

BOOK REVIEWS

A. TREBST and M. AVRON (eds.) *Encyclopedia of Plant Physiology. New Series, Vol. 5. Photosynthesis I. Photosynthetic Electron Transport and Photophosphorylation*. Springer-Verlag, Berlin, Heidelberg, New York. 1977. XXIV + 730 pages, 128 figs. Price DM. 194.-, U.S. \$ 85.40.

In this book, the first part of Volume 5, the membrane-associated reactions of photosynthesis, namely primary photoreactions, electron transport, and photophosphorylation, are considered. Each of the main sections consists of an introductory review followed by concise articles, in which limited topics are discussed by specialists. This way of presentation certainly will be appreciated by the reader; it facilitates obtaining either general or detailed information, or both.

The volume on photosynthesis of the preceding series was published in 1960. In the meantime considerable progress has been made in this field of research. These advances, the resulting change of concepts, and perspectives are dealt with in an introduction by Trebst and Avron as well as in the first section on the history of photosynthesis research during the period 1950-1975 by Arnon.

Electron transport is discussed in the second section. In the first part of the introductory chapter, by Junge, the physical aspects of the primary reactions, such as energy transfer by inductive resonance, spillover, pigment interactions, and antenna systems are considered. Next, electron transfer, generation of the electrochemical potential, and the formation of a proton gradient across the thylakoid membrane are reviewed. In the second part of this chapter Golbeck, Lien, and San Pietro describe the oxidizing and reducing sides as well as the reaction center complexes of both photosystems. The concise essays deal with pigments, conversion efficiency, properties and localization of P-700, chlorophyll fluorescence as a tool for studying photosynthesis, the techniques and application of EPR spectroscopy in photosynthesis research, primary electron acceptors, oxygen evolution including a discussion of the S-States and the role of manganese, electron carriers, artificial acceptors and donors, inhibitors of electron transport and inhibition sites, antibodies and their effects, and chemical modification of chloroplast membranes.

In the third section energy conservation is considered. The introductory chapter on photophosphorylation, presented by Jagendorf, discusses the relation of electron transport to this process, the chemiosmotic and other hypotheses with regard to ATP formation, and the role of the coupling factor. In the specialized articles attention is paid to the structure-bound phenomena in the thylakoid membranes, e.g. proton and ion transport, field changes, the high energy state and hypotheses on the nature of X_e , ATPase, conformational changes, coupling factor, inhibitors, photophosphorylation in vivo, exchange reactions, and delayed luminescence.

In the introductory chapter of section IV on structure and function of the photosynthetic apparatus, by Mühlethaler, very nice and instructive electron micrographs are included. It is followed by essays on the topography of the thylakoid membrane. Interesting electron micrographs are also presented in a most valuable article by the late Dr. G. Jacobi on subchloroplast particles, their preparation and reaction properties. The remaining concise articles refer to the fragmentation procedure, the organization of chlorophyll in vivo, and the development of chloroplast structure and function.

The final section V deals with algal and bacterial photosynthesis. It is followed by author and subject indices.

The above may demonstrate that a large amount of information is presented in this Volume. This information is offered by 53 contributors. All of them are well-known specialists in the particular fields. As a consequence, the quality of this book is very high. The same may be said of its editing. There is only a minor remark: in some cases the sequence of the detailed

articles is not quite optimal, however, without affecting the readability. In conclusion this Volume can be highly recommended to readers interested in general as well as detailed information. It is a most useful edition.

J. B. THOMAS

Editors: L. BOGORAD and J. H. WEIL: *Nucleic Acids and Protein Synthesis in Plants*. Plenum Press, New York, 1977. XI + 417 p. Price U.S. \$ 47.40.

This book contains 24 lectures presented at the International Colloquium on Nucleic Acids and Protein Synthesis in Plants held in Strasbourg in July 1976. All lectures represent reviews on topics within the field. (Hundred or so brief communications also presented at this colloquium are being published elsewhere.) Together these lectures cover many important aspects of the molecular biology of plants, including a short section on plant viruses. The rapid publication justifies the direct reproduction of the original manuscripts. Moreover, despite the fact that some 24 different letter types are found in this volume, the quality of the printing and the readability is very good.

The material is subdivided into six sections: Organization and replication of nuclear and chloroplast genomes; Transcription; Translation: the protein synthesis apparatus; Synthesis of nucleic acids and proteins by organelles: organelle-nucleus relationships; Control of nucleic acids and protein synthesis by hormones and environmental factors; Foreign DNA and plant cells: Plant viruses.

That last subheading does not sound very logical because practically all plant viruses are RNA viruses; however, the section also contains contributions on the uptake of DNA and organelles by protoplasts and tumor induction by plasmids of *Agrobacterium*.

Some parts of this book will certainly attract the attention of molecular biologists working with animal systems or prokaryotes. For instance, the chapter by Dr. Seal et al. on protein synthesis in wheat germ is of interest to the many groups that use wheat germ cell-free systems for the translation of animal mRNAs. More theoretically, the general information on the genetics of chloroplasts and their DNA-RNA-protein apparatus is pertinent to analogous research on animal mitochondria.

The price is rather high for private purchase, especially because books like this one become outdated in a few years. Therefore, I hope that it will find its way to many institute libraries.

H. P. J. BLOEMERS

CHARLES HÉBANT: *The conducting tissues of Bryophytes*. J. Cramer. Lehre (Germany). 1977. 153 p., 348 figs. Subscr. price DM. 80.—, regular price DM. 100.—.

This book is a comprehensive review of research on the conducting tissues of the Bryophytes. One of its advantages is that it considers not only contemporary literature but also the older literature from about 1800 onwards. Subjects covered include the anatomy, morphology and histology of the conducting tissues in different groups of bryophytes as well as the development of these tissues and the physiology of water and solute transport. Phylogenetic problems are also discussed.

The first part of the text, which deals with anatomy, morphology and histology, is lavishly illustrated. The figures are well reproduced, some being drawings and others light and electron (TEM and SEM) micrographs. The author stresses the importance of the state of development and the ecological source of the material used. The fact that plants from different origin differ in many respects causes misunderstanding and controversies among botanists; the author quotes several examples.

The second part of the book is devoted to physiological topics such as external and internal water-conduction, water-absorption and water-retention, transport of organic compounds, source-sink processes etc.

It gives a clear picture of our present state of knowledge in this field. The author stresses that our knowledge is limited and that there is much research still to be done.

A smaller section of the book is devoted to evolutionary considerations. Evolution within the bryophytes and the phylogenetic relationship of the bryophytes to other taxa are discussed using arguments from all fields of research. The author weighs up the arguments from different fields of research and is reluctant to jump to conclusions.

The author has managed to produce a well balanced monograph which will be useful to many botanists. The fact that the author has been able to do this in 116 pages is evidence that modern science has so far not shown much interest in this group of plants.

B. HUISINGA

G. L. BARRON: *The Nematode-Destroying Fungi*. Topics in Microbiology 1, Canada Biological Publications Ltd., Box 214, Guelph, Ontario. 140 pp., price US \$ 12.50.

The nematode destroying fungi are an interesting group of specialized microorganisms. They may become of importance in the biological control of harmful nematodes. One of the first mycologists to study and describe such fungi in detail was Charles Drechsler (USA), to whom the present book is dedicated. Mainly discussed are the biology and ecology of the nematode destroying fungi and the data are mostly based on original, not earlier published work. Barron distinguishes two groups of nematode destroying fungi. The first represents the predatory fungi which trap nematodes by specialized organs such as adhesive knobs, hyphal nets or constricting rings. A number of species belonging to genera such as *Arthrobotrys* and *Nematotoxus* are discussed. In the latter genus the hyphae have clamp-connections indicating a relationship to the Basidiomycetes. All nematode-trapping fungi develop an extensive mycelium outside the host, usually in the soil, and the trapping organs develop on the hyphae.

The second group comprises endoparasitic fungi which invade the host, for example by germinating spores, and which mainly develop inside the nematode body. They belong to widely varying mycological taxa; well known are the hyphomycete genera *Meria* and *Harpogonium*.

The species discussed are illustrated by good drawings of the microscopical structures and/or by excellent photographs from light or scanning electron microscopy. Various chapters are devoted to the biology, the biological control and the production of toxins and antibiotics, in addition to methods for isolation, recovery and pure culture. This publication gives a good survey of the present knowledge of fungi on nematodes. It can be recommended not only to mycologists and nematologists, but also to other biologists interested in this fascinating group of organisms.

J. A. VON ARX

P. E. PILET (ed.): *Plant Growth Regulation; Proceedings of the 9th International Conference on Plant Growth Substance, Lausanne, August 30–September 4, 1976*. Proceedings in Life Sciences. Springer Verlag, Berlin, Heidelberg, New York 1977. XI + 305 pages, 128 figs., 53 tables. Cloth: DM 64.–; US \$ 28.20.

The Lausanne Conference differed from previous ones in that the usual short submitted papers, followed by brief discussions, were replaced by reports, poster demonstrations and work shops. The present Volume contains the 30 reports together with a list of the 203 poster demonstrations. The reports, written by experienced investigators, typically contain a short history, a survey and a critical analysis of the subject the authors and their group are specialized in. So the present "Proceedings" is not comparable with the voluminous works proceeded from previous conferences, which contained a complete collection of all the short papers

read by the participants. This book, therefore, is situated somewhere between a normal journal and an annual review. It provides information in a reliable way on the mode of thinking in 30 research groups active in the domain of Plant Growth Regulation. In several papers the authors even indicate the direction into which the subject will be further developed including new perspectives of research and methodology.

Books like the present one fill a gap, since the scarce articles in annual reviews cannot sufficiently meet the needs of this kind of information. Their appearance should not depend on conferences.

Pilet has aptly divided the 30 contributions over 8 chapters. These are listed below with the contributors between brackets: I. The Wall of Growing Cells (1. Albertsheim, Mc Neil and Labavitch; 2. Mac Lachlan; 3. Masuda), II. Hormones – Membranes (4. Venis; 5. Morré and Cherry; 6. Marker, Paleg and Spotswood; 7. Marré) III. Hormone Analysis (8. Crozier and Reeve; 9. Wightman), IV. Auxins and Root Growth Inhibitors (10. Laldewey, Ginkel, Karmann and Paland; 11. Elliott; 12. Wain; 13. Pilet), V. Gibberellins and Cytokinins (14. Mac Millan; 15. Fox and Erion; 16. Wareing, Horgan, Henson and Davis; 17. Klämbt), VI. Ethylene and other Regulators (18. Osborne; 19. Kende and Hanson; 20. Kefeli and Kutacec; 21. Bocion and de Silva), VII. Gravity and Light Effects (22. Wilkins; 23. Sievers and Volkmann; 24. Bruinsma; 25. Galston), VIII. Hormonal Control (26. Péaud-Lenoël; 27. Addicott and Wiatr; 28. Chaylakhyan; 29. Davies, Proebsting and Gianfagna; 30. Cocking). Each report contains a bibliography and the book ends with a Subject Index.

L. ANKER

PEDRO A. SANCHEZ: *Properties and Management of Soils in the Tropics*. John Wiley and Sons, New York 1976. X + 618 pp., 147 tables, 154 figures, 21 photographs. \$ 38.10.

This well produced book is presented at a level which assumes knowledge of an elementary course in soil science. It gives an account not only of the properties and the management, but also describes the environment in which the latter must operate. The text is well-illustrated with figures and tables. The quality of the photographs leaves somewhat to be desired. Each chapter concludes with a summary and an excellent bibliography.

The first chapter is a brief description of the tropical environment, including climate, vegetation types, geology, land use, farming systems and food requirements. The second chapter deals with the classification of soils in the tropics. Apart from the U.S. Soil Taxonomy, which is used throughout the rest of the book, the FAO, French, Belgian and Brazilian systems are described. The third chapter is on soil physical properties, with emphasis on soil structure. In the next chapter, on clay mineralogy and ion exchange processes, the importance of measuring the cation exchange capacity of the soil at its field pH is stressed. The fifth chapter, on soil organic matter, examines the contents and changes of organic matter in tropical soils and attempts to specify their relevance to management practices. Chapter 6 deals with soil nitrogen and the nitrogen requirements of tropical crops. In chapter 7, on soil acidity and liming, emphasis is placed on the effects of aluminium and lack of calcium on crop growth. Chapter 8 deals with phosphorus, silicon and sulphur. The ninth chapter examines the various approaches to soil fertility evaluation and describes some of the efforts to correlate soil fertility parameters with soil classification. Chapters 10 to 13 integrate the foregoing concepts into the four principal soil management systems in the tropics: shifting cultivation, rice cultivation, multiple cropping and pasture production.

This authoritative and up-to-date book should be used as a textbook for undergraduate students in tropical agriculture science, and can serve as a useful reference to agriculture scientists interested or working in the tropics.

J. F. WIENK

J. RŮŽIČKA: *Die Desmidiaceen Mitteleuropas*. Band 1, 1 Lieferung. VIII + 292 pag., 44 tables. E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart 1977. Cloth, DM 138.—.

Since the completion of the well-known British desmid flora by W. & G. S. West in 1923 (the last and fifth volume with the cooperation of N. Carter), no comparable comprehensive treatment of the same standard has been published. Several attempts did not proceed any further than the treatment of a limited number (and mostly always the same) genera. Also in the publication under review – announced as Part One of the first of three volumes to appear – more or less the same group of taxa is encountered. More than ever we must hope that this time the series will be completed, because Růžicka's monograph is more than a cut above comparable identification manuals. Those who are acquainted with publications by this author will not be surprised to find that he pays great attention to taxonomy and nomenclature. In his preface the author points out emphatically that he intends to avoid certain errors marring desmid manuals published earlier. Such mistakes are mainly attributable to negations of the International Code of Botanical Nomenclature, so that the author makes shift with the replacement of several much-used specific names by almost unknown ones, such as the substitution of *Closterium libellula* Focke by *C. closterioides* (Ralfs) Louis & Peeters. Růžicka's monograph also distinguishes itself favourably by its starting point, the so-called monothetic taxonomic concept; and furthermore in that (1) voids in our knowledge are clearly indicated (instead of the author resorting to authoritative dicta which cannot be substantiated), (2) the taxonomically significant and useless characters are separated as much as possible, and (3) the recognition (or maintenance) and description of the individual taxa starts from the first valid publication of each taxon.

A rather extensive morphological disquisition concerning e.g. cell shape, symmetry relations, chloroplasts, zygospores, and monstrosities precedes the taxonomic part. For the systematic classification of the order of the Desmidiales the most recent finds concerning the cell wall structure (such as the electron microscope studies of M. Mix) have been used. Accordingly, the Mesotaeniaceae are referred to the order Zygnematales and will not be treated in this monograph. The order Desmidiales is split up into two suborders, viz., the Closteriineae (completely dealt with in the issue published), with the families Gonatozygaceae (the genera *Gonatozygon* and *Genicularia*) Peniaceae (*Penium*), and Closteriaceae (*Closterium*), and the Desmidiineae, with one family (Desmidiaceae), of which in this part the genera *Docidium*, *Pleurotaenium*, *Triploceras* and *Triplastrum* are treated. Although the last two, with a chiefly tropical distribution, have so far never been recorded from Central Europe, Růžicka has treated them, because all taxa which may be expected to occur in the area covered are included in the identification keys and the systematic discussion. This means that the area covered by the desmid flora under review is considerably larger than the title suggests. Růžicka points out, in this connection, that the desmid flora is of an almost uniform composition throughout temperate Eurasia.

For each genus mentioned above an identification key to the species is given, but the author emphasizes that such a key cannot be more than an expedient, and that the final naming must be based on the extensive description of the species (or of its infraspecific, subordinate taxa, as the case may be). As regards the treatment of each individual species, a concise general description is followed by, successively, an enumeration of the differences with other similar taxa, relevant remarks concerning nomenclature and taxonomy (inconsistencies and contradictions in the literature, if any, being pointed out), a record of the range of variation of individual characters, and statements about habitat and geographical range.

In his preface the author states that he had nearly all taxonomically relevant publications at his disposal, with the exception of some published during and after World War II. This may account for the fact that, as regards formation of colonies in the genus *Cosmocladium*, Růžicka still maintains the theory that the strands connecting the cells are derivatives of the shed primary walls of the daughter cells, although this has already been refuted by Gerrath by means of electron microscopy in 1970. He can hardly be blamed for such omis-

sions, and such minor blemishes barely reduce the excellent quality of the work, also in a typographical sense. The issue is amply worth its price, also on account of its wealth of critical information.

P. COESEL

MICHAEL G. BARBOUR & JACK MAJOR (eds.), *Terrestrial vegetation of California*. Joh Wiley & Sons, New York-London-Sydney-Toronto. 1977. IX + 1002 pp., many figs., tables. 1 colored fold-out map of the natural vegetation of California, scale 1 : 1,000,000 by A. W. Küchler. Price \$ 60.00, £ 35.65.

The Golden State, California, covers an area of about 12.5 times the Netherlands and reaches north-southward over more than nine degrees of latitude, in the old world comparable to the stretch from the northern boundary of Portugal down to Casablanca. Owing to its location on the American west coast, where it comprises the transition between the humid temperate and mediterranean climates, and further inland the continental, desert climate, and as a result of its great variety in geomorphological features, the state has a rich diversity of vegetation types. These include the famous redwood forests (*Sequoia sempervirens*) on the coast, and the giant sequoia groves (*Sequoiadendron giganteum*) of the Sierra Nevada, as well as such well-known formations as chaparral (the mediterranean type scrub), the sagebrush steppe (*Artemisia tridentata* and related species) of the Great Basin, the Joshua tree woodland (*Yucca brevifolia*) of the Mojave Desert, and the creosote bush scrub (*Larrea tridentata*) of the Mojave and Sonoran Deserts. But also floristically California is extraordinarily rich with 875 indigenous genera and 5057 species of vascular plants, and according to P. H. Raven in his background chapter on the Californian flora, with 743 genera and 4119 species native to the Californian Floristic Province, which expands over 75 per cent of the state's territory.

The book consists of eight sections, together comprising 26 chapters and an appendix, written by 37 authors. The first section, with six chapters, provides an introductory on the Californian climates particularly in relation to the various vegetation types (by J. Major), the Californian flora (by P. H. Raven), the history of the Californian vegetation (by D. I. Axelrod) and on the status of protected research areas, research programmes and vegetation mapping. The following six sections, with altogether twenty chapters, each deal with a Floristic Province: the Californian, the Sierran, the Pacific Northwest, the Great Basin, the Hot Desert, and the southern California Islands. Unfortunately, the delimitation of these Floristic Provinces does not entirely coincide with the division adhered to by Raven in his background chapter. The final section, the appendix, presents an expanded legend (23 pages) to the 54 vegetation types recognized in Küchler's map of the natural vegetation of California which is folded into a pocket on the back cover of the book.

Each chapter has a statewide outlook and discusses both synecological and autecological data. Most chapters discuss topics as varied as regeneration and succession, influence of fire, growth forms, carbon balances, phenology, and management plans, and the authors point out the limits of our understanding of Californian vegetation. The chapters all start with a simplified map of California showing the major locations of the vegetation types discussed and they end with a survey of the present state of knowledge of the areas under discussion, making suggestions for future research. In the chapters many theses, dissertations and otherwise not readily accessible literature is reviewed and integrated, and most chapters are also fairly well integrated with other chapters in the book. Remarkable for an American publication is the consistent emphasis on scientific names instead of common ones throughout the book. This editorial decision certainly will be much appreciated by non-American readers. For convenience the index provides cross-references for scientific and common names, another useful editorial decision.

With so many authors contributing to one volume it is very hard to obtain consistency of concepts, opinion and treatment of topics in the chapters, and it is obvious that here and there some discrepancies are apparent (e.g. the differences between authors in their concept of a

plant community), but all in all the book gives evidence of a very high editorial standard with which the editors should be congratulated. In the space available, it would be futile to list a series of minor omissions, points that could be somewhat improved, or personal wishes. However, in view of the editors' statement that they are sorry to have been forced to eliminate a few other manuscripts from the book due to its size, it may perhaps be pointed out that a considerable number of pages could have been saved without loss of clarity if many of the tables had not been reproduced in a too widely typed format. But this minor criticism should in no way reduce the merits of authors and editors of this great book on Californian vegetation. I expect that it will stay an unexcelled standard reference for Californian ecologists for much longer than the fifteen years that the editors expect it to hold.

M. J. A. WERGER

Ingrid ROTH: *Fruits of Angiosperms*. Handbuch der Pflanzenanatomie, Allgemeiner Teil: Band X, Teil 1, 675 pages, 232 figures. Gebrüder Borntraeger, Berlin, Stuttgart, 1977. DM 288,-.

A satisfactory classification of Angiosperm fruits has not been achieved up to the present day. Roth thinks a "natural" classification should be based on gynoecial morphology. She adopts the concepts of the pistil structure by Troll, and the concepts of the carpels by Eames. The well-known typological derivations of the gynoecium, such as the transition from spiral to cyclic arrangement, free to fused parts, many to few carpels and seeds, superior to inferior position, are valid also for fruits. Making use of these derivations, Roth presents a tabular form of "phylogenetic evolution" of the fruit. However, in my opinion, this is too much of a translation of idealistic morphology into phylogenetic terms. An impossible sentence (pag. 7) as "...in regard of the anatomical changes occurring in the carpel during evolution from a vegetative leaf into a sporophyll,..." shows how inbred idealistic arguments keep the mind of morphologists occupied. The reader may find more stimulating views on the evolution of fruits in the works by Corner and Van der Pijl, especially as tropical fruits come into the picture. Both authors are cited too sparsely by Roth, not even the ideas of Van der Pijl on the leguminous pods are mentioned. Fortunately, for the practical grouping of the chapters, Roth uses the types of fruit that are commonly recognized, namely the capsule, the nut, the achene, the drupe, the berry, the aggregate fruits, and the infrutescences. This accords with evident anatomical differences. It is her opinion that dehiscent fruits are more primitive than indehiscent ones, dry fruits more primitive than fleshy ones, and those without accessory parts more primitive than those with accessory parts.

The present book is the first, general and special, book on the Angiosperm fruits. As such it is a prime achievement. Yet, at the same time, it reveals how poor the correlation with morphology and systematics is. Not even a descriptive notation has been attempted, like this has been done for seeds by Corner. For seeds there is also Netolitsky, and the bibliography by Barton. For fruits there is nothing comparable. Nevertheless this book marks the first and important step. In the preface Roth remarks: "In spite of all the efforts, there appeared less than 800 citations in the bibliography", presumably there is much more "hidden". I missed Staritsky on *Pyrus*, Leroy on *Juglans*, Fahn & Kotter and Friedrich & Strauch on *Musa*. On the other hand the bibliography excels in the citations of many older papers, papers from eastern Europe, and many theses and dissertations. There is quite some repetition in the book. However, this makes consultation of the separate chapters easier. Also there is considerable duplication with Guttenberg's *Bewegungsgewebe und Perzeptionsorgane*.

The main body of the book is formed by the special part, in which Roth gives the anatomical, and histological, details of many, mostly well-known, fruits. Most striking is her original work on (sub)tropical fruits, as *Citrus*, *Musa*, *Coffea*, *Theobroma*, *Carica*, *Anacardium*, etc., all copiously illustrated, a feast for the fruit-loving botanist. Part of this work was published earlier in Spanish, and much of it will be continued. All diverse subjects are introduced by general remarks. Wherever possible Roth presents the data in a developmental context.

Mostly this concerns the post-flowering stages; about the earlier development not much is reported (as to this compare the consistent reports on the ovules in the book on seeds by Corner). It should be regretted that the structure of inferior fruits, like those of rose or apple, remains unsolved, by lack of comparative developmental research on the interplay between the growth of the primary floral meristems and the initiation of organs, and also by lack of clear concepts, for instance of fusion. The "core-line" in the apple remains obscure as ever. Roth shows that she is aware of the necessity of developmental studies, when she concludes the chapter on the apple – with its endless arguments – with the relevant work of Kraus (Oregon Agr. Exp. Sta. 1913, 1916). There are several recurring themes, such as the possibility of a reciprocal development between seed and pericarp; the division into the exo-, meso-, and endocarp; the development of the inner epidermis of the pericarp into the endocarp, pulpa, seed-cushion, etc.; the radial growth of the mesocarp; and the correlation of sclerenchyma and Ca-oxalate crystals.

The composition of the endocarp of crossing layers and the pertaining micellary structure, and the formation of patterns, is recognized as functionally important and taxonomically useful. It is remarkable that there is not a single electron micrograph in the book. Considering the quality of the book, the number of typographic errors is rather high. Sixteen full pages of plant names are indexed, but although english plant names are often used, those are not indexed. The book is an indispensable handbook for the libraries of botanical and agricultural institutes.

W. A. VAN HEEL

J. REINERT and Y. P. S. BAJAJ (Eds.): *Applied and fundamental aspects of plant cell, tissue, and organ culture*. Springer-Verlag, Berlin – Heidelberg – New York, 1977. XVI + 803 pages, 181 figs. Cloth DM 190,-; US \$83.60. ISBN 3-540-07677-8.

Plant tissue culture as a method has found its way in many fields of research. Application in agriculture is an unexpected success of the last few decades. Within the space of some 800 pages the book gives a surprisingly complete view on the current state of this practical aspect of tissue culture. Fundamental in the title does not mean that a considerable part of the book is devoted to pure scientific explanations of general aspects of tissue culture. On the contrary, even a general introduction at the beginning and a general discussion at the end of the book are missing. However, although the approach of the selected subjects in essence is applied, proper attention is given to fundamental aspects of plant science if required.

In seven chapters, each provided with an extensive list of references, the contributions of nearly 50 specialists are conveniently arranged. The first chapter, the most extensive one, deals with the regeneration and vegetative propagation of quite a number of important crops. Of course the list of crops propagated by in vitro methods is far from complete. However, the well chosen subjects bring to life the whole process from initial problem and first trial to successful regeneration of a diversity of plants.

The second, the third and the fourth chapter have a similar motive, they put into the picture the application of tissue culture in plant breeding. Together with the chapter on propagation this aspect of tissue culture covers the respectable number of 580 pages of the book. Anther culture and the production of haploids, so important in breeding programs, are discussed in the second chapter. The third hides under the rather obscure title "Cytology, cytogenetics and plant breeding" subjects like "Applied aspects of embryo culture", and "Application of in vitro pollination and in vitro fertilization". The fourth chapter is devoted to the fascinating new developments in tissue culture, protoplast culture, somatic hybridization and genetic engineering. It is most remarkable that no special attention is paid to such an important subject as mutation breeding.

Chapter five "Tissue culture and plant pathology" gives a rather unprogressive survey mainly on meristem culture as a technique in the virus-free propagation of crops. The possi-

bilities of pathogen-free storage and dispersal of clonal propagated crops are not mentioned. This aspect of tissue culture already in practice is in particular important in tropical countries where the bulk of conventional clonal material and phytosanitary regulations obstruct the introduction or exchange of improved cultivars.

The next chapter "Cell culture and secondary products" gives information about "Application of cell suspension cultures", "Secondary products in tissue cultures" and "Tissue culture and pharmacy".

The last chapter, "Miscellaneous", deals with "Isozymes in plant tissue culture", "Radiation biology of cultured plant cells" and "Cryobiology of plant cell cultures and establishment of gene-banks". Of course, the conservation of gene-material by freezing is a fascinating dream of the future. However, as mentioned before even without this advanced technique tissue culture facilitates the preservation and dispersal of germ-free gene-material.

According to the presentation in so many subjects written by a variety of specialists an overlap is unavoidable. On the other hand most specialists quote personal communications with their colleagues and mention unpublished data. In other words the book is more than up to date. Especially for those applying tissue culture methods in their research and to those who intend to do so the book is indispensable.

The price of this well-produced volume is rather high in comparison to most publications in english.

G. STARITSKY

W. BARZ, E. REINHARD and M. H. ZENK (editors): *Plant tissue culture and its bio-technological application*. Springer-Verlag, Berlin, Heidelberg, New York, 1977, 419 pages, 196 figures, 60 tables. Price: DM 88,-; US \$38.80.

This book presents the proceedings of the first international congress on medicinal plant research, section B, held at the University of Munich, Germany, September 6-10, 1976.

Till now no book has appeared on plant tissue culture as a tool for biotechnological research and application. Therefore it should be welcomed as a good source for a restricted group of research workers in this field.

For several reasons this book cannot be considered as a typical handbook: it does certainly not cover the field indicated by the title, which is very general and broad; the number of review articles especially in the first 4 chapters is small whereas the number of typical research papers on very specific subjects is large; the number of lectures during the congress (34 from totally 72 authors coming from only 11 countries, in particular W-Germany, U.S.A., England and Japan) is too small to cover the whole field. Since the book presents the proceedings of a congress with a restricted number of specialists from 11 countries, a full coverage of the whole field represented in the title could therefore not be expected and achieved. However, the book certainly incorporates much of the biotechnological developments using plant tissue and cell culture as a technique.

The book is divided into 7 sections: cell culture and secondary products; biochemistry, physiology and regulatory aspects; biotransformation; catabolism; general and analytical techniques; somatic hybridization, fusion and haploids; regeneration and organogenesis. The first 5 sections are relatively new and therefore form the most interesting part of this book; however, it is a pity that a contribution by a leading specialist like E. J. Staba from the U.S.A. is missing. The last 2 sections are also of importance but can in a more efficient way be studied in another handbook from Springer Verlag: J. Reinert and Y. P. S. Bajaj (editors), *Applied and fundamental aspects of plant cell, tissue, and organ culture*, 1977.

This book will certainly be a very useful source for those who are interested to obtain more information on biotechnology in vitro, particularly with higher plants. The literature lists at the end of each article and an extensive subject index at the end of the book can be a further guide.

R. L. M. PIERIK

Roderic COOKE: *The Biology of Symbiotic Fungi*. John Wiley & Sons Ltd. Chichester, Sussex, 1977. Hard cover, xi + 282 pp., 75 text-figures, 26 tables, price £10.75/\$21.00.

This is an interesting book on fungi and their relationship to other living organisms (including other fungi).

The author pleads in his introductory chapter for a return to the original meaning of the term symbiosis. De Bary who coined it in 1879 defined it as "Zusammenleben ungleichnamiger Organismen" which could be translated as "living together of different organisms". Such a return was recently also advocated by others, e.g. Lewis '73, '74 and Starr '75; in contradiction to the present author, however, they still want to restrict it to associations involving a permanent intimate contact.

The book is composed around a subdivision of symbiosis after the effect of the symbiont on its host in antagonistic (= harmful), neutral and mutualistic (= beneficial) ones. On the basis of host dependence they are further distinguished into facultative- or obligate symbioses, thus giving rise to six categories or groups. A further subdivision based on the way of nutrition is also given and used, viz. in saprophytic, necrotrophic, biotrophic and hemibiotrophic relationships. Hemibiotrophs are those fungi that start with a biotrophic association and end up with a heterotrophic one. The author deals with these kinds of symbioses in separate chapters. Chapter 2-7 treat symbioses with animals, chapter 8-13 with plants and chapter 14 interfungal ones. As the author states in the first chapter, not all of his symbiotic categories are equally common with plants, animals and other fungi or they may be less well known. Consequently interfungal symbiosis is only represented by a chapter on antagonism between fungi and there is e.g. no chapter on neutral relationships with plants. The argument that too little factual information is known and that the book should not become too thick can be easily understood. It would have added to the logical structure of the book, however, if these categories would have been incorporated in the form of short sections even if only to inform us about the lack or scarcity of existing knowledge about them. Neutral relationships of fungi with plants (phyllosphere, rhizosphere, etc.) are interesting enough to devote to them at least some attention and possibly speculations. The author's preface ends with the remark that the philosophy of the book is to try to go a little further than the facts and this subject would have offered another good opportunity.

Apart from this remark I consider the attempt of the author to treat the whole concept of fungal symbiosis in one concisely and clearly written book as successful. Due to its wide coverage it can only give well chosen examples and facts and not too many details.

To the biologist, zoologist, botanist, phytopathologist, mycologist, etc. interested in fungal symbiosis this book brings together information which is otherwise widely scattered. A botanist who in his reading will not easily come across relationships between fungi and animals can find a good review of them here, allowing for comparisons with those between fungi and plants.

T. LIMONARD

W. H. LEWIS and M. P. F. ELVIN-LEWIS: *Medical botany – Plants affecting man's health*. John Wiley & Sons, New York – London – Sydney – Toronto, 1977. XV + 515 pages. Price £18.00; \$31.65. ISBN 0 471 53320 3.

Back to nature has a magical attraction on people of the developed countries. The consumption of organically grown foodplants and the use of medicines of vegetable origin is the result of this attitude. The interest in medicinal plants is reflected in the growing number of publications in this field. Evidence of this growth can be found in "Horticultural Abstracts" which has a special category devoted to medicinal plants. The percentage of abstracts on medicinal plants raised mainly in the last five years from 2.4 in 1965 to 6.2 in 1977. "Medical Botany" brings in focus this important group of plants.

The classification is based on medical principles. Section 1 contains "injurious" plants, section 2 "remedial" plants and section 3 "psychoactive" plants. The sections are split into chapters. The second section, the most extensive is divided into twelve chapters devoted to cancer, nervous system, heart and circulation, metabolism, etc. Each chapter quite independently deals with its subject. In general much attention is given to historical background, description of the human system and of diseases connected with it. After that, information is given on the use of plants in orthodox medicine, in folk medicine throughout the world and in modern medicine. Pictures from old books and herbals illustrate the text. Schemes and tables contribute to surveyability. Finally, at the end of each chapter a list of references is included.

The first section "injurious" plants does not only give information on poisonous plants but also on allergy and cell modifiers, for example mutagenically active plants.

Not only the higher plants are examined, bacteria as well as fungi have a place in the book. Probably because they are less known or forgotten keen attention is given to the harmful effects of plants. An example is the horror of ergotism in the Middle and Dark Ages caused by organically grown rye. (The authors do not deal with the economical and agricultural aspects of their subjects. Remarks on organic agriculture are an addition of the reviewer.) Many quotations from very old to up to date publications enliven the text.

The authors often pay special attention to their own environment, the United States of America. For the convenience of the reader an outline of the plant kingdom, a bibliography of herbal medicine and a glossary are included.

"Medical Botany" is of interest to a diverse readership who wants to know more about how plants affect the body. To people who have a faithful confidence in the benefit of plants and who promote organic agriculture and the use of herbal medicine the book is extremely instructive.

G. STARITSKY

R. BEIDERBECK: *Pflanzentumoren. Ein problem der pflanzlichen Entwicklung*. 216 Seiten, 39 Abb., 14 Tab. Verlag Eugen Ulmer Stuttgart, 1977. DM 48,-.

Although they had been known for a very long time, the investigations on plant tumours started not earlier than in 1907. Now, 70 years later, we begin to understand the molecular basis of plant tumour induction. It is clear that to reach this point a large amount of work had to be done by many scientists. It is the merit of the author to have put together the results of the investigations of the last 30 years. The book discusses the several aspects of plant tumours like the tumour-inducing agent, induction, anatomy, morphology, growth and physiology of the tumours, tissue culture, genetics, etc.

Although the main part of the book deals with crown galls, also wound-tumour virus, genetic tumours, habituation, chemical tumours, tumours of *Picea*, and radiation-induced abnormal growth are described. The main interest of the author is the disturbance of the development of higher plants, and in this light he frequently compares normal development with the development of tumours. Thus, the first chapters of this book describe the division, differentiation and pattern formation of cells and the process of wound healing before the process of tumour formation is discussed. The "abnormal" plant development which is characteristic for tumours offers us a unique object for the study of the genetic regulation mechanisms in eukaryotes. Therefore, the attention of those interested in molecular developmental biology, is strongly directed to crown gall, as it now seems that the latest results (DRUMMOND et al. Nature 269, 535, 1977) provide convincing evidence for the transformation of eukaryotic cells by a prokaryote. In this respect the part of the book dealing with the tumour-inducing principle is already behind the facts.

However, both for those already working with plant tumours, and for students interested in this subject, the book offers a good survey of the many aspects of plant-tumour research. Its price is not prohibitive.

A. M. MENNES

E. HENNIPMAN: *A monograph of the fern genus Bolbitis (Lomariopsidaceae)*. xii + 331 pp., 12 pl., 87 figs. Publ. as vol. II of Leiden Botanical Series by Leiden University Press, 1977. Hfl. 92.00.

The pantropic fern genus *Bolbitis* is a somewhat special case among the many fern genera whose taxonomy was until recently (or in other cases still is) very imperfectly known. After some recent work by other students the generic boundaries are hardly disputed, but the species delimitation met with unusual difficulties. The plasticity of such characters as leaf architecture, degree of laminal dimorphism, venation pattern, etc., often used for species discrimination in other genera of leptosporangiate ferns, proved to be so poorly understood that very large numbers of previously described "species" had to be united with others. Demonstrating the lack of boundaries between many of these "species" in the present case was not only a matter of assembling large amounts of specimens and putting them side by side. Many species of *Bolbitis* have adventitious buds on their sterile leaves, often resulting in large clonal populations in nature. Sampling these clones by the author in S.E. Asia and by other collectors in general provided series of specimens that permitted much better founded conclusions than usual. Experimental work supplemented these studies, resulting, i.a., also in many new chromosome counts. Some widespread and well-known species proved to be completely sterile hybrids. Certain of these hybrids must have originated from hybridization of species from different subgeneric categories, an important reason why these are maintained only at the level of series, including the "genus" *Egenolfia*, still recognized by many modern authors, here with full justification reduced to a series, *Egenolfianae*. Such hybrids from different series cannot, of course, be placed in one or the other and must needs remain "incertae sedis".

Observing juvenile plants grown from spores as well as developed from leaf proliferations provided the author with a unique possibility to study the blastogeny in a large number of species and to use it for taxonomic and especially for phylogenetic conclusions. This possibility was made use of in a most fruitful way. The leaf and especially the venation pattern of some species proved very similar to that observed in the juvenile plants of others. This led to far-reaching conclusions not only as to affinity but also as to derivation; contrary to widely held opinions this evolution, by pedogenesis or neoteny, leads to simplification rather than to elaboration. It is true that such a process was in recent years often surmised by fern taxonomists but here it is for the first time virtually proved. From this point of view the present monograph deserves the attention of much wider circles than the pteridologists' alone.

This is just one of the many aspects of the genus elaborated in this monumental Ph. D. thesis. As a taxonomic monograph it may be compared to the best publications extant; it should set a standard for many years to come. The keys, as tested by the reviewer, work very well; the descriptions are succinct and complete; the illustrations are well executed and well reproduced. Unsolved problems, unplaced specimens are never swept under the carpet but brought to the reader's attention. The morphological part should also prove to be of much general interest.

This is much more than just an account of a single fern genus, and further work by the same author will be awaited with anticipation. In appearance the book is very attractive, resulting, it must be admitted, in a rather high price.

K. U. KRAMER, Zürich

D. W. LACHE: *Umweltbedingungen von Binnendünen und Heidegesellschaften im Nordwesten Mitteleuropas*. Scripta Geobotanica Verlag Erich Holze K.G. Göttingen, 1976. 96 p. 42 ill. DM 15,-.

In this publication heaths and inland dune vegetations of N-W Germany and Denmark are treated in relation to their environment. Vegetation tables show samples of the *Ericetum tetralicis*, *Calluneto Genistetum* and *Spergulo morisonii-Corynephorum typicum* and their subassociations. Plant geographical aspects of the main vegetation components and climate of the areas studied are treated shortly.

The main body of the paper is devoted to water relations, microclimate and nutrient conditions of the vegetations studied.

Micrometeorological measurements were taken mainly with conventional instruments such as the Assmann psychrometer.

One of the aims of the author was to find out why *Empetrum* grows almost exclusively on north slopes. In fact, when vegetations of *Empetrum* and *Calluna* are compared the former has lower soil temperatures as well as lower air temperatures and higher humidities inside the vegetation. As usual in this type of work it is difficult to separate the effect of the vegetation *per se* from that of the site. Furthermore the method used did not allow to measure the temperature of the most active part of the vegetation i.e. the leaf canopy. Evaporation measurements suggest that there were considerable differences in windiness at 1.50 inch above the site and this has to be taken into account in the interpretation of the micrometeorological measurements inside vegetations of *Calluna*, *Empetrum* and *Corynephorus*.

Much attention was given to the nitrogen mineralisation both in samples left in their natural surroundings as well as in laboratory experiments. The author realises that disturbance of the soil may have caused too high values of the N-mineralisation found. The amounts of mineral N formed during the vegetation period range from 26–37 kg/ha (*Ericetum*) to 16 kg/ha (*Corynephorum*).

The C/N quotient was found to be lowest in the *Corynephorum* and highest in the heaths. We add the remark that this is what could be expected with the high soil temperatures in the *Corynephorum*. It is a nice smallscale demonstration of the general trend in the relation between climate and humus composition.

In conclusion: for the critical reader this is a useful publication on the relations of heaths and inland dune vegetations with their environment.

P. STOUTJESDIJK