

BOOK REVIEWS AND ANNOUNCEMENTS

J. B. HARBORNE: *Phytochemical Methods. A guide to modern techniques of plant analysis*. 2nd. Ed. Chapman and Hall Ltd., London, New York 1984. xii + 288 pp., 59 figs., 55 tables. Hard cover. £ 17.50, \$ 33.—. ISBN 0-412-25550-2.

Since the first edition of this book appeared in 1973 several spectacular developments in e.g. carbon-13 NMR spectroscopy, HPLC and mass-spectroscopy have occurred. The number of known substances reported from plant sources has increased considerably in the past 11 years, the price of the inevitable new edition of *Phytochemical Methods* has unfortunately more than tripled. The structure of the second edition has not been changed. Every chapter has been updated to the level of 1984, 30–50% of the references refer to books and papers of the last decade. The book is, as might be expected from Dr. Harborne, well written, informative and gives a good general account of the techniques employed in phytochemistry. Due to the enormous number of known plant constituents a few drawbacks are inevitable in a book of limited size. It is impossible to cover all the representative techniques in protein chemistry within the limits of seven pages and to mention the procedure of Lowry *et al.* as a reliable method for determining the protein content of any plant preparation is questionable. The book provides a comprehensive summary of methods, but many extraction and isolation procedures are mentioned too briefly or sometimes omitted. How to prepare a pure fraction of e.g. organic acids, cardenolides or gibberellins (to mention a few) is by no means to be learned from this book only. The general reference section and the supplementary references at the end of each chapter are important, making this book rather a library handbook than a laboratory handbook. No important class of compounds has been ignored. The book is primarily intended for students (botany, pharmacognosy) and with 25 well described practical experiments in the isolation of various natural products they can get an elegant introduction into the phytochemistry of higher plants. I hope that every laboratory will be able to buy a copy.

H.W. GROENEVELD

K.C. MARSHALL (Ed.): *Advances in microbial ecology* Vol. 6. Plenum Press, New York and London 1982. xii + 240 pp., 21 figs. 20 tables. US \$ 47.40, US and Canada \$ 39.50. ISBN 0-306-41064-8.

This volume contains six papers, five of which are dealing with the role of micro-organisms in the aquatic ecosystem. The exception is the first paper, in which J.W. Doran describes the involvement of micro-organisms in the selenium cycle and presents a detailed survey of the distribution of selenium in the environment and the transformation of Se-compounds.

In the second paper: "The effect of environmental factors and their interactions on phytoplankton growth", G.Y. Rhee restricts himself to three important ecological factors: nutrients, light, and temperature. Even with this limitation, however, the author did not succeed in giving a complete review of the available information. Especially the treatment of the influence of nutrients shows a number of omissions; apparently the author largely restricts himself to the results in his own publications.

The third paper, by H.W. Pearl on "Factors limiting productivity of freshwater ecosystems" is in a way a continuation of the former one. Notwithstanding the extensive list of references the information given is restricted. The paragraph on CO₂ limitation repeats a discussion already held between 1970 and 1974. It is disappointing that in the treatment of the methods to determine factors limiting primary production promising methods like the use of physiological indicators are ignored.

In the fourth paper F.B. van Es and L.A. Meyer-Reil give clear descriptions of a number of

methods for determining biomass and metabolic activity of heterotrophic bacteria; some classical ones like determination of oxygen and CO₂ fixation as well as methods based on the kinetics of the uptake of nutrients. Quantitative information on the activity of heterotrophic bacteria, however, is not given.

The important phenomenon of starvation survival of heterotrophs in the marine environment is treated in the next paper, by R.Y. Norita. A short survey is presented of most important processes occurring in cell starvation, like change of viability, of cell size and of the internal composition of the cell. The conclusion, however, that energy starvation leads to high ATP and RNA levels in the cell, seems doubtful.

The sixth and last paper, by J. Fletcher and K.C. Marshall: "Are solid surfaces of ecological significance to aquatic bacteria?" contains a nice review of this topic. A good discussion is given on physicochemical, physical and biological characteristics of surfaces, followed by a discussion of methods for the preparation of solid films, and a summary of the activity of bacteria on these films.

It may be concluded that in Volume 6 of the *Advances in Microbiological Ecology* a number of interesting and important topics are treated. The incompleteness of some papers might be due to space limitation.

L.R. MUR

T. K. SCOTT (Ed.): *Hormonal regulation of development II. The functions of hormones from the level of the cell to the whole plant. Encyclopedia of Plant Physiology* vol. 10. Springer Verlag, Berlin, Heidelberg, New York, Tokyo 1984. xv + 309 pp., 42 figs. Cloth. DM 168.-, c. US \$ 65.90. (Reduced price for purchasers of vols. 9, 10, 11: DM 134.40, c. US \$ 52.70.) ISBN 3-540-10196-9.

This book is the second of a series of three volumes in the *Encyclopedia of Plant Physiology*, New Series, dealing with the role of hormones in plant development. The first part, volume 9, edited by J. MacMillan, is devoted to the molecular and subcellular aspects of phytohormones, the third part, volume 11, edited by A. Pirson and the late M.H. Zimmermann, discusses the role of environmental factors in hormone-regulated processes. The middle part deals with hormone actions at the cellular, tissue, organ, and whole-plant levels of organization. In seven chapters it covers literature that appeared in the twenty years since the volumes XIV and XV of the old series of the *Encyclopedia* were published.

At the levels concerned, the messenger role of phytohormones comes to the fore, although they are neither the sole form in which the plant conveys signals, nor just signal transmitters since they also act at their site of production. Therefore, in any part of the plant at any time various hormones, both locally produced and derived from elsewhere, interact and these interactions at the cellular level are thoroughly discussed by Evans. Because the messenger function is so important for all hormones, it is regrettable that the movement of hormones is largely confined to auxins. The final and provocative chapter, by Zajaczkowski and Wodzicki, postulates the morphogenetic effect of vectors of auxin wave propagation, perhaps too speculative to be incorporated as a chapter in an encyclopedia.

On the contrary, the other chapters are rather orthodox with few exciting speculations. They are all written by well established U.S. scientists and show a sometimes remarkable lack of information about research in other parts of the world. From Japanese and, particularly, West European sources too many interesting facts and viewpoints have been overlooked. The incorporation of British and French contributions might have considerably broadened the outlook, especially in this field of plant morphogenesis.

However, the book contains much valuable information. Illustrations are scarce, but the book is of course very well produced and indispensable where plant growth and development is investigated or instructed.

J. BRUINSMA

D.H. JENNINGS and A.D.M. RAYNER: The ecology and physiology of the fungal mycelium. British Mycological Society Symposium 8. Cambridge University Press, Cambridge, 1984. xvi + 564 pp., 168 figs., 30 tables. Cloth. £ 57.50. ISBN 0-521-25413-2.

Because of the invasive colonization of natural substrata by fungal mycelia, the ecology of fungi is mostly restricted to the occurrence of macroscopic fruiting bodies. In addition, the presence of hyphal anastomoses both within and between originally separate mycelia, at least in the higher fungi, makes it difficult to delineate individual members of a population. This book, containing the invited papers read at a symposium of the British Mycological Society held in Bath in 1983, sets the stage for a new look at the ecology and evolutionary biology of the higher fungi, Basidiomycotina and Ascomycotina, by taking into account recent findings on the cytology, physiology, genetics and molecular biology of these organisms. Therefore, the book is of value not only for those interested in fungal ecology and ecology in general but also for those taking an interest in other aspects of fungal mycelia. Although its relevance to the major theme of the symposium may be questioned, there is even a chapter on the construction of plasmids for molecular cloning in filamentous fungi.

The book opens with a very readable chapter by P.H. Gregory, surveying the earlier studies, notably the works of A.H. Reginald Buller on hyphal anastomoses which have contributed much to the concept of genetic mosaicism in fungal mycelia. The book ends with a chapter written by A.D.M. Rayner and others, stressing the individuality of mycelia in nature due to the operation of vegetative incompatibility systems, even in the Basidiomycotina which rely on hyphal anastomoses for sexual interactions. In between these two excellent accounts are 21 chapters that variously contribute to this theme.

The first chapters deal with the generation of the fungal colony and the cytology of hyphal anastomosis. Then specialized mycelial aggregates are discussed such as strands and cords and the movement of materials through these structures while one chapter is devoted to basidiocarp formation. A number of chapters are concerned with the general ecology of saprotrophs in woodlands. Interactions of fungal mycelia with other organisms are considered in chapters on mycorrhizas and on nematode-trapping fungi while a number of chapters on plant-pathogenic fungi are particularly concerned with the occurrence of vegetative incompatibility between strains and the failure of virus transmission between certain strains. As can be expected from a volume with so many contributors the quality of the reviews varies but some are particularly well written, such as the reviews given by D.J. Read on mycorrhizas and by J.H. Croft and R.B.G. Dales on mycelial interactions in *Aspergillus*, one of the best studied systems in terms of vegetative incompatibility.

The book is well produced and the format fits the other volumes of this valuable series. Inevitably it is not cheap but deserves a place in every library on mycology and ecology.

J.G.H. WESSELS

D. SPAAR, H. KLEINHEMPEL & R. FRITZSCHE (Ed.): *Diagnose von Krankheiten und Beschädigungen an Kulturpflanzen*. TH. WETZEL: *Diagnosemethoden*. Springer-Verlag Berlin, Heidelberg, New York, Tokyo 1984. 198 pp., 103 figs. Cloth. DM 59.-; c. US \$ 21.50.

This book is the first volume of a series concerning the diagnosis of diseases and pests in agricultural crops. It describes the more general methods and techniques, which can be used to support or confirm the diagnosis or which are required to make diagnosis possible. This treatise concerns plant diseases caused by abiotic factors, by plant pathogens as viruses and mycoplasma's (26 pp.), bacteria (18 pp.), fungi (46 pp.), nematodes (19 pp.) and by insects and mites (47 pp.). Preceding this there is a chapter on sampling and shipping of samples (13 pp.), and one on monitoring of disease and pest development (3 pp.). The latter falls in my opinion outside the scope of this book. A large

number of methods are described, accompanied by clear line drawings, which are very helpful to understand the text.

To give an impression about the set up of the book I may mention the contents of chapter 6 on diagnosis of fungal diseases. There are paragraphs on symptom analysis, identification of fungi on plant material (preparation of diseased plant material for observation by the normal or the fluorescence microscope, preparation of epidermal strips, making leaf material transparent, staining of mycelium), identification of fungi in vitro (methods for isolation of fungi from plant, seed or soil, preparation of single spore cultures, culturing of fungi on artificial media, preparation of media, methods to stimulate sporulation, measurement and identification of spores) and assessment of pathogenicity (inoculation of plants or soil, assessment of density of spore suspension, preservation of inoculum etc.).

The authors deliberately have placed the accent on methods, which do not need sophisticated equipment, so that they can be used in practice or with help of relatively simple laboratory equipment. Only in cases where simple methods are not available or insufficient, methods are presented which can only be carried out in better equipped laboratories. Diagnostic methods for which electron microscopy is needed, are not treated.

The following volumes will treat the methods for diagnosis of diseases and pests, arranged according to crops or groups of crops, but also in the first volume some methods are discussed which deal rather specifically with particular diseases, such as eye spot on cereals.

This series is meant for plant protection specialists, active in practical agriculture, for research workers at experiment stations and research laboratories, and for teachers. I expect that this series of books will serve its purpose well.

J. DEKKER

B.M. JOHRI (Ed.): *Embryology of Angiosperms*. Springer Verlag, Berlin, Heidelberg, New York, Tokyo 1984. xxvi + 830 pp., 278 figs. Cloth. DM 290.—. ISBN 3-540-12739-9.

This book is the third on Embryology from India. The first was written by P. MAHESHWARI (1950) and the second was edited by the same author (1963). Embryology as conceived in these books comprises the (ultra)structure, the development and function of the gametophytic phase in a broad sense. The present book deals with the microsporangium and the pollen, the female gametophyte, the fertilization, the embryo and the endosperm, and the seed. There are extensive chapters on apomixis, polyembryony, polyploidy, and germination. In addition special chapters are devoted to embryology and taxonomy, and homologies and phylogeny. About flowers and seedlings other sources should be consulted. All these subjects are treated by specialists in a concise manner. The impact of new optical techniques and electron microscopy is most evident. There are many original contributions, such as by M. Willemsse and J. van Went mainly on the female gametophyte and the fertilization, and by F. Bouman and D. Boesewinkel on ovules and seeds. New for this book is the chapter on germination with emphasis on function (J. Jacobson). Profoundly renewed are the chapters on pollen (B. Knox) and on apomixis (G. Nogler). The treatise on embryology and taxonomy by J. Herr presents a number of well-known case-histories, after which the reader is left in uncertainty on the applicability of embryological characters.

The editor, himself an embryologist, by expertly bringing together present knowledge, has added a valuable source of information to this branch of botany.

W.A. VAN HEEL

Selection in Mutation Breeding. Proceedings of a consultants meeting FAO/IAEA, Vienna, 21-25 June 1982. International Atomic Energy Agency, Vienna 1984. 180 pp., ill. Austrian Sh. 360.-. ISBN 92-0-111284-X.

The book is one out of a comprehensive series of publications on all aspects of mutation breeding, which is issued by the FAO/IAEA division in Vienna.

Artificial selection by plant breeders refers to a series of operations of which the objectives are clearly defined and pursued under specific environmental conditions. On account of this, readers of this book expect to find information on the practical application of selection with programmes that involve induced mutations. The expectations are, however, only fulfilled in part. Some contributions do provide ideas and procedures; others are only distantly related to the central topic.

In his clear introduction Micke correctly points out that for many years mutation breeding research has been concentrated on effective mutagenic techniques. It is the subsequent selection procedures that form the bottle-neck of each programme. Most scientists outside the field of plant breeding are insufficiently aware of this. Micke as well as Donini et al. elaborate on the theme that the varieties obtained via mutation breeding (about 500 at the moment) represent but a small part of the genetic variation which can be induced via mutations. That again reflects the inadequacy of selection procedures concentrating too much on easily recognizable, simply inherited traits.

The most interesting and useful chapter of this book has, no doubt, been written by MacKey from Uppsala. He mentions that the natural variation as used in conventional breeding programmes is, in a way, prescreened, whereas induced mutations are raw products. It is the latter which considerably limits selection efficiency, because adverse side-effects or undesired, linked genes often limit the value of a useful induced mutation. The author stresses the fact that one is dependent on the genetic background in which mutations are induced. An interesting statement is that exploration of micromutations in vegetatively propagated and autogamous crop plants for plant breeding purposes is unrealistic.

The chapter by Hänsel on indirect selection appears somewhat lost. The same is true for some other articles. Besides MacKey, the only author referring to practical mutation breeding is Lacey with his paper on fruit trees. In the final chapter Kranz is, surprisingly enough, the first to refer to the fundamental work on the calculation of mutation frequencies by Li and Redei.

My main objection is that insufficient attention has been paid to important basic methodology. I would have preferred to find, for example, more contributions dealing with the efficiency of selection procedures, such as the paper by Dellaert at another IAEA consultants meeting in Vienna in 1981.

Finally, the conclusions and recommendations are somewhat disappointing. The bibliography at the end is useful for readers interested in specific problems concerning their crops or projects.

A.M. VAN HARTEN

D.G. JONES and D.R. DAVIES (Eds.): *Temperate Legumes, Physiology, Genetics and Nodulation*. Pitman books Ltd., London 1983. 442 pp., 77 figs. 51 tables. £ 15.95.

This book contains the contributions of a group of physiologists, geneticists, microbiologists and plant breeders delivered at a symposium held by the Association of Applied Biologists of England in Reading 1982 on the physiology, genetics and nodulation of temperate legumes. In essence the symposium posed the question "why is it that crops which have the significant potential advantages of an ability to fix their own nitrogen, and of a relatively high protein content, are not more successful?"

In the first chapter Nutman gives a clear overview of "physiology and legume symbiosis". He discusses inheritance, structure and function of the two nitrogenase subunits, the relation of nitrogen fixation to other processes in the plant and to its energy costs.

The following 13 chapters including vegetative and reproductive development and the scope for exploiting genetic variation affecting yield components in forage and grain legumes. The partitioning

of assimilates and the nitrogen economy of these plants are considered in depth. Techniques involved in the measurement of respiratory costs of nitrogen fixation are also an important topic of discussion. Noteworthy are the contributions of Hadley et al. on "effects of temperature and photoperiod on reproductive development of selected grain legume crops", of Ryle on "nitrogen fixation and carbon economy of the leafy legume", and of Thompson on "changes in the partitioning of assimilate of *Vicia faba* in response to environment".

The last nine chapters cover topics ranging from the physiology of nitrogen fixation to the genetics and ecology of *Rhizobium*. Sprent and Minchin in "environmental effects on the physiology of nodules and nitrogen fixation" conclude that in considering the effects of environment too few comparisons have been made between the responses of plants reliant on symbiotically fixed nitrogen and those given combined nitrogen. A better understanding of environmental effects on the inter-relationships involved in the functioning of the symbiotic system can only be achieved through studies at the whole plant/crop physiology level. Mytton, in "host plant selection and breeding for improved symbiotic efficiency" states that at a time when resources aimed at improving our knowledge of biological nitrogen fixation have been greatly increased it is a lamentable oversight that so little has been made available to increasing breeding research on the same topic. Newbould, in "the application of inoculation in agriculture", concludes that a full understanding of the processes and interactions taking place in the rhizosphere of legume plants is lacking, and that agronomists have so far been unsuccessful in translating the vast amount of knowledge on the physiology, genetics and nodulation of temperate legumes to widespread and consistent practical use in the field.

This stimulating book can be recommended to all concerned with legume research and the application of its results into practical use.

E. WESTPHAL

J. SCHWOERBEL: *Einführung in die Limnologie*. Uni-Taschenbücher nr. 31, 5. Aufl. Gustav Fischer Verlag, Stuttgart, 1984. 233 pp., 69 figs. 32 tables. Soft cover. DM 17.80. ISBN 3-437-20320-7.

Schwoerbel's "Einführung in die Limnologie" introduced since 1971 a generation of students in general limnology. It had the advantages of being compact, clearly written (in the German language), and having good illustrations. Relatively little attention was paid to biological phenomena, mainly chemical and physical processes were presented.

The fifth edition is clearly improved in these aspects, many biological (mainly ecophysiological) data are added to the booklet. A good example of the present state of limnology is given, with a strong emphasis on causal relations. The world-wide orientation of the cited literature is clearly reflected, and, it can be said with some professional pride, this is not unusual in limnology. A strong emphasis is put on the system as a unit for research, stating that "the system shows characteristics that cannot be derived from the single elements", revealing a holistic view on the discipline.

A separate chapter is devoted to applied aspects of limnology, including a paragraph on water therapy. More attention to these aspects could have improved the usefulness of the book, as applied limnology is gaining more and more importance, in publications as well as in fund availability, and thus in job possibilities for students.

It can be concluded that the "Einführung" is still one of the best general – and payable – introductions to limnology for anybody who is able to read German. It is, however, advisable to combine it with the study of a text on applied limnology, e.g. WELCH's unsurpassed "Ecological effects of waste water" (Cambridge University Press 1980).

H. HILLEBRAND

J.K. HOOPER: *Chloroplasts*. Plenum Press, New York and London, 1984. x + 280 pp., 141 figs. US \$ 51.– (in U.S.A.: \$ 42.50). ISBN 0-306-41643-3.

One principle for classification of biologists is that according to field of interest; e.g. the cellular,

organismal or community levels. Recent evaluations of Dutch biological effort followed this line. Within the cellular level there exist broad sub-specialities like subcellular morphology, biochemistry and molecular biology, but new subspecialities arise, directed at the cellular organelles, which may be due to growing acceptance of the endosymbiosis theory. The present book is the second in a series Cellular organelles, the first volume of which treated the mitochondria. Although it has several characteristics of a monograph, it is less specialistic than current monographs, and usually reads like a textbook. In fact, many chapters supply supplementary basic information in an unpretentious way on subjects like membrane analysis by freeze-fracturing technique, peptide synthesis on ribosomes etc. Also structural formulas of most relevant compounds are added. The level of chemical sophistication required must be considered present in all dutch biologists who have taken their degrees after 1960, as a last date – this with regard to an early apologizing remark by the author in his preface. There are nine chapters; historical perspectives (excellent); chloroplast structure, with very much attention to the peculiarities of various phyla of algae; chloroplast components; two chapters on light and dark reactions of photosynthesis; the chloroplast genome and its expression; two chapters on chloroplast development and its regulation and a final one on evolutionary aspects. Literature quoted and recommended at each chapter's end is abundant and largely quite recent, up to 1983.

Although the book is easily readable, the information is often quite detailed, reflecting, of course, the preferences of the author. Hence, there is much more *Chlamydomonas* than spinach in the book – but this does not make it less palatable. The integration of the chloroplast in plant cell biology is largely restricted to the regulatory mechanisms of the expression of nuclear and plastid genomes, a.o. by phytochrome. But the metabolic regulation of assimilatory and dissimilatory processes via the metabolite translocators in plastid envelopes is only briefly mentioned. On the other hand, the morphological, chemical and physiological similarities and dissimilarities of chloroplasts and photosynthetic bacteria are extensively exposed.

Quality of paper, printing and illustrations are excellent. The review of this book in *Science* mentions the availability of a paperback version at less than half the price. Your reviewer hopes that this last bit of information will contribute to the merited success of the book.

J.F.G.M. WINTERMANS

W. M. DUGGER and SALOMON BARTNICKI-GARCIA (Eds.): *Structure, function and biosynthesis of plant cell walls*. American Society of Plant Physiologists, Rockville, Maryland, 1984. xiii + 507 pp., many figs. \$ 15. —.

This book comprises the lectures and posters of the 7th Symposium in Botany, Jan. 1984, University of California, Riverside.

The session "Cell Wall chemistry and Biosynthesis" opens with a paper by BARTNICKI-GARCIA on the origin and evolution of cell walls, the bulk of the earth's biomass and is followed by a contribution of ALBERSHEIM et al., on wall oligosaccharides regulating gene expression and metabolic processes. STONE discusses data on occurrence of non-cellulosic β -glucans. COOPER et al., picture the wall as xyloglucan coated cellulose microfibrils intercalated through an extensin-pectin network. HERTH and HAUSSER show plasma membrane rosettes, the candidates for cellulose microfibril formation in higher plants, not to be directly affected by calcofluor white, an inhibitor of cellulose microfibril formation. Unfortunately they refer to *Poterioochromonas* in "Material and Methods" as *P. stipitata*, but in the figures as *P. málhamensis*; in the text "big particles" are mentioned in the EF of plasma membranes, but are visible on pictures of both EF and PF. TANNER's paper describes regulation of glycoprotein synthesis. The first session closes with a lucid paper by DELMER et al., on the regulation of cellulose synthesis by an attempt at in vitro synthesis of β -1,4 glucan. The production is dependent upon the combined presence of Ca^{+2} , Mg^{+2} and cellobiose and is always contaminated with β -1,3 glucan.

The session "Cellular events associated with cell wall biosynthesis" opens with a paper by NORTH-COTE giving several control levels of wall assembly: synthesis, transport into the endomembrane system and rate of vesicle fusion with the plasma membrane. DOMOZYCH reports on cytokinesis,

morphogenesis and wall development in green algal flagellates. The next two papers deal with cell wall proteins: ROBINSON et al., report on the synthesis of structural glycoprotein, SCOTT and O'NEILL on enzyme activities of wall protein extracts. YAMAMOTO and MASUDA discuss the role of auxin in polysaccharide synthesis.

The last session "Interactions of plant cell walls with pathogens and related responses" opens with a paper by KOLATTUKYDY on cutin and suberin, mechanisms of penetration of cutin and the isolation of cutinase and its role in fungal penetration. An interesting contribution by KEENAN and TASKAWICZ includes use of molecular biology and gene cloning to understand plant-pathogen systems.

Finally, WEST et al., recall ALBERSHEIM's concept by discussing the role of pectic wall fragments as regulators in disease resistance.

Ample space is given to the posters; The solid-state ^{13}C NMR studies by Atalla open new views about native cellulose. A page is missing in the index (i-p). The book is a source of information to all engaged in cell wall research, though at places the fact that papers were not refereed, characteristic for proceedings, is perceived. Stress is more on biochemical than on ultrastructural aspects. Publication was made possible by sponsoring, a procedure which might have enabled publication of the proceedings of the Fribourg 1984 Cell Wall Meeting with valuable additional information on the same subject.

A.-M. C. EMONS

P. SCHÜTT, K. J. LANG and H. J. SCHUCK: *Nadelhölzer in Mitteleuropa. Bestimmung, Beschreibung, Anbaukriterien*. G. Fischer Verlag, Stuttgart, New York 1984. 274 pp., 157 figs., 8 colour plates, 14 tables. Cloth. DM 68.—

Descriptions are given of a number of conifer species found in (central) Europe, indigenous or introduced, in woods, parks, and gardens. There is a key to the 25 genera treated and keys to the species of these genera. Some 60 species receive ample treatment with detailed descriptions of their morphology and items about ecology, distribution area, use, and cultivation. 65 species receive a more concise treatment, and 22 are mentioned in the key, but not in the text. On the other hand two species (*Pinus brutia* and *Juniperus sibirica*) and two hybrids are treated in the text but not included in the keys. The authors have selected from the many known cultivars some 200, available for sale in the specialised european nurseries; they are briefly described under the respective species.

The book is attractively illustrated with 16 drawings, 26 colour photographs, and 115 black-and-white photographs, the latter mostly of critical details of the morphology. Several of them are sensibly interspersed in the key to the genera, to facilitate its use.

Should amateur-dendrologists, for whom the book is primarily intended, give their new acquisition a trial on the yew tree in their garden they will reach with easy steps in the key to the genera item 7, where they are asked whether the needles are stalked or not; in choosing "not" in three steps nr. 12 is reached, where they again are asked whether the needles are stalked or not; only by now choosing "stalked" will they reach the yew family.

A revised edition of this attractively produced book could be of interest not only to the amateur-dendrologist, foremost in the authors' minds, but to everyone interested in the coniferae of the european flora or introduced from foreign parts in forestries, parks, and gardens.

H.P. BOTTELIER

J. JANICK, R. W. SCHERY, F. W. WOODS and V. W. RUTTAN: *Plant Science*, an introduction to world crops. 3rd edition. W.H. Freeman and Company, San Francisco 1981. VIII + 868 pp. 520 figs. Board £ 15.60. ISBN 0-7167-1261-X.

Three editions of *Plant Science* in twelve years means appreciation by a rather large readership. Indeed, the book has much to offer. The content is divided in six sections i.e.: Plants and people,

Nature of crop plants, Plant environment, Strategy of crop production, Industry of plant agriculture and The marketplace. Each section includes four to five chapters. At the end of each chapter a list of selected references is given. Quite unusual but convenient to the reader is that all the references are briefly reviewed. Special subjects are brought to notice by placing compiled information on them in boxes.

The set-up of Plant Science is rather conventionally, a vast amount of detailed information is presented to the reader without much integration between the separate subjects. Besides, because primarily written for US-students by US-authors the book contains mostly examples from US origin or experience. As a consequence certain aspects of tropical agriculture as mixed cropping and shifting cultivation (shifting agriculture) did not get the attention they deserve. Thus, the illusion is roused that modern western technology is capable to improve substantially agricultural production in the tropics and not that the principles of crop cultivation in the humid tropics are basically different from that in the temperate and sub-tropical regions. Such a view can only lead to more rusty relics of machinery in the tropics. Therefore, Plant Science is regarded unsuited as a textbook for university students, the future advisors of support to development countries.

However, the encyclopedic knowledge in Plant Science is so conveniently arranged that it will be a moderate priced, excellently produced acquisition to libraries of secondary schools, where it may serve as a highly appreciated reference book for teachers and students.

G. STARITSKY

J.-P. FRAHM und W. FREY: *Moosflora*. Verlag Eugen Ulmer, Stuttgart 1983. vii + 515 pp., 108 figs. DM 29.80.

The UTB "Rote Bücher" series has a reputation for cheap provision of a wealth of scientific information in a nutshell and this handsome new bryophyte flora of Germany – written by two leading specialists in the field – forms no exception to that rule. With almost 1000 species treated – about twice as many as in the Dutch pocket flora by Margadant and During – this booklet should allow the user to identify practically all mosses and liverworts of central and continental western Europe. Extensive keys are included to that aim: to families, genera, species, to fertile as well as to sterile plants. The generic keys to acrocarpous and to pleurocarpous mosses alone cover almost forty pages (a bulk caused in part by the rather cumbersome and uneconomic indentation, though). For all species short descriptions providing the main morphological features as well as habitats and geographical distributions are given and, in addition, selected diagnostic characters are depicted for the majority of them. I find the numerous references to these figures in the keys a particularly welcome feature of this book, as bryophyte identification simply cannot do without illustrations. The nomenclature is in accordance with international standards and selected synonyms are given where appropriate.

I have used this booklet for some time and find that in general keys work quite well for mosses. *Dicranoweisia crispula* and smooth-celled *Leskeaceae* are the ones for which I got stuck in the keys (p. 232 and 407, respectively), but these seem to be exceptions. The liverwort part, on the other hand, leaves more to be desired. In need for improvement are, for example, the keys to *Nardia* (plant size does not work here), *Lophozia* (too much emphasis on leaf shape), *Jungermannia* (sterile material cannot be identified) and *Riccardia* (oil body characters should be given). For plant size, width rather than stem length, which is more unreliable, should preferably be given in the keys. *Fossombroniaceae* should certainly appear in the key to leafy liverwort families and *Haplomitrium* got misplaced among the thallose liverworts. I would also recommend inclusion of the fern prothallium in the introductory key as it is frequently taken for a liverwort by beginners. These as well as other suggestions, which I have forwarded to the authors, shall, I hope, be taken care of in a next edition.

Ulmer's *Moosflora* is a well-done job for which authors, illustrator and editor are to be congratulated. It is by far the most inexpensive comprehensive bryophyte flora for our region and certainly worth buying.

S. R. GRADSTEIN

P. GEISSLER and H. BISCHLER (Editors): *Index Hepaticarum*. Founded by C. E. B. Bonner. Vol. 10 *Lembidium* to *Mytilopsis*. Verlag J. Cramer in der Gantner Verlag Kommanditgesellschaft Fl-9490 Vaduz and Conservatoire et Jardin Botaniques Genève 1985. 352 pp. Cloth, DM 150.– (I.A.B. members DM 120.–). ISBN 3-7682-1100-2.

With the appearance of vol. 10 – after an interim of seven years – an important progress is made towards the completion of the “Index Hepaticarum”.

The preceding nine volumes (A – *Lejeunea*, *Plagiochila*), published from 1962 on, were compiled by the late Dr. C. E. B. Bonner. It was Bonner's aim to make an index, comparable to the *Index Kewensis* for flowering plants. From the very onset the Index included more than a listing of epithets with bibliographical references; details of the type specimens, when known, are also given.

In the newly published volume of the Index this basic concept has been maintained, but there are some notable differences. Firstly, the Index is no longer a one-man's job, but is being compiled by an international team of specialists, under the aegis of the International Association of Bryologists. A conspicuous difference between vol. 10 and its predecessors is its much more economic typography and format, allowing for three times as many names per page. Another important improvement of the Index as it is continued now, is the mentioning of the nomenclatural status of every specific (subspecific, varietal or formal) name, with reference to the corresponding article of the Leningrad Code, thus explaining why the name concerned is invalid or illegitimate.

Ranks between genus and species have not been taken into account. The book merely is an Index: no taxonomical data are given. It is a useful reference book for all those interested in the nomenclature of hepatics.

G. ZIJLSTRA

C. BACKEBERG: *Die Cactaceae, Handbuch der Kakteenkunde*. Six volumes. Reprint of the first edition (1958 – 1960). Gustav Fischer Verlag Stuttgart 1982 – 1985. I: Introduction, Peireskioideae DM 220.–; II: Cereaceae DM 235.–; III: Austrocactinae DM 235.–; IV: Boreocereaceae DM 260.–; V: Boreocactinae DM 298; VI: Additions and index DM 260.–. c. 3000 pp., many ill. Cloth. Subscription for six volumes: DM 1272.–.

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