Kandeler, survey the present knowledge on this family. They cover nearly all the aspects of phytochemistry, physiology and the importance of economics.

The mineral content of Lemnaceae appears to be high compared with other water plants, they are able to accumulate heavy metals. The content of protein in Lemnaceae is one of the highest in the plant kingdom and is dependent on growth conditions. Percentages of protein of 6.8–45 of the dry weight are reported.

The utilization of species of the Lemnaceae for the investigation of physiological processes is widespread. Aseptic culturing and different nutrient solutions are generally used for this purpose. The detailed account of the effects of dissolved chemical compounds (inorganic and organic substances) is of particular interest. The Lemnaceae are sensitive to herbicides and can be used as test organisms to detect the presence of herbicides in water. Some chapters discuss the influence of light and temperature on growth and survival, various aspects of flower induction and dormancy of

turons, and metabolic processes. The combined study of length measurements on electron micrographs and of the analysis of the fragment map of chloroplast DNA, after the treatment of *Spirodela punctata* with restriction enzymes, shows that the chloroplast DNA has a longer contour length than in other Angiosperms. The surplus segment lies in the large single-copy region. The overall distribution of specific genes, e.g. tRNAs, appears to be similar to the distribution on spinach and maize.

The high protein content, the pronounced ability to accumulate heavy metals, the absence of disease and the ability to be easily harvested, and its applications, are discussed in the final chapter. A protein harvest of up to 15 t ha<sup>-1</sup> year<sup>-1</sup> is possible, whereas soybeans yield a maximum of 0.7 t protein ha<sup>-1</sup> year<sup>-1</sup>. Wolffia, the smallest Angiosperm, is used as for food in eastern Asia. Sufficient protein for 100 dairy cattle can be obtained from 3.1 ha water area plus duckweed. Lemnaceae are well suited to biological treatment of waste water under certain conditions. The ability of Lemnaceae to accumulate heavy metals can be used to remove such minerals from polluted waters.

I have mentioned only a few of the topics treated in this volume. There are many more, all of which throw a great deal of light on the subject. Because of the importance of placing new observations into reasonable perspective, every scientific approach, at a certain stage, needs a basic synthesis of the knowledge of descriptive and experimental methods. This synthesis, presented by Landolt and Kandelier, is such that a wide diffusion will greatly benefit all students of evolutionary biology and systematics. I recommend the present volume to all biologists and regard it as an extraordinary achievement which will be looked upon as a model for similar studies of other plant groups.

T.J.W. GADELLA

### Modern Methods of Plant Analysis. New Series Volume 4. Immunology in Plant Sciences

H.F. Linskens and J.F. Jackson (eds) Springer-Verlag, Berlin, 1986. xviii + 263 pp., 90 figures, hard cover, DM 169.00. ISBN 3-540-16842-7.

Volume 4 in the new series, *Modern Methods of Plant Analysis*, edited by H.F. Linskens and J.F. Jackson, is entitled 'Immunology in Plant Sciences'. This volume contains a collection of chapters on the immunodetection of a large range of plant substances (plant hormones, phytoalexins, secondary metabolites, enzymes, phytochrome, storage protein). According to the introduction, contributing authors have attempted to present the methods 'in a way that made

description, as applied to plant material, complete in itself with little need to consult other publications'.

Unfortunately, not only with respect to the price of the book (DM 169.00 for 263 pages), this attempt has failed. Only a few authors are able to produce a detailed and, nevertheless, readable methodology book; many modern methods had already been modified at the time of publication, and each worker has his/her own experiences with necessary adaptations of described techniques due to peculiarities in their own subject of research.

A series like *Modern Methods of Plant Analysis* is of value because it offers the possibility to present an overview of available techniques in one special field, and to discuss the pros and cons of these techniques. In order to reach this goal, the different chapters should be didactically linked so that related topics are covered. The editors 'have tried not to interfere too much with the personal style of each author' and succeeded extraordinarily in doing so. The chapters are incoherent, show inconvenient differences in clarity and in their critical evaluation of techniques, and contain overlapping explanations. The editors have further added to the unbalanced character of this volume by presenting the chapters in an apparently arbitrary order. As a consequence, the value of the book in its present form depends on the subject of interest to the reader and on the way it has been handled by the authors concerned. After arranging the chapters in order of quality, we find on top of the list the following clear, instructive and exemplary chapters: D. Ernst, on Cytokinin Determination (comparison of RIA with GC/MS), L.H. Pratt *et al.*, on Immunodetection of Phytochrome, R.J. Robins, on Immunoassay of Low-Molecular Weight, Non-immunogenic Compounds, and T.M. Kuo and J.B. Ohlrogge, on Immunodetection of Acyl Carrier Protein Isoforms.

Absent from this volume are the 'pseudoimmunological' methods that comprise similar or identical techniques using lectins, saccharide- or nucleotide-affinity probes, etc., instead of antibodies, and, surprisingly, any hint at their existence is lacking. Not surprising is the absence of a critical evaluation of plant extraction methods in the context of plant immunology because of the poor availability of reproducible data on this topic.

Apart from the scientific contents, the book is well-edited, has a pleasant lay-out and contains very few errors at first sight; the most notable is the exchange of the legends to figures 3 and 4 on pages 78 and 80.

In conclusion, I would advise potential purchasers to check carefully whether or not their topic of interest is adequately covered.

J.W. KIJNE

### A Check-List of Mycorrhiza in the British Flora

J.L. Harley and E.L. Harley (New Phytologist, supplement No. 105) Academic Press, London, 1987. 102 pp., paperback £5.00.

This is a tabulated list of plant species occurring in the British Isles, arranged according to host family, with information on their mycorrhizal status as reported in the literature. The relevant literature references are given for each species. The list of references contains 723 entries. The order in which the families are given is the same as in the *Excursion Flora of the British Isles of 1981*, with no index.

This check-list may be considered a worthwhile addition to the mycorrhizal literature. Anybody interested in what has been reported on the occurrence of mycorrhiza on a particular plant species, provided that it occurs in the British Isles, may save a lot of time.

J. LIMONARD

### Recognition in Microbe-Plant Symbiotic and Pathogenic Interactions

B. Lugtenberg (ed.) (NATO ASI Series, Series H: Cell Biology, Vol. 4). Springer-Verlag, Berlin, 1986. xiii + 449 pp., illustrated hard cover DM 198. ISBN 3-540-17183-5.

The NATO Science Committee sponsors activities which aim to disseminate advanced scientific and technological knowledge. This book is one of the results of the sponsoring programme. The book contains the lectures in the field of microbe-plant recognition, delivered at the NATO Advanced Research Workshop, Biddinghuizen, The Netherlands, during 11-16 May, 1986.

Recognition processes play a crucial role in interactions and equilibria between microbes and plants. A knowledge of these processes is of great importance for the development of alternative methods of biological control of crop pests, instead of chemical control.

The papers (lectures) in the book are grouped into five sections. The first section (16 lectures) is devoted to recognition during nodulation by *Rhizobium* spp. Various nodulation genes are well-defined and located. Infection takes place as a result of recognition by the bacteria of polysaccharides at the host-cell surface. Flavones and flavanones have been shown to induce nodulation genes. Exchange of signal molecules between the symbiotic partners governs the final differentiation of plant and bacterium, necessary for the expression of nitrogen fixation.

The second section (12 lectures) deals with recognition processes in pathogen-plant interactions. The

pathogenic strategies of bacteria (e.g. *Agrobacterium* spp.) and fungi (e.g. *Phytophthora* spp.) have been studied at the biochemical and ultrastructural level in several model systems (e.g. protoplasts and cells in suspension culture). Bacterial virulence and t-DNA transformation were also investigated using molecular biological and genetic techniques.

Phytoalexins, elicitors, and other specific compounds, which are important in plant-pathogen interactions, are the main subjects of the third section (nine lectures). After mutual recognition and signal transduction, the plant starts its protection against the pathogen by a multicomponent defence response, leading to gene expression and accumulation of defence-related products. These products may have antibiotic activity against the pathogen, or can inhibit pathogen spreading by causing a hypersensitive reaction.

The fourth section (five lectures) deals with recognition in biological crop-pest control. Special attention is given to the use of *Pseudomonas* spp., saprophytic rhizosphere micro-organisms. This genus can colonize roots very rapidly, possibly due to its flagella, and also inhibits growth of other (pathogenic) micro-organisms. In addition, the genus produces a great diversity of secondary metabolites, which may have an impact on plant development and crop yield. It is also a candidate for genetic manipulation, as a 'carrier' organism to deliver beneficial genes into the rhizosphere. These characteristics make *Pseudomonas* spp. useful for crop protection in the rhizosphere.

Recommendations for future research and applications, concerning *Rhizobium* spp., plant disease control, the *Agrobacterium* spp. system, and plant defence mechanisms, are discussed in the last section of the book (five lectures).

The book is well laid-out, notwithstanding the fact that it is composed of copy-ready contributions. The preface is followed by a contents list which gives the full chapter titles and authors' names. The division of the book into sections is only apparent in this list, and is unfortunately omitted between chapters in the main text. The book ends with a useful and extended subject index. The quality of the contributions further enhances the value and usefulness of the book to all scientists in this field of research, where plants and micro-organisms recognize each other.

L.J.W. GILISSEN

### The Metabolism, Structure, and Function of Plant Lipids

P.K. Stumpf, J.B. Mudd and W.D. Nes (eds) Plenum Press, New York and London, 1987. xviii + 724 pp., illustrated hard cover US\$110. ISBN 0-306-42492-4.

This book contains the Proceedings of the Seventh International Symposium on Plant Lipids, held 27 July–1 August, 1986, at the University of California, Davis, California, USA.

The 128 papers are distributed over eight chapters:

(1) *Biosynthesis and function of sterols and isoprenoids*. This contains 24 papers on the biosynthesis of monoterpenes, gibberellic acids, prenylquinones, carotenoids, sterols, pentacyclic triterpenoids, long-chain fatty alcohols and esters as well as on the function of sterols.

(2) *Structure and function of lipids*. The 19 papers in this chapter deal with membrane components, cold and drought resistance and plant cell structures related to lipids.

(3) *Biosynthesis of complex lipids*. The 27 papers deal with phospholipids, galactolipids, glycerolipids, temperature effects, compartmentation and enzyme regulation.

(4) *Oxygen requiring systems—oxygenases and desaturases*. The lipoxygenases and desaturation are discussed in 12 papers.

(5) *Medium- and long-chain biosynthesis*. The 23 contributions mainly discuss the elongation of fatty acids.

(6) *Interaction of federal, industrial and academic research*. This chapter contains only three papers, of which the first has hardly anything to do with lipid research.

(7) *Algal lipids*. The 12 papers mainly deal with algal fatty acids. One paper treats a method for relative lipid content measurement.

(8) *The future—genetics/biotechnology*. The last 10 papers cover genetics, amino acid sequences, some biotechnology and contain only a few allusions on future research.

Though I dislike conference proceedings with normal book titles, it makes book reviews even more useful. Different styles, lettertypes and layouts are inherent to direct reproduction. The photographs are of good quality. A few graphs lost the resolution of some marks.

As in most proceedings, the editors have to deal with diverse interests of the conference participants, with the result that the topics of the contributions seem to be distributed at random over the wide field of the title. The book has a nine-pages long contents and a six-pages long subject/species index. I still have missed a considerable number of entrances, such as key words mentioned in the titles. For some species indexed, you need to use both the English and their scientific name.

The papers are generally of a high quality. Those that deal with metabolism have many references. Some other contributions contain a more general introduction to their topic. Among the many interesting papers, which drew my attention, there were some papers on the biosynthesis of chloroplast lipids which

were particularly informative. The functional aspects of the lipids were focused on the significance of different membrane lipids. It is a pity that the editors neglected the opportunity to give their personal view on the future of lipid research. Referring to additional poster presentations is of little value for the reader. Many papers typically are progress reports of the authors research groups and are of limited general interest. The book, as a whole, has hardly any value as a handbook; it is more comparable with a thick delivery of a specialized journal. If, on the other hand, you are involved in lipid research, you will need the information and have to accept its high price.

H.H. VAN GENDEREN

### Nickel. Elemente in der aquatischen Umwelt I. Biotische und abiotische Systeme

F.R. Atri Gustav Fischer Verlag, Stuttgart, New York, 1987. vi + 316 pp., illustrated paperback DM 54. (Schriftenreihe des Vereins für Wasser-, Boden- und Lufthygiene, ISSN 0300-8665, Band 73). ISBN 3-437-30564-6.

This book is a data collection of nickel concentrations in abiotic and biotic components of rivers, lakes and oceans. In the introduction the problem of bioaccumulation and bio-magnification of nickel in biotas is treated. What follows is a simple compilation of nickel in water and sediments with emphasis on German rivers, but without considering the basic data presented earlier by Förstner & Müller (1974) and Förstner & Wittmann (1981). The nickel concentrations in water plants and animals are given in relation to the systematic status, avoiding any approach of food webs, variability within and between populations, species-specific demands, life history aspects, etc. This book is nothing more than an exercise in data collection. It does not fill a scientific gap but it does fill 2 cm on a bookshelf.

#### REFERENCES

- Förstner, U. & Müller, G. (1974): *Schwermetalle in Flüssen und Seen*. Springer-Verlag, Berlin.  
 Förstner, U. & Wittmann, G. T. W. (1981): *Metal Pollution in The Aquatic Environment*. Springer-Verlag, Berlin.

W.H.O. ERNST

### Inorganic Nitrogen Metabolism

W.R. Ullrich, P.J.A. Aparicio, P.J. Syrett and F. Castillo (eds) Springer-Verlag, Berlin, 1987. xiv + 295 pp., 88 figures. Hard cover DM 148. ISBN 3-540-17532-6.

This book contains a collection of 52 papers, written by 115 authors, which was presented at an advanced

course on inorganic nitrogen metabolism held in Jarandilla de la Vera (Spain), 1986. The meeting, organized by The Federation of European Societies of Plant Physiology, had a distinct European character.

According to the preface the reader should not expect a textbook or a monograph-type publication. The book does not pretend to give a complete picture of all aspects of inorganic nitrogen metabolism. It consists of four parts: (I) basic aspects (2 papers); (II) a general survey on uptake and metabolism of inorganic nitrogen (6 papers); (III) enzymes of inorganic nitrogen metabolism (8 papers on nitrate reductase, 3 on nitrite reductase, 6 on enzymes of ammonia metabolism, 8 on nitrogenase and hydrogenase activities, and 7 on other enzymes and metallo-proteins); and (IV) regulation of nitrogen utilization (in blue-green algae, 5 papers; in eukaryotes, 7 papers). Because the book mainly contains research papers, one can find many new and so far unpublished data and views within it but there is also a considerable degree of overlap, especially in the introductions.

The many Spanish and, to a lesser degree, Italian and Portuguese contributions add to the value of the book.

All the papers have a common list of 700 (written in English) references. The book is carefully produced and indispensable for those who work in this field.

J. VAN DIE

### Proceedings of the IAB Conference of Bryoecology

T. Pócs, T. Simon, Z. Tuba and J. Podani (eds)  
Budapest-Vácrátót, Hungary. 5-10 August, 1985.  
Part A. xix + pp. 1-547, illustrated, part B. x +  
pp. 549-902, illustrated. Akadémiai Kiadó,  
Budapest, 1987. Symposia Biologica Hungarica, Vol.  
35. ISBN 963-05-4634-5 (Part A) and ISBN 963-05-  
4635-3 (Part B). \$89.00, ISBN 963-05-4633-7  
(Vol. 35).

The first world conference on bryophyte ecology, held in 1985 in Budapest, under the auspices of the International Association of Bryologists, was well-organized, very lively and varied; many bryologists from all over the world reported and discussed their current research. The proceedings of this symposium, two volumes totalling over 900 pages, still reflect the atmosphere at the conference. The 72 contributions are (not always logically) arranged into six sections: Volume A covers the sessions on Physiological Ecology, Reproduction and Dispersal Ecology, and Community Ecology; volume B contains the papers on Population Ecology, Bryophytes in Ecosystems, and Bryophytes as Bioindicators. The great majority of papers report on original work, often case studies, and review papers are remarkably scarce: the

excellent reviews that appeared in the last decade have been used, not repeated.

Several contributions discuss laboratory work on genetics, physiology of nutrient uptake and water relations, and tolerance of polluting agents, but the emphasis is clearly on research into or directly relating to the field. This includes both descriptive studies—composition of communities in relation to micro-climate and soil characteristics, palaeoecology, phytogeography and some work on population dynamics—and experimental work at all levels of integration. Mathematical modelling and cultivation experiments that test for direct competition are virtually absent but for various reasons these approaches have hardly been used in bryoecology at all.

Studies on inter-relations with other organisms include herbivory (mites, slugs), parasitism of a fungus on Sphagnum, and the effects of bryophytes on seedling establishment. A discussion of the possible importance of associations with nitrogen-fixing bacteria is lacking, however.

Traditionally, reproduction and dispersal receive much attention; the important role of asexual propagules and of the bank of propagules in the soil are stressed in some contributions.

Bryophytes are poikilohydric plants, in contrast to most phanerogams; both the physiological mechanisms involved and the consequences for growth and colonization in the field are discussed in several contributions. The topic of genetic variation, which appears to be rather high in view of the predominance of asexual propagation and the small dispersal distances of the male gametes, also receives much attention.

As usual with conference proceedings, the quality of the individual contributions varies, but altogether these two volumes give a good impression of the present state of bryophyte ecology and of the many approaches involved. Every bryologist will find a wealth of information and ideas in these proceedings and many other botanists will enjoy browsing through them.

H.J. DURING

### The Biochemistry of Plants. A Comprehensive Treatise. Vol. 9. Lipids: Structure and Function

P.K. Stumpf (ed.) Academic Press, Orlando, Florida, 1987. xii + 363 pp., illustrated hard cover \$65.00. ISBN 0-12-675409-8.

The rapid development of the knowledge of lipids has made it essential to update volume 4 of *The Biochemistry of Plants* (1980). As a result, this new volume, which has the same title, has been written.

Physical techniques employed in lipid research,  $\beta$ -oxidation systems in higher plants, and oxidative modifications of unsaturated fatty acids are covered in the first three chapters.

Plant fatty acid synthetases, acyl carrier proteins and desaturases are treated in three other chapters, while a further three chapters are devoted to more complex lipids such as fats, galactolipids and sulpholipids. Although most authors deal almost exclusively with the biochemical aspects of their subjects, physiological matters, such as compartmentation and organelle development (Helmuth Kindl) and defensive roles (Kolattukudy), are also discussed. Unfortunately, Kolattukudy's chapter deals with suberin and with lipids derived from fatty acids but not with such quantitatively and functionally important surface layer constituents as triterpenols and their oxidation products.

Although many plant physiologists already have the 1980 volume, this volume should not be ignored on the book shelves by those engaged in plant lipid research. For those who lecture in this field it will be a highly valuable source of information; at least for the next few years.

J. VAN DIE

### *In Vitro* Culture of Higher Plants

R.L.M. Pierik Martinus Nijhoff Publishers, Dordrecht, Boston, Lancaster, 1987. v + 344 pp., illustrated. Hardback Dfl. 220.00/£74.50 (ISBN 90-247-3530-0); paperback Dfl. 90.00/£29.25 (ISBN 90-247-3531-9).

At the first reading, this book appears to be a new edition of the bibliography which first appeared in 1979 under the same title. It will be a surprise for many *in-vitro* culturists within the Dutch linguistic domain to see that it actually concerns the English counterpart of the well-known instruction manual of Dr Pierik.

Those who possess the latter already know that having it on the shelf is one thing, keeping it there is another. The storehouse of information which it contains causes it to move constantly between visitors, students and experienced investigators in the laboratory. Introducing a new-comer in to the field of *in-vitro* culture usually starts by simply handing-over the book with the suggestion to read it thoroughly. This is not a difficult work, since the style of writing is friendly with a clear objective: it is educational.

The contents of the book cover a wide range of aspects, but Pierik also pays attention to detail: for example, his glossary agrees well with the several descriptions published in *In Vitro* (20: 19, 1984). Unfortunately, the definition of transformation *in vitro* is quite unclear. To put it this way suggests that somaclonal variation is the result of transformation. Molecular biologists might deviate in their opinions here. Pierik's definition possibly originates from the field of animal cell culture. In summary, the book gives many fundamental and technological hints, an overview of several applications of *in-vitro* culture and valuable background information. It also deserves

attention in countries where Dutch is not the first language. The translation of the original book guarantees a good base for trainers and trainees in *in-vitro* culturing techniques.

H.J. HUIZING

### Postglaciálny vývoj vegetácie Slovenska (Postglaziale Entwicklung der Vegetation der Slowakei)

E. Krippel VEDA, Verlag der Slowakischen Akademie der Wissenschaften, Bratislava, 1986. 307 pp., illustrated hard cover DM 42, US\$18.

Krippel's work on the vegetational history of Slovakia (the eastern half of Czechoslovakia) during the last 15,000 years is a synthesis of the results of palynological research, mainly by the author himself, supplemented by the analysis of plant macrofossils (wood, seeds, fruits) retrieved from ancient settlement sites. The book is written in Slovak, but an extensive summary in German makes it accessible to a broader public interested in the subject.

After a synopsis of the development of environmental conditions (climate, soil) in Slovakia since the last glaciation (Würm glacial), the most common tree species are discussed. Maps of their inferred distribution in specific periods are presented for some of them. The main body of the work concerns the reconstruction of the vegetation during the successive stages of the late-glacial and post-glacial. These reconstructions find expression in a series of palaeo-vegetation maps that show the distribution of the large vegetation units, such as river-valley forest, xerophilous mixed oak forest, beech forest and coniferous forest. The German summary gives characteristics of the vegetation units indicated on the maps. Unfortunately, the legend for the map of the vegetation during the Atlantic period, the post-glacial climatic optimum, is missing in the summary. A number of pollen-diagram sections are presented that show the most important tree-pollen curves and the tree-pollen/herbaceous-pollen (AP/NAP) ratios.

The author holds the view that in the relatively warm and dry lowlands of southern Slovakia (the Pannonian region), steppe vegetation could have maintained itself throughout the post-glacial. This view is based on the presence of well-developed (non-degraded) chernozem soil profiles and on the occurrence of typical steppe elements in flora and fauna. It would have been in steppe and forest-steppe areas that the earliest agriculturists settled in Atlantic time. Serious interference with the forest, by man, would not have started until the first millennium BC, after the introduction of the use of iron.

This work is of interest not only to palynologists but also to plant ecologists and foresters.

W. VAN ZEIST