

## BOOK REVIEWS

M. R. D. SEAWARD (ed.): *Lichen Ecology*. Academic press, London, New York, San Francisco, 1977, 550 p., £ 23.—.

In recent years a revival in the interest for lichens has become manifest, may be inspired by their possible use as bio-indicators for air pollution. One of the symptoms for this revival is the relatively large number of lichenological textbooks published recently. Among them is the present volume the scope of which, however, is more limited than is suggested by the title. In it a number of topics of lichenology are treated which had received insufficient attention in the textbooks of FERRY et al. ("Lichens and Air Pollution"), AHMADJIAN & HALE ("The Lichens") and BROWN et al. ("Lichenology, Progress and Problems"). As a consequence the text is not very coherent.

The following themes are included: phenotypic modifications and taxonomy; colonization, growth, succession and competition; relations between lichens and animals: phytography of lichens in the boreal pine forests, cold and dry deserts; lichens from artificial substrates; the lichen communities; the protection of lichens in Great Britain. In two appendices a bibliography of lichen floras and a glossary are given.

The first impression one gathers from this book is that lichen ecology is a branch of science still in its infancy. Especially the knowledge about the relation between lichens and animals is highly fragmentary (but the same may be true for the relations between other plants and animals). Only about some topics of economic importance ("industrial melanism" and the grazing by reindeer) more extensive investigations have been performed. Also the chapters on phytography are disappointing, partly because of an inadequate taxonomy. Interesting points are, e.g., the floristic uniformity of the boreal area and the large difference in number of species between arctic and antarctic. It is remarkable that there seems to be no plausible explanation for the occurrence of specialized growth-forms in extreme environments (the "Wanderflechte" in arid regions and the "shrubby microlichens" in the antarctic). Remarkable too is the idea found in chapters 7 and 8 that "xeromorphic" structures in lichens may decrease transpiration, whereas already in 1965 BLUM showed that this effect is negligible.

Apart from chapter 3 (colonization, succession, competition), giving an admirable summary of the literature, the purely descriptive parts are probably the more useful ones in this book (chapter 10 and both appendices). In chapter 10 a preliminary description is given of the lichen communities of Great Britain, about analogous to BARKMAN's work on the Netherlands' epiphytes. The enormous amount of work the authors (JAMES, HAWKSWORTH and ROSE) must have done to collect all data presented here is admirable. The descriptions of the associations and alliances are accompanied by a discussion of the synonyms (it is a problem that still there are no generally accepted rules for the nomenclature of syntaxonomic units); new associations with relevee tables and type relevees. For a "continental" ecologist it must be a pleasure to see "his" methods used on a large scale in an English-speaking country, although the authors' opinions sometimes differ somewhat from those current in the BRAUN-BLANQUET school (e.g. p. 303: delimitation of types on the base of ecological besides floristic criteria). In the sphere of protection of lichen communities the opinions differ also from those current on the continent: it is recommended to plant rare species in appropriate habitats.

The list of lichen floras (appendix A) is a valuable item in this book. For every country all comprehensive as well as concise floras, (local) monographs, check-lists, bibliographies and descriptions of the vegetation are mentioned. Especially in lichenology, where taxonomic work on a world scale is so very rare, and where the data are scattered through the literature, such a list is a valuable asset.

Appendix B gives a good list of terms, although on the whole they are of a general ecological rather than a lichenological nature.

All in all the book seems to be a valuable addition to earlier works on the subject.

H. VAN DOBBEN

E. THENIUS: *Meere und Länder im Wechsel der Zeiten. Die Paläographie als Grundlage für die Biogeographie*. Verständliche Wissenschaft Bd. 114. Springer Verlag, Berlin, Heidelberg, New York, 1977, 200 p., 74 ill., DM. 12.–, \$ 5.30.

Plant taxonomy cannot be studied without knowledge of palaeobotany, affinities and evolution cannot be understood without knowledge of the characteristics and properties of fossil plants; for the study of plant geography knowledge of the origin of the present situation is essential; plant ecology cannot be understood without knowledge of palae-ecology. However, for palaeobotany knowledge of several aspects of the earth sciences and of geological terminology is required.

In the subtitle of this attractive, useful, concise book (in the German language) this is acknowledged. Every botanist having to deal with geological aspects will as a rule find useful information in this book, the value of which is increased by a rather extensive glossary.

Although the author has tried to do justice to palaeobotany, palaeozoology apparently is more in his line. Modern contributions to palaeogeography, palaeoclimatology and palaeo-ecology from the palaeobotanical angle, especially those published in "Review of Palaeobotany and Palynology", "Lethaia", and "Palaeogeography, Palaeoclimatology, Palaeoecology", and the modern palaeobotanical textbooks are apparently unknown to him. The list of references consequently is not of much use to a botanist. Moreover that list is based chiefly – although not exclusively – on literature in the German language.

Errors in the field of palaeobotany occur, e.g.: the leaves of the *Cordaites*-type are not "wholly absent" in Gondwanaland (as stated on p. 90); they do occur but the *Cordaites-strobili* are absent, which might indicate that this leaf-type was found in many plant species (see *Lethaia* 8(2), 1975: 103–123).

Notwithstanding these small imperfections the book can certainly be recommended.

F. P. JONKER

L. M. RICCIARDI: *Diffusion processes and related topics in biology*. Lecture notes in biomathematics, No. 14. Springer-Verlag, Berlin-Heidelberg-New York, 1977. V + 200 pp., 29 figs. Price DM. 24.80, US \$ 11.00.

Ricciardi's lecture notes (based on a course given in 1976 at the University of Chicago) deal with parts of the theory of stochastic processes (Markov processes, random walk, stochastic diffusion equations, etc.) that are applicable in various areas of biology, such as population growth, population genetics, and in models of firing neurons. The book is well suited to take the reader already familiar with a certain amount of mathematics (calculus, basic probability theory, fundamentals of differential equations) to a level where he will be well-equipped to handle the kind of stochastic models used in neurophysiology and population biology. As such, it is concerned with biomathematics in the stricter sense: it deals with probability densities and various transformations rather than with fitness or squid axons. It is also biomathematics in the good sense: it approaches the subject-matter in a practical-minded way, treating it as a means of getting results rather than as a goal in itself.

The preface states that the book requires of the reader "only a slight acquaintance with probability and differential equations". Although this may be true from the point of view of a mathematician, I think the claim is overly optimistic for a book directed at readers with a biological background. A reader with no more than a "slight acquaintance" (as opposed to active proficiency) with the indicated subjects (and, of course, calculus) will be hard put to work his way through.

The lectures were competently worked out by C. E. Smith. Throughout the book, many exercises help the reader to test his understanding of the text.

P. G. DOUCET

F. A. LOEWUS and V. C. RONECKLES (editors): *The Structure, Biosynthesis, and Degradation of Wood*. Recent Advances in Phytochemistry, Vol. 11. Plenum Press, New York and London, 1977, XII + 527 pages, illustrations, tables. Price: US \$ 59.40. ISBN 0-306-34711-3.

It is not an easy task to review a book like the present one, covering a wide array of disciplines related in various ways to wood and bark. This volume contains contributions by 14 scientists, laid down in 11 chapters. Each chapter originated from a contribution by the author(s) to a symposium titled "The Structure, Biosynthesis, and Degradation of Wood", held in 1976 at the University of British Columbia on the occasion of the sixteenth annual meeting of the Phytochemical society of North America.

An enumeration of the authors and the titles of their contributions will give an idea of the specific subjects treated: W. A. COTÉ: Wood Ultrastructure in Relation to Chemical Composition; D. P. DELMER: The Biosynthesis of Cellulose and other Plant Cell Wall Polysaccharides; D. T. A. LAMPOR: Structure, Biosynthesis, and Significance of Cell Wall Glycoproteins; A. SAKABIBARA: Degradation Products of Protolignin and the Structure of Lignin; G. G. GROSS: Biosynthesis of Lignin and related Monomers; P. E. KOLATTUKUDY: Lipid Polymers and Associated Phenols, their Chemistry, Biosynthesis and Role in Pathogenesis; W. E. HILLIS: Secondary Changes in Wood; E. T. REESE: Degradation of Polymeric Carbohydrates by Microbial Enzymes; T. KENT KIRK, W. J. CONNORS & J. G. ZEIKUS: Advances in Understanding the Microbiological Degradation of Lignin; Bir D. MULLICK: The non-specific Nature of Defense in Bark and Wood during Wounding, Insect and Pathogen Attack; F. W. HERRICK & H. L. HERGERT: Utilization of Chemicals from Wood: Retrospect and Prospect.

Although the main emphasis is placed on ultrastructure and chemistry of wood cell walls, and on the lignin components in particular, the book covers plant biochemistry and phytochemistry aspects which have a more general significance and a wider scope beyond an exclusive relation to wood as the title suggests.

The authors are all specialists in their fields, and their papers are of high standing. The book is very well executed. Graphs, chemical symbols, and drawings illustrate the text; photographs are included in the chapters dealing with ultrastructure of wood and defense mechanisms in bark, the latter is even illustrated by colour photographs. Extensive lists of references add to the value of the work, and undoubtedly will often be consulted also by those readers who are not specialists in that particular field themselves. Therefore it seems regrettable that no uniformity exists in the citation of the literature. Usually titles are fully cited, but in some chapters they are omitted from the references.

In the opinion of the reviewer, this collection of papers represents an excellent and up to date survey of the knowledge of fine structure, chemistry and changes in the cell wall of the wood during the life of a tree, and in view of several contributions with a wider scope the book will be of interest to a larger circle of readers beyond specialists in wood and trees.

A. M. W. MENNEGA

J. HESLOP-HARRISON: *Cellular Recognition Systems in Plants*. Studies in Biology nr 100. Edward Arnold Publ., London, 1978. iv + 60 pages, 26 figures and 6 tables. Prices £ 1.60 net Paper, £ 3.50 net Boards.

Current textbooks can no longer keep up with rapid developments in the various fields of biological science. Their lagging behind creates a need for small, inexpensive issues on specialized topics to keep teachers and students informed about new facts and insights. Two British publishers meet this demand very successfully: Chapman and Hall, London, publish a series "Outline Studies in Biology", and Edward Arnold Ltd., London, issues already the hundredth booklet in the series "Studies in Biology", sponsored by The Institute of Biology, London. In this jubilee publication, professor Heslop-Harrison lucidly treats the communication between plant cells by physical contact.

Although sometimes membrane-to-membrane contacts between plant cells occur, as with animal cells, or even direct cytoplasmic contacts, the surface of a plant cell generally is a complex polysac-

charide wall. This wall must carry specific complementary binding sites for the selective (re)cognition between reproductive or somatic cells of the same species or, in cases of parasitism or symbiosis, of a specific different species. In many of these interactions, such as gamete formation in algae and fungi, pollination and fertilization phenomena in vascular plants, and the binding of nitrogen-fixing bacteria to leguminous roots, lectin-like glycoproteins and the enzymes involved, the glycosyltransferases, turn out to play a role. Most systems, however, are still little studied and understood, and other mechanisms may also occur.

The limited size of booklets of this type does not allow thorough critical examination of the crucial experiments, and the reader has to rely on the authority of the author. It is to be regretted, therefore, that more often than not it is impossible to find a way from the text into the literature, and that the list of references is so short. In spite of the restricted size, the author cannot always resist the temptation to digress on related topics of his interest, for instance, he includes more distant recognition systems such as pheromones and root-produced germination stimulants which are rather of a hormone-like nature.

Apart from this general remark and a few points of detail that can always be made on an of necessity rather personal treatment of the subject, the booklet can be highly recommended, both for its specific content and as an example of what can be achieved in the scope of a series of front reports in behalf of teachers and students in biology.

J. BRUINSMA

J. F. SUTCLIFFE and J. S. PATE (Ed.): *The physiology of the garden pea*. Academic Press, London, 1977, 500 pp., £ 18.50.

The publication of a monograph on the physiology of one particular plant species is a very novel experience. It could not be done more successfully with any other species except the garden pea. It is quite astonishing how much research has been done on this plant throughout all levels of organization.

This monograph pays attention to almost all aspects of plant physiology. By following the various stages in the life cycle from germination to seed production, a useful framework for the presentation has been obtained. The contributing authors are well-known specialists in their own field of main interest and the editors obviously succeeded in getting suitable cross-references between the various chapters. Hence we have here a textbook of plant physiology in which most of the common topics have been integrated without the confusion of interspecific extrapolation. Nevertheless it appeared that interspecific differences between cultivars are still considerable.

Compared with traditional textbooks a more than average space has been devoted to morphogenetic features. In a number of chapters a thorough discussion on morphogenesis, its physiological background and its consequences for subsequent functioning has been presented. The possible role of plant hormones in morphological expression has been discussed at large. It becomes clear, however, that in spite of an overwhelming amount of experimental data, as yet, no clear picture of the actual role in plant performance can be given, at least not on a quantitative scale. Main problems in this field are still reliable estimations of plant hormone-content and supposed changes in responsiveness. Unfortunately very little information has been presented on the possible role of nutritional aspects in correlation phenomena. A combined treatment of hormonal and nutritional effects might have contributed to a better understanding.

In this connection it is typical that there are no special chapters on water relations and mineral nutrition topics which in general more and more are consigned from physiological to ecological textbooks. In the introductory chapter the editors mention this shortcoming and ascribe it to a lack of relevant work with *Pisum sativum*. As an obvious exception to other nutritional elements the nitrogen metabolism including nodulation has been given an extensive and excellent treatment. The book ends with a chapter on the physiology of the pea as a crop plant.

With a few exceptions referred to above a rather complete picture of the physiological performance of the pea plant has been presented in a rather readable way, which can be recommended to all who are interested in integrated physiology; biologists as well as agriculturalists.

R. BROUWER

J. A. BRIANT (ed.): *Molecular aspects of gene expression in plants*. Academic Press, London and New York, 1977, 388 p., £ 9.60.

According to a note on the cover this is the first textbook dealing specifically with gene expression in higher plants. The importance of this field of investigation is increasing rapidly, partly because of the role it may play in the search for solutions of the world food problem, because the genetic content of a plant cell and its expression can be modified, possibly resulting in larger and better crops.

All this to be learned from the cover, but now the book itself. In the first three chapters a general survey is given of the physiological properties and the metabolism of DNA and RNA, the types to be distinguished in those substances, isolation procedures etc. In chapters 4 and 5 the synthesis of nucleic acids and of proteins in mitochondria and in chloroplasts are treated, themes every self-respecting author of molecular biological or molecular genetical textbooks will include. Too often, however, in these chapters the remark is made that our knowledge of a topic with regard to higher plants is scanty and then the treatment is switched to what is known from e.g. bacteria and/or non-vegetable eukaryotes.

The last two chapters contain a treatment of the molecular aspects of differentiation and plant growth substances. They are the more interesting ones for those interested in higher plants. This is especially true for Trewavas' chapter on plant growth hormones. Among other things he concludes from mathematical considerations that degradation of proteins may be an important factor in the regulation of physiological processes. He also suggests an influence on the membrane physiology as the primary reaction in all kinds of plant hormone activity.

From all themes of plant physiology that can be described from a molecular biological point of view the two mentioned seem to have been chosen at random. The study of genetical variation as a tool for the study of these problems is not mentioned, only the molecular aspects of these problems are treated. This is, in the reviewer's opinion, not the same thing as the study of molecular aspects of gene expression suggested by the title of the book.

J. VAN BREDERODE

M. MOSER: *Die Röhrlinge und Blätterpilze*, 4., völlig überarbeitete Auflage. In H. GAMS, *Kleine Kryptogamenflora*, Band IIb/2. G. Fischer Verlag, Stuttgart, 1978, 532 Seiten, 429 Figuren, D.M. 58.-.

Verglichen mit der im Jahre 1967 erschienenen dritten Auflage, die 443 Seiten besaß, ist die vorliegende erneut dicker geworden und kann kaum mehr als Taschenbuch angesprochen werden. In 1967 rechnete Moser alle Röhrlinge und Blätterpilze zu einer einzigen Ordnung Agaricales und diese Einteilung hielt R. Singer (*The Agaricales in modern taxonomy*, 1975) noch bei. Nun unterscheidet Moser vier Ordnungen, die Polyporales, Boletales, Agaricales und Russulales. Zwei Gattungen, *Schizophyllum* und *Lentinellus* werden als Poriales mit Lamellen in einem Anhang behandelt. Diese Neu-Einteilung kann nur begrüßt werden, sie entspricht ohne Zweifel den natürlichen Verwandtschaften, wurde andererseits vor allem auf mikroskopischen und chemischen Merkmalen (Färbungen) basiert.

Moser's Bestimmungsbuch der Hutpilze ist überall dort wo man deutsch lesen kann ein sowohl von Berufs- wie von Amateur-Mykologen viel gebrauchtes Werk; für Feld-Mykologen eigentlich das einzig brauchbare. Auch in dieser Auflage, in der die Zahl der Arten für Mitteleuropa dank vieler Neufunde und mancher Neubeschreibungen auf mehr als 3100 angewachsen ist, sind die Schlüssel klar abgefasst und sind so weit wie möglich auf makroskopischen, im Feld wahrnehmbaren Merkmalen basiert. Die nur mit Hilfe des Mikroskopes feststellbare Form und Grösse der Basidiosporen und die oft typische Form von Cystiden und ähnlichen Strukturen wird jedoch ebenfalls für jede Art angegeben. Sonst sind die Beschreibungen kurz gehalten.

Die Illustrationen sind dieselben geblieben wie in der vorigen Auflage. Es handelt sich um 429 Strichzeichnungen von Fruchtkörpern, Sporen, Cystiden und Geflechtsteilen. Sie sind am Ende des Buches in 13 Tafeln zusammengefasst. Ein ausführliches Register der Gattungs- und Artnamen

erleichtert das Auffinden der besprochenen Taxa.

Das Buch ist steif gebunden und gut ausgestattet. Der Preis ist angemessen. Für Feld-Mykologen wird es auch in Zukunft unentbehrlich sein.

J. A. VON ARX

M. FRIEDMAN (ed.). *Nutritional improvement of food and feed proteins*. Proc. Symposium on improvement of protein nutritive quality of foods and feeds, August 29–September 2, 1977, Chicago. Plenum Press, New York, 1978, 882 pp., f 83.40.

There is probably no reviewer who would survey all the subjects of this voluminous book in a way that enables an extensive review criticism. This would not surprise anyone, albeit only because the realization of the nutritional improvement of food and feed proteins is attempted with rather diverse means, viz. technological methods, plant breeding techniques, and nutritional research. Further, the results of all efforts have to be brought to the people suffering from malnutrition; the contributions of Monckeberg and Bressani make clear that, doing so, factors influencing acceptation must be strongly taken into account. Those do not only concern consumers. The farmer, too, should be prepared to grow the improved crop. Deutscher outlines the troublesome way of the opaque-2 varieties of maize, whose acceptation is still extremely limited, mainly because of the negative association between maize yields and protein quality (294). Theoretically Johnson (315) may be right when arguing that this association need not be a barrier to the combat against a local protein deficiency under sub-optimal conditions. But the experience of 15 years cereal breeding for protein quantity and quality (surveyably outlined for maize, barley and wheat) may induce some pessimism and raise the question whether in this way an effective contribution to the problems can be expected. Therefore, to pay some more attention to grain legumes in proportion to cereals would have befitted this collection of papers. Exploration of new protein sources, such as cotton seeds on which Cherry is reporting, is worthwhile, too.

Even a rough survey of what is offered in these proceedings can only be very incomplete. The effect of ureum supplementation is discussed, but also the role of plant fibers in human nutrition; the availability of amino acids, whether or not supplemented, but also the enhancement of protein production by increased photosynthesis; the (not always consistent) effects of amino acid supplementation (e.g. of bread), but also the production of those amino acids by *Corynebacterium glutamicum*. Finney urges the consumption of whole (germinated) seeds of the two big crops of the USA, wheat and soybean; Bookwalter gives an interesting contribution regarding other ways of soy protein utilization in food systems. Thirty-nine articles on these and related subjects are included.

The fortieth and last contribution is an "editorial", consisting of a Glossary of abbreviations and definitions of nutritional terms, which is a valuable addition because much of this kind of literature must be understood by non-nutritionists. Some critical remarks may prove that I have read it conscientiously: after explaining an abbreviation, as a rule, a definition is given (e.g. PER, NPU). In some cases, however, this has been omitted (e.g. NPR, UN). For BV indeed a definition is given, but not as a ratio like it is for TD; consequently, a relationship in the way of  $NPU = TD \times BV/100$ , which affords insight, is lacking. The index has been kept very brief and is incomplete; *Vicia faba* is not only mentioned on p. 453–467 but on at least eight other places. The spelling "hereditability" (259) is not common among plant breeders.

Finally, publications on the breeding of vegetable proteins and improving proteins in foods and feeds appear in gigantic numbers the last few years. Among them are many symposium proceedings like the one announced now, in which a lot of identical information is offered by the same people to the same people. Have we not come to a point where scientific speakers/writers and listeners/readers should be employed more efficiently?

A. PH. DE VRIES

*Plant, Cell and environment* Vol. 1(1), 1978. H. SMITH, editor. Blackwell Scientific Publications Ltd., P.O. Box 88, Oxford. Subscription price: £ 20.000 (U.K.), £ 24.00 (overseas), \$ 45.00 (U.S.A. and Canada) per annum.

This new journal is open to original articles in all branches of physiology of green plants. Some emphasis is put, however, on whole plant physiology, environmental physiology, and community physiology, because in these fields, as is stated in the "Editorial", some publication difficulties are felt.

It is intended to be an international journal and as far as can be judged from the first issue the editors are as good as their word: it contains ten papers from five-European-countries. In the editorial review board 42 scientists in twelve countries are ready to assist the editors in reviewing all manuscripts submitted. Full papers, either experimental or theoretical, short communications, technical papers, reviews, and book reviews will be published. Of the ten papers of this first issue four are on transport and related phenomena, two on photosynthesis, two on growth, one on the inactivation of urease in lichens and there is one technical report on infrared gas analysis. As far as the reviewer can judge in all ten papers a high standard of quality is maintained.

The printer possesses an assortment of letters with accents and Umlauts and the journal distinguishes itself by the correct use of them as well as by the correct spelling of surnames, British and foreign. There are very few printing errors and in the rare cases they occur in names they are equally distributed between British and foreign ones (Servattaz-Servattez in paper 5, Slayter-Slatyer in paper 7).

It is apparent that in every respect editors and publisher have the interests of both contributors and subscribers to their journal at heart. The latter is perhaps best illustrated by the inclusion in this first issue of the first volume of directions for ordering back issues (cover page 2).

The editors of *Acta Botanica Neerlandica* welcome the new journal and hope it will prove to be a success both scientifically and commercially.

H. P. BOTTELIER

V. MARKGRAF and H. L. D'ANTONI: *Pollen flora of Argentina. Modern Spore and Pollen types of Pteridophyta, Gymnospermae and Angiospermae*. With a Spore morphologic key and photomicrographs of the genera of the Fuego-Patagonian Pteridophyta by Marta A. MORBELLI. 1978. 208 pp., 43 plates. The University of Arizona Press, Tucson, Arizona. US \$ 9.50.

This pollen flora covers Argentina and is primarily intended to promote paleoclimatic research. Acetolysed pollen grains of 374 species are concisely described at the light microscopical level, while keys are provided for each plant geographical area separately. The criteria for selection are not made clear but, presumably, ecologically significant species have been included mainly.

The flora is well illustrated by photomicrographs at  $\times 1000$ . A glossary of technical terms and three indexes enhance its practical value. Especially commendable are the references to published descriptions elsewhere for each species.

Many genera are described for the first time and this makes the flora valuable also for the taxonomist. In this connection attention can be drawn to the remarkable pollen morphological variability in Argentinian Compositae. The affinity of pollen types such as those of *Leucenia* and *Proustia* would be hard to recognize if found dispersed in pre-Quaternary sediments.

A minor criticism can be levelled at the execution of the photoplates which have been assembled by trimming the individual photomicrographs following the contour of the grains. It is then often difficult to decide whether the edge of the image is the true one or a trimming artefact, e.g. in *Jacaranda mimosifolia*. This may result in loss of critical diagnostic evidence visible in optical section. It is realized that this practice, in which the present atlas does not stand alone, results from a desire to produce aesthetically pleasing plates from prints lacking in contrast. However, in the reviewer's opinion a clear view of the optical contour is essential and this can only be achieved by rectangular trimming, while lack of contrast can always be remedied by proper staining and use of a high contrast film type.

Together with the pollen flora's of Chili by Heusser and of the adjoining part of Brasil by Salgado-Labouriau, the present work forms an indispensable aid for any palynological study of past vegetation in this part of the world and the authors are to be congratulated with this well executed and relatively low priced volume.

J. MULLER

A. T. CZAJA: *Stärke und Stärkespeicherung bei Gefäßpflanzen*. Gustav Fischer Verlag, Stuttgart – New York, 1978. 269 pp., 75 illustrations. Price DM 98.00.

The structure of starch grains and their swelling behaviour on heating has long been demonstrated to be of diagnostic value in the examination of pharmaceutical and food products in important publications by Dr. Czaja. In the present volume the author explores the distribution of different starch grain types in vascular plants. Apart from the introductory section in which these types are described and defined, the book reports on original research on numerous orders and families of the Pteridophytes, Gymnosperms and Angiosperms. The results appear highly interesting. The 'primitive' type of Pteridophyte starch grains is typical for Pteridophytes and Gymnosperms as well as for a number of families in the Monocotyledons and Casuarinaceae and Haloragaceae of the Dicotyledons. Only some representatives of the Marattiales show envelope starch grains which are typical for the majority of Angiosperms. Highly compound starch grains occur in the seeds of a number of Monocotyledons and in all families of the Centrospermae and Piperales studied, as well as in the Nymphaeaceae and *Urtica*. Some families, tribes or genera are characterized by special types (Euphorbiaceae, Cannaceae, and Triticeae of the grasses).

The distribution of Pteridophyte type starch grains and of highly compound starch grains in the Angiosperms has induced the author to draw very far-reaching conclusions. The Monocotyledons are divided into three groups: 'Primary' Monocots with Pteridophyte type starch grains, including most Helobiae as well as the Haloragaceae which are transferred to the Monocotyledons on account of their starch grains (!). 'True' Monocotyledons with highly compound starch grains constitute a second group, which include Hydrocharitaceae ('which have nothing to do with the Helobiae') and Nymphaeaceae and Piperales traditionally placed in the Dicotyledons. Finally there are the 'Derived' Monocotyledons which store fatty oils in their seeds and envelope starch grains in their vegetative parts. On account of the great incidence of 'primitive' starch grains in the Monocotyledons, this group cannot be considered to be derived from a Dicotyledonous group such as the Polycarpiceae. The author's treatment of some Dicotyledons as Monocotyledons is not the only example of putting heavy weight on starch grain types as taxonomic markers. Also the family delimitation of Haloragaceae is drastically extended to include *Barclaya*, *Callitriche*, *Ceratophyllum*, *Hippuris* and *Myriophyllum* on account of the shared type of starch grains.

Although the distribution of different starch grain types in extant tracheophytes is indeed highly indicative of their taxonomic significance, many of the author's radical conclusion may be questioned and alternative interpretations should be considered.

The presentation of this pioneering survey is rather unfortunate. The hard facts are hidden in family treatments which are cluttered by summarized information on habit and geographical distribution and by quotations from Hegnauer's Chemotaxonomie, Wettstein's Handbuch and Engler's Syllabus. Several mistakes and inconsistencies complicate the reading of this book. The bibliography is incomplete. One also misses a discussion of the more modern systems.

In spite of deficiencies in these editorial aspects, and of some controversial conclusions, this book should be welcomed as an important source of new information. Botanists interested in the natural affinities of vascular plants should not ignore Dr. Czaja's results, but are advised to use this book with caution. It is hoped that it will stimulate further studies in this promising field of enquiry.

P. BAAS