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Figures at the end of the issue.

TRIBE, M. A., ERAUT, M. R., SNOOK, R. K.: **Enzymes**. — Basic Biology Course, Book 7, Cambridge University Press, Cambridge—London—New York—Melbourne 1976. 104 pp., 2.75 £.

This book is part of the Basic Biology Course (called "Regulation within Cells") for undergraduates written by the Inter-University Biology Teaching Project team at Sussex. The main aim of the book is to provide a reader with basic understanding of enzyme action and structure, since all chemical reactions occurring within living cells are subject to catalysis and control of enzymes. Although it can be studied quite independently from other books in the course, it has nevertheless been designated as an essential link between Photosynthesis (Book 6) on the one hand, and Metabolism and Mitochondria (Book 8) on the other. Consequently, several of the examples used have been taken from multi-enzymic systems already encountered in Photosynthesis.

The book is divided into two parts: (1) Reaction rates, equilibria and catalysis, and (2) Enzyme structure, enzyme kinetics and mechanism. The first part deals with the physical and chemical background of reaction mechanisms and catalysis in general and enzymic reactions in particular. In the second part, the chemical nature and structure of enzymes is discussed. Starting with Fischer's hypothesis of "lock and key", the authors go through the most important notions on enzymes during the last decades. All information is interpreted strictly on the molecular basis and/or from the point of view of physical chemistry. Some current theories are introduced on how the enzymes work.

Reading this book calls for student's concentration and promotes his ability to think over the topic independently. The concise text is very clear and informative. It is sure that a text-book of such type is extremely useful; we can recommend it to all biology students.

J. ŠATAVA (Praha)

Gazometricheskoe Issledovanie Fotosinteza i Dykhaniya Rastenii [Gazometrische Photosynthese- und Atmungsuntersuchungen bei Pflanzen]. — Tezisy Doklady Vsesoyuznogo Soveshchaniya Tartu-Tõravere, 11—15 maya 1976 goda. Tartu 1976. 152 S. 0,47 Rbl. [Russisch].

In Zusammenarbeit des „Wissenschaftlichen Rates für Photosyntheseprobleme und Photobiologie der Pflanzen“ der Akademie der Wissenschaften der UdSSR und des Institutes für Astrophysik und Physik der Atmosphäre der Akademie der Wissenschaften der Estnischen SSR fand im Mai 1976 eine wissenschaftliche Konferenz der sowjetischen Photosyntheseforscher statt. Vorliegendes Büchlein enthält 50 Kurzfassungen der einzelnen Vorträge, die jedoch illustriert sind und manchmal sogar ein kurzes Literaturverzeichnis enthalten. Die Vorträge behandeln nicht nur methodische Fragen der Photosynthese-, Transpirations-, Lichtatmung- und Dunkelatmungsmessungen, sondern befassen sich ebenfalls mit den Gasstoffwechselkenngrößen verschiedener Vertreter des Pflanzenreichs (von Algen bis zu höheren Pflanzen und zu Pflanzenbeständen), der Aktivität einzelner Pflanzenteile, mit den Primärreaktionen der Photosynthese,

dem Elektronentransport und der Photophosphorylierung; nichtsdestoweniger werden ökologische und physiologische Probleme behandelt wie der Einfluss von Sauerstoffkonzentration, Temperatur, Licht, CO₂-Konzentration, Assimilatenansammlung usw. auf den Photosynthesevorgang. Über Messungen der Spaltöffnungstätigkeit und der Transpirationsrate wurde ebenfalls vorgetragen. Im Ganzen werden die Vorträge durch die Tendenz zur Automatisierung der Mess- und Auswertungsverfahren und zur Modellierung der Vorgänge gekennzeichnet.

Zusammenfassend kann man sagen, dass auf dieser Konferenz nicht nur die bekannten sowjetischen Institute auf dem Gebiet der Photosyntheseforschung wie z.B. das Institut für Pflanzenphysiologie der Akademie der Wissenschaften der UdSSR in Moskau, das Photosyntheselinstitut der Akademie der Wissenschaften der UdSSR in Pushchino, das Botanische Institut der Akademie der Wissenschaften der UdSSR in Leningrad, das Institut für Astrophysik und Physik der Atmosphäre der Akademie der Wissenschaften der Estnischen SSR in Tartu-Tõravere, sondern ebenfalls eine grosse Anzahl weiterer kleinerer oder grösserer Arbeitsstätten vertreten waren und dass deshalb dieses Blichlein eine gute Vorstellung über die gegenwärtige sowjetische Photosyntheseforschung in dieser Richtung darbietet.

INGRID TICHÁ (Praha)

BRODA, E.: *The Evolution of the Bioenergetic Processes*. — Pergamon Press, Oxford—New York—Toronto—Sydney—Paris—Braunschweig 1975. 211 pp., \$ 20.00, £ 8.30.

Not only life but also literature undergoes some evolutionary steps. A 63-page essay has grown in five years into a book of 211 pages with more than 2000 references. This is how to lower the entropy in the world literature! To use fully the vast amount of references to papers including those written as recently as at the beginning of the year 1975, the author literally stuffed each paragraph of his book with them.

The author is professor of physics, and his job is evident from each of the 25 chapters of this monograph. The text is condensed, without unnecessary talkative passages, it is based on facts and the discussions of obscure points are limited to a minimum. It contains a spare amount of figures (unfortunately!), but a good subject index and a list of Latin names of organisms.

The starting chapters describe the biophysical bases of energy distribution and transformations in the biosphere, including the bioenergetic principles of evolution and their reflection in the classification of organisms. Chapters 3 and 4 evaluate the formation of the Earth and its atmosphere and the concepts of origin of life. The path from the primeval soup to eobionts and organisms (ecacervates, microspheres, genetic code, self-organization, enzymes, optical activity, functions) is dealt with in Chapter 5, while Chapter 6 describes the energy-rich compounds and energetic coupling. Further on, the sequentially formed types of metabolism are described together with the respective organisms: fermentation (Chapter 7), various forms of bacterial and higher plants' photosynthesis (Chapters 8 to 12), and various forms of respiration including chemolithotrophy (Chapters 13 to 16). These chapters include the description of individual metabolic pathways, their phylogenesis and appearance in groups of organisms. The energy balance of individual metabolic types and their role in the maintenance of living world is always underlined. Special concepts and hypotheses are also analysed, e.g. the photosynthetic unit, the division of photosynthetic bacteria into photoorganotrophs (non-sulphur purple bacteria) and photolithotrophs (purple and green sulphur bacteria), metabolism of chemolithotrophs, existence of carbonate respirers. Chapter 17 draws a tentative scheme for the evolution of Prokaryotes based on the probable developmental position of individual metabolic types. The organelles of Eucaryotes are described in Chapter 18, and the origin of the most important organelles, chloroplasts and mitochondria in Chapter 19. This chapter also discusses the possibility of their endosymbiotic origin and the candidates for original endosymbionts (*Micrococcus denitrificans* for mitochondria, and blue-green algae for chloroplasts). Also the origin of peroxisomes is analysed, in contrast to phycobilisomes.

Energy supply of protozoa and fungi is explained in Chapter 20 and the metabolic relationships between plants, animals and fungi in Chapter 21. Special questions of tissue bioenergetics are discussed in Chapter 22: relationship to differentiation, transition of life from water to land, photorespiration and C₄ and CAM plants, energetics of plant and animal tissues, effects of anaerobiosis. The two evidences (paleontological and geological) for the bioenergetic evolution are analysed in the following two chapters. Oxygen evolution began earlier than 3 Gy (gigayears, i.e. 10⁹ years) ago: evidence for oxygen origin, regulation of its level by photosynthesis and respiration, and possible changes induced by man are given in the last chapter.

Broda's monograph is a good brief textbook as well as the immense source of references. I was not able to find any major fault of its text. It will certainly be used by students, teachers, and scientists. The well-printed volume has a nice jacket featuring one of the paintings of Vincent van Gogh with a big yellow Sun which gives the energy necessary for all life on our planet.

Z. ŠESTÁK (Praha)

GRANT, V.: **Artbildung bei Pflanzen.** — Paul Parey Verlag, Berlin—Hamburg 1976. 303 S. DM 68,—.

Vorliegende Monographie ist die Übersetzung des englischen Originals „Plant Speciation“ von Verne Grant. Sie wurde von dem bekannten deutschen Botaniker, Prof. F. Schwanitz, der sich selbst ebenfalls mit den Fragen der Pflanzenevolution beschäftigt, übersetzt und ergänzt. V. Grant ist eine bekannte Persönlichkeit. Er bearbeitet die Probleme der Evolution, besonders der Evolutionsmechanismen. In seinem im Jahre 1971 im Columbia University Press (USA) erschienenen Buche fasst er seine eigenen bisherigen Erfahrungen und Kenntnisse sowie die Resultate vieler weiteren Autoren zusammen und ist bemüht, die Kompliziertheit der Artbildung bei Pflanzen herauszuheben, und zwar von verschiedenen Standpunkten aus. Der Verfasser ist um eine Synthese unserer bisherigen Kenntnisse über die Artbildung bemüht und er betrachtet kritisch und zusammenfassend eine Reihe von Faktoren, vor allem genetischer Faktoren, die die Artbildung beeinflussen.

Das Buch ist in 5 Teile eingeteilt, wobei jeder mehrere Kapitel enthält:

I. Teil — Die Natur der Arten — hier wird über die verschiedenen Typen der Pflanzenproduktion, über die biologische Art und die Evolutionsart, über die Auffassung der Art bei den Pflanzen, über die genetischen Grundlagen der Unterschiede zwischen den Arten, über die Isolierung bei der Vermehrung gesprochen.

II. Teil — Die Verschiedenheit der Pflanzen — beschäftigt sich mit den Verwandtschaftsbeziehungen zwischen den Arten, der primären Artbildung, dem Strukturumbau der Chromosomen, dem Wallace-Effekt.

III. Teil — Refusion und ihre Folgen — enthält vor allem Angaben über die Aufgabe der natürlichen Bastardierung, Introgression, Artbildung durch Bastardierung, über die Beziehungen von Rekombination und Artbildung.

IV. Teil — Abgeleitete genetische Systeme — fasst Kapitel über Polyploidie, über die Polyploidie unterstützende Faktoren, über Agmatoploidie und Agamospermie zusammen.

V. Teil — Evolution der Hybridkomplexe — beschäftigt sich mit Hybrid-, Polyploidie-, Agamo- und Klonkomplexen und heterogamen und homogamen Komplexen.

Die Monographie beschäftigt sich also einerseits mit der Divergenz der Arten und andererseits mit deren erneuter Verbindung bei der Bastardierung und mit der Beziehung dieser Vorgänge zur Makroevolution der Pflanzen. Gleichzeitig vergleicht der Verfasser in einer Reihe von Fällen die Artbildung im Pflanzen- und Tierreich. An einer Reihe von Beispielen erklärt er konkret alle diskutierten Faktoren und wertet gleichzeitig deren Bedeutung für die Artbildung aus.

Abschliessend diskutiert der Verfasser die Frage der dichotomischen (Stammbaumbildung) oder eher netzartigen (netzförmige, retikuläre Evolution) Phylogenese bei Pflanzen und er selbst neigt an Hand einer Reihe von Beispielen eher zur retikulären Evolution.

Das Buch ist vor allem durch die Vielseitigkeit, mit welcher der Verfasser an die Lösung des gegebenen, vom allgemein biologischen Standpunkt aus sehr wichtigen Problems herantritt, interessant und anregend. Es wird ein breites faktisches Material zusammengefasst, man findet hier eine Reihe von Tabellen, graphischen Darstellungen, Diagrammen und viele gute Illustrationen. Das Buch enthält eine verhältnismässig breite Bibliographie. Es ist auf eine gut zugängliche Weise niedergeschrieben und wird bestimmt nicht nur Systematiker und Evolutionsbotaniker, sondern Botaniker überhaupt und alle die, die sich mit Pflanzen beschäftigen, interessieren.

EVA KLOZOVÁ (Praha)

PICKETT-HEAPS, J.: **Green Algae. Structure, Reproduction and Evolution in Selected Genera.** — Sinauer Associates, Inc., Sunderland, Massachusetts, 1975. Pp. 606, 882 photomicrographs, 44 line drawings. \$ 27.—.

This is a fascinating, inspiring and truly modern biological book.

The author writes in the introduction: "The book has become a personal record of a biologist's fascination with the beauty and variety of algal cells and his wonder at how they grow, reproduce and order their lives." I am sure the book will confer both fascination and wonder on anyone not yet hit and will intensify these feelings in admirers of algal beauties. The account is very fresh, personal, clear and some paragraphs read like a detective story.

The author not only records what structures are found in the cells but also how they change during the life cycles of the cells and often attempts to explain by what mechanisms these changes occur. It is the pictures that play the leading part, however, and, in many cases, the reader can literally see what happens in the cells. All modern techniques allowing to look beyond the barrier imposed by the resolving power of the human eye are mobilized to serve this purpose.

Time-lapse pictures taken by Nomarski interference optics, transmission electron micrographs of thin and thick (0.5 μm , 1000 kV) sections and of replicas taken from freeze-fractured surfaces as well as scanning electron micrographs (even in the stereo-version!) disclose structural details and elegance of form that were beyond human imagination some ten to twenty years ago.

The 606 pages of the book comprise 882 micrographs and, in the greatest part of the book, text and photographs take an equal share. The illustrations are of top quality as to the objects and the reproduction technique. Moreover, they always perfectly illustrate the subject at issue. The text includes extensive figure captions which, like with modern textbooks, excellently complement the text. One may envy the author the rare possibility (reflected, regrettably, in the price of the book!) he was given to realize his intention, but one must admit that he has made the very best of it.

It is extremely inspiring and rewarding for a cell physiologist to follow the detailed accounts of morphological events and to contemplate on their biochemical and biophysical basis. One is also often tempted to ask what physiological grounds would ultimately be found for the evolution of morphological structures. But the book brings a very specific and equally challenging message to cytologists and taxonomists since "for many interesting Green Algae, particularly in the siphonous lines of evolution there are virtually no pertinent recent ultrastructural data. These gaps in our knowledge suggest specific organisms that could be profitably investigated". Apparently, this will hold true, perhaps even more, for other groups of algae in view of the author's remark that "at the time of writing (the book) not one detailed ultrastructural account has appeared concerning cell division in Brown Algae and only one in a Red Alga". Cellular division is not the only aspect of algal cell ultrastructure on which more detailed work is needed. No doubt the physiologists will be among the first to highly profit from a growing knowledge on fine cell morphology. I cannot but join the author in his belief that "algae should command more interest from biologists because they represent a fascinating and vast range of organisms whose potential for the study of fundamental processes of life has been largely unexploited" and that "the dominance of work on animal cells in formulating theories and dogmas in cell biology is . . . an unbalanced approach quite dangerous and beset with pitfalls."

"I invite attention to a new challenging aspect of cell biology — the phylogeny of cell structures." . . . "The concept of evolution applied to cell structure is, in my opinion, exciting and productive." These quotations characterize adequately what is in the focus of the book. At the same time, this is what I feel to make its basic concept both new and truly modern. Perhaps, the merit of the book lies more in its impact on cellular biology than on algal taxonomy. When I asked distinguished algal taxonomists their opinion on the book, their reaction was mostly non-committal although they all appreciated the high quality of the illustrations. Among physiologists and biochemists concerned with cell biological studies the response was invariably more enthusiastic.

This difference may partly be rooted in the fact, frankly acknowledged by the author, that he is not a botanist and has never attended a lecture course in botany (incidentally, this provides an excellent excuse for my writing the review while I am also not an algologist). But, certainly, more than guild-pride is involved in the cool reaction of the taxonomists and they may have serious objections. In part, the author himself is aware of his approach to phylogeny being rather restricted, since it is based mainly upon structural and morphological comparisons of cells. Nevertheless, he feels that "there is considerable value in assessing such evidence produced only on its own merits, without initially taking into account preexisting notions." May I add that the distinguished and modern feature of Pickett-Heaps' concept of cell morphology is its emphasis on the dynamic aspect. He has demonstrated fairly convincingly that "one of the most profitable ways of using electron microscopy to investigate the relation of function and structure involves the detailed study of sequences of intracellular events combined, where possible, with observation of live cells. Regrettably, few algae have been tackled this way, perhaps because the work is tedious and difficult . . ." But it is, no doubt, one of the most progressive lines in ultrastructural research and Pickett-Heaps' book is well designed to stimulate followers.

The more attractive a work, the easier its imperfections can be seen. In a book like this one, it is quite understandable that the author does not "attempt to catalogue or review the numerous papers concerned purely with ultrastructural morphology", nor will anyone blame the author that he predominantly describes what attracts his interest and what he has seen himself. But in a scientific publication there is no exception to the rule that earlier work by other authors bringing identical or similar information has to be adequately quoted. When only commenting on what I am familiar with, I was surprised to find, that part II of Komárek and Ludvík's paper on the ultrastructure of cell wall in various species of *Scenedesmus* (1972) is only cursorily appreciated as an "excellent example of the use of fine structure in taxonomy", but part I (1971) in which several ultrastructural details have been described for the first time is completely ignored as is also the paper by Pelicarić, Sulek and Ludvík (1970) on the wall in *Scenedesmus*

quadricauda. At the same time, many photographs in Pickett-Heaps' book and the drawing on p. 109 are nearly identical with what is presented in the above papers.

The other extreme is also met in the book. Some observations and conclusions by other authors are passed over without what I would call due caution or critical consideration. Asexual zoospores of *Scenedesmus* and gametes forming zygotes are said to "have been recently discovered," but nobody has seen these stages, except Trainor, who reported their formation in a nitrogen deficient medium (a fairly simple condition to be reproduced with success) more than ten years ago.

Here and there hasty statements and conclusions by the author himself are also found: *Pediastrum* is said not to be parasitized due to the outer sporopollenin layer of its cell wall; but a good many parasites were described with *Scenedesmus*, which has the same resistant protective layer as the author describes in detail.

Another feature of the book that can be easily criticized is the lack of balance in the description of various structures in various organisms. The priorities taken by the author are sometimes difficult to understand. His concentration on cellular division does not prevent him from describing in much detail the structure, function and assembly of flagella in several species while, for example, characteristic features of chloroplasts in various taxonomic groups are hardly mentioned.

In many parts of the book the text lacks stylistic coherence. Two or three subordinate ideas are quite often grafted on a main idea, and the reader, while kept in constant vigilance, ultimately may feel that he has lost the main point. The explanation of specific terms is also inconsistent. The story of the book turns mainly on nuclear and cellular division and the author introduced several specific notions in his earlier papers (e.g. that of the phycoplast). Neither these nor other terms, which need not be familiar to every reader, are sufficiently explained or explicitly defined. On the other hand the meaning of rather banal terms (such as homo- and heterothallism, or iso-, aniso- and oogamy) is explained in detail and the difference between the latter three terms is even illustrated by a schematic drawing.

My last comment concerns the drawings, which are comparatively scarce in the book. I have duly acknowledged above the merits of predominant use of photomicrographs as illustrations. But there are many complex processes described in the book for which photographic documentation is either lacking or would miss the mark. In such cases the text would read more easily if more frequently accompanied by instructive drawings such as used to illustrate, for example, colony inversion in *Volvox*, cell division in *Oedogonium*, course of spermiogenesis in *Oedogonium* or sexual reproduction in *Bulbochaste*.

In conclusion, I can say in good faith to anybody engaged in algal biology: you must read the book. Whatever will be your opinion on it (after having read it) you will profit from having made this experience.

I. ŠETLÍK (Třeboň)

ZIMMERMANN, M. H., MILBURN, J. A. (ed.): **Transport in Plants I. Phloem Transport.** — PIRSON, A., ZIMMERMANN, M. H. (ed.): *Encyclopedia of Plant Physiology, New Series, Volume 1.* Springer-Verlag, Berlin—Heidelberg—New York 1975. 535 pp., 93 Figs. DM 158.—.

Since the publication in 1967 of the last volume of the well-known *Encyclopedia of Plant Physiology* edited by W. Ruhland, the knowledge and the approach to the study of the life processes in plants progressed considerably. Although this *Encyclopedia* still remains an important source of information, there is great demand for a new comprehensive, modern treatise of plant physiology and the planning of such a work, recently conceived in cooperation of many scientists with the publisher is to be welcomed. This plan started to be realized in 1975 by the publication of the first volume of the *Encyclopedia of Plant Physiology, New Series*, under the editorship of A. Pirson, Göttingen and M. H. Zimmermann, Harvard. The concept of the New Series differs from that of the old *Encyclopedia*. There is no overall publication plan in terms of the number of volumes and subdivision of the field into defined areas. As mentioned by the editors in the preface to the first volume, each volume will treat a special topic, will be self-contained and less extensive than the volumes of the old *Encyclopedia* and will be written exclusively in English. This concept has no doubt many advantages enabling continuous adaptation to the new developments in plant science.

The first volume is dedicated to the long-distance transport, while the transport and exchange phenomena between cells in tissues and organs, and at the level of structures within cells are treated in the second and third volume respectively.

The book is organized into five sections containing 19 chapters by 20 different authors, most of them well-known in the field of work they present. The introductory section deals in two chapters with the structure of the sieve-element and with the sealing systems in phloem (callose and sieve-tube slime). The second describes in detail the chemical nature of the transported

substances and the metabolic events occurring in phloem. To this section relates appendix III at the end of the book, listing sugars and sugar alcohols in sieve-tube exudate of more than five hundred species. The next section is somewhat heterogeneous, including under the heading "Phloem Transport: Assessment of Evidence" seven chapters concerned with measurement and factors influencing mass transfer in phloem, with aphids-plant relations and use of aphids in study of phloem transport, with phloem exudation from monocotyledonous axes, with the work on isolated phloem strands, with the problem of bidirectional transport and with some metabolic aspects of translocation. Though most of these chapters also discuss the mechanism of translocation, this problem is treated in detail in five chapters of the fourth section. Several theories and mathematical models of the translocation process are critically described, most attention being paid to the theory of electroosmotic flow and to the Münch's osmotic pressure-flow hypothesis. The remaining three chapters of the last section are focused on phloem loading, on transport and storage of assimilates in rays and on xylem-phloem interchange of solutes and the circulatory system of the plant.

In the overall plan and division of the book one can notice some dependence on the areas of interest of the selected contributors. Some topics are treated independently by different authors in several chapters, which resulted in the presentation of widely varied and in some cases contradictory opinions. The book is, however, well balanced and covers all major aspects of the field concerned, and the presentation of different opinions showing to the reader the actual state and problems of investigations of transport mechanisms will undoubtedly have a stimulatory effect on further research.

The production is excellent, with clear type and illustrations, and many subtitles and the authors and subject indexes provide quick orientation. The book is a very important comprehensive survey with emphasis on experimental work and it will certainly establish itself as a primary source of information on the topics it covers.

J. TUPÝ (*Praha*)

LÜTTGE, U., PITMAN, M. G. (ed.): **Transport in Plants II. Part A. Cells.** — PIRSON, A., ZIMMERMANN, M. H. (ed.): *Encyclopedia of Plant Physiology*, New Series, Volume 2. Part A. Springer-Verlag, Berlin—Heidelberg—New York 1976. 419 pp. DM 128.—.

The three volumes of the New Series of *Encyclopedia of Plant Physiology*, which appear in short intervals, are devoted to transport processes in plants. Volume 1 deals with long-distance transport in floem, this Volume 2 includes transport at the cellular level (Part A) and at the organ level (Part B), and Volume 3 will deal with sub-cellular aspects of transport.

As in other volumes, the editors as well as contributors to the Volume 2 Part A (W. J. Cram, J. Dainty, G. P. Findlay, T. K. Hodges, A. B. Hope, D. H. Jennings, U. Lüttge, C. B. Osmond, M. G. Pitman, R. J. Poole, J. A. Raven, F. A. Smith, N. A. Walker) are well-known specialists in the field concerned.

This book is organized into three sections. Section I (Theoretical and Biophysical Approaches) contains five chapters giving basic knowledge of the structure of membranes (lipid-protein sandwich model and liquid amphiphilic layer model), water relations of plant cells (water potential and its components and transport of water across cell membranes on the basis of irreversible thermodynamics), theoretical background for membrane transport (especially equilibrium equations and rate equations), methods for measuring electrical properties of plant cells, and models for estimation of fluxes across membranes. The following three chapters of Section II (Particular Cell Systems) cover experimental results concerning membrane properties, fluxes of electrolytes and non-electrolytes, permeability coefficients of cell membranes *etc.* in algal cells, in fungal cells and in cells of storage tissue of higher plants. Special attention of Section III (Regulation, Metabolism and Transport) is given to the control of various transport processes in the cells. Its five chapters deal with coupling between sources of metabolic energy and transport mechanisms, role of ATPases in ion transport, negative feedback regulation of transport in cells, models of H^+ transport and ion effect on carbon metabolism.

Each chapter contains a detailed list of references (in the whole book more than 1500) to facilitate further extension of knowledge in the needed direction. The book is well produced and the text is illustrated with 97 graphic figures and 64 tables. It is possible to hope that the list of symbols, units and abbreviations will promote the unification of terminology. The author and subject indexes are also included.

In conclusion it may be stated that the material of this book will be very useful for all scientists as well as university teachers and students who are interested in biophysics, biochemistry and plant physiology.

JANA POSPÍŠILOVÁ (*Praha*)

LÜTTGE, U., PITMAN, M. G. (ed.): **Transport in Plants II. Part B. Tissues and Organs.** — PIRSON, A., ZIMMERMANN, M. H. (ed.): *Encyclopedia of Plant Physiology*, New Series, Volume 2. Part B. Springer-Verlag, Berlin—Heidelberg—New York 1976. 456 pp. DM 138.—.

This book, as its title says, continues reviewing the transport processes in plants. While in Part A special attention is given to the processes occurring at membranes bounding the cells, in this Part B emphasis is laid on cell to cell transport related to the organization of the tissue. The names of editors and contributors themselves (W. P. Anderson, E. Epstein, A. E. Hill, B. S. Hill, T. C. Hsiao, W. D. Jeschke, A. Läuchli, U. Lüttge, J. Pate, M. G. Pitman, E. Schnepf, R. M. Spanswick, R. F. M. Van Steveninck, J. F. Sutcliffe) are a sufficient guarantee for the high standard of this book.

Part B is also divided into three sections. Section I (Pathways of Transport in Tissues) represents general background for the field concerned and its two chapters are devoted to both basic transport pathways in plant tissues: apoplastic and symplastic transport pathways. In the largest Section II (Particular Tissue Systems) four chapters deal with transport processes in roots (e.g. structural considerations, kinetics of ion transport, mechanisms of ion uptake and transport of salts and water from external solution to the xylem stream). The following three chapters cover experimental results concerning transport processes in leaves (in addition to the structure of leaf and ion concentrations and fluxes, special attention is given to stomatal ion relations). Elimination processes by glands are considered in three chapters and the last chapter of this section is devoted to transport in symbiotic systems fixing nitrogen. Section III (Control and Regulation of Transport in Tissues and Integration in Whole Plants) discusses the effect of hormones on ion transport, the effect of ageing, genotypic variations and regulation in the whole plant.

The book is well printed and produced. 129 very instructive figures and 47 tables greatly contribute to a better understanding of the matter. Author index, subject index and list of symbols, units and abbreviations are also included. More than 2000 references offer the readers further extension of knowledge in special direction.

The book will certainly be welcome as a valuable source of new information in this rapidly developing field concerning many scientific branches.

JANA POSPÍŠILOVÁ (*Praha*)

CHAPMAN, S. R., CARTER, L. P.: **Crop Production. Principles and Practices.** — W. H. Freeman and Company, San Francisco, 1976. Pp. 566. US \$ 15.00.

Successful crop production requires at least a basic knowledge of the structure, growth and development of plants and of the effects of external factors, as well as the ability to create the most favourable environmental conditions for the production and quality of those parts of plants, for which the latter are grown. The book under review, which provides a very good summary of the fundamental information, is divided into three parts.

Part one — Principles — contains five chapters, the first of which (Plant science and human welfare) shows the dependence of mankind on the plant production and presents a concise historical and geographical overview of growing the cultivated plants, modes of their utilization, prospects and conditions of the increase in production and productivity of plants necessary for the rapidly increasing population, and in the fight against hunger. The following four chapters (Cell structure and function, Vegetative growth and development, Reproductive growth and development and Plant classification and nomenclature) provide basic information on the anatomy, physiology and systematics of plants.

In Part two — Plants and their environment — five chapters (Soils and crop production, Moisture and crop growth, Light and temperature, Insects, diseases, and weeds and Cropping systems and resource conservation) are devoted to the influence and protection of the environmental conditions and their control.

The first two chapters of Part three — Production practices — (Marketing crop products and Seeds and seeding) follow the way of crop products from the producer to the consumer or to their further treatment, and report on the particularities of seed production, their cleaning, assessment of their quality and certification. Individual field crops or groups of crops are dealt with in the remaining 19 chapters (Cereals and man. Corn and sorghum, Rice, Wheat, Barley, Oats and rye, Edible legumes and man, Soybeans, Peanuts, Field beans and peas, Cotton, Tobacco, Sugar beets and sugar-cane, Potatoes, Safflower, rape seed, flax, and sunflower for oil, Forages and man. Forage legumes, Forage grasses, Forage management and utilization), with special respect to the conditions in North America. Each of the chapter is subdivided into seven sections (Origin and history of culture, Botanical characteristics, Environmental requirements, Production practices, Diseases and pests, Crop utilization and Conclusions) and complemented by maps showing the location and distribution of single cultures in the U.S.A., and by a schematic re-

presentation of the share of individual countries in world production. The closing 32nd chapter — Progress through research — outlines the increase in crop production in the last two decades and the promising methods for its further growth. Selected references at the end of each chapter include only significant, currently available papers, which discuss the subject matter in greater detail and from different points of view. Study questions prevent students from mere memorizing and help them to check their understanding of the text. The book is concluded by a Glossary of important terms, which is almost indispensable with regard to the wide range of scientific branches involved, and by an Index.

The book representing an unconventional approach to the matter discussed provides in very readable form a comprehensive summary of the basics of economic crop production. It is a handsome publication, illustrated with 55 tables, 213 instructive diagrams, figures and excellent photographs. Regrettably, most of the numerical data and values are given in units common in the U.S.A. (acres, sacks, inches, bushels) and not in the SI system.

The volume can be recommended as a complete course of modern practices of major field crops production to undergraduates in biology and related branches, to the high-school teachers of biology, and to specialists in related scientific fields as a source of basic information.

JARMILA SOLÁROVÁ (*Praha*)

YEOMAN, M. M. (ed.): **Cell Division in Higher Plants**. Experimental Botany: An International Series of Monographs, Vol. 7. — Acad. Press, London, New York, San Francisco 1976. 542 pp. £ 16.50.

Extensive research in cell division has been carried out since the publication of Strasburger's classical work and many details of structural and metabolic events of the mitotic cell cycle in various meristematic tissues have been described. All this comprehensive knowledge of cell division was dispersed until now. In fact, much remains to be done before a general picture of the process by which the cells replicate will be achieved. This book attempts to bring together the different aspects of cell division in higher plants. It covers the problems of the mitotic cycle and the preparation of cell division, as well as the resulting growth and organ initiation. The book is a multi-author work. Two groups of contributions can be distinguished. One of them deals with the mechanism of cell division itself. The visible events of cell division (written by A. F. Dyer) observed with the use of microscopy and electron microscopy are presented as a chronological sequence of visible changes including the replication of chromosomes, changes of nuclear structures, of the nucleolus spindle and centriole, as well as replication of cytoplasmatic organelles. This chapter also contains a dynamic picture of the development of localized meristems in a plant. The review of the structural events is followed by a contribution written by M. M. Yeoman and P. A. Aitchison, which provides information on molecular events of the cell cycle. It is concerned with DNA replication correlated with the pattern of synthesis and accumulation of RNA and proteins and changes in the activities of some enzymes. A critical survey of techniques including synchrony is also given. Special chapters are devoted to the replication of plastids (R. M. Leech) and to sporogenesis (M. D. Bennett). The last contribution to this section (by A. F. Dyer) is concerned with modifications and errors of cell division in plants. The second part of the book presents a survey of cell division in different meristematic regions of a plant as related to morphogenesis. In the article of F. A. L. Clowes the structure of the root apex is described and the relations to cell division and histogenesis are discussed. The cell production at different levels of the root meristem is discussed and a detailed analysis of the rates and planes of cell division is given. Time parameters of mitotic cycles are also presented in the next chapter dealing with the shoot apex (written by R. F. Lyndon) but these data are rather restricted in this system. More attention is given to the planes of cell division with respect to the generation of leaves and flower organs. A discussion of the gradients in cell division rates within the shoot apex is included. A special contribution on cell division in leaves (by J. E. Dale) contains descriptions of leaf growth and some physiological aspects, particularly the influence of light and growth substances. Hormonal regulation of cell division is discussed in the following chapter written by I. D. J. Phillips, which deals with cambial activity. This second part of the book is closed by a short review by A. W. Davidson *et al.* concerning cell division in disorganized systems, *i.e.* in cell and tissue cultures. The introduction (by R. Brown) and the summary (by M. M. Yeoman) provide a generalized view of the whole problem of cell division in plants and propose some ideas of the future direction of research in this field. The book will serve as a valuable source of information on the main problems and achievements in cell division of different dividing systems in plants. It will be of great use to all engaged in the study of plant growth and morphogenesis and to those interested in the problems of cell biology.

FRIDETA SEIDLOVÁ (*Praha*)

TRIBE, M. A., ERAUT, M. R., SNOOK, R. K.: **Ecological Principles**. Basic Biology Course, Book 4. — Cambridge University Press, Cambridge 1975. Pp. 160. Hard covers £ 8.00, Limp bound £ 3.50, Film strip £ 3.50.

This is a fine and instructive example how to write a modern, attractive and not too voluminous university textbook dealing with the "traditional" theme — the structure and functioning of the living systems as related to their environment. The manual was written by the members of the Inter University Teaching Project Team at Sussex as part of a Basic Biology Course, and together with other ten books cover the most fields of modern biology. In this issue, the authors are not satisfied with a mere description of facts but they try to give a deep up-to-date analysis of a variability in plant and animal responses to changes in abiotic and biotic conditions. Major stress is laid on the functional dynamics of interactions within and between various ecosystems while historical aspects representing the evolutionary trends and genetic changes are purposefully omitted.

There are three main fields discussed in detail in particular chapters: The interactions between organisms and their non-living environment (including the mass and energy exchange, the concept of limiting factors, the concept of production), the interactions between organisms and their living environment (e.g. the concept of ecosystem, different types of interactions — the autotrophic, heterotrophic, parasitic, saprobe and commensal — between organisms within an ecosystem, processes of invasion, colonization, competition and succession, the ecological niche, concepts of the existence of life in the universe) and, at last, the interactions between man and ecosystems brought about by the increase in human population and its demands for food, space and resources. The text is documented with abundant tables, diagrams and figures, supplied with numerous references, recommended supplementary reading and a detailed subject index, and provided with a demonstrative color film strip.

The strong points of this textbook lie in strictly defined basic terms and clearly formulated problems, in keeping the consistent logic of interpretations and in the well-thought out pedagogic approaches, which guide a reader to understand the text graduated from simple to more complicated problems. Thus the reader is forced into active thought and individual evaluation of knowledge by answering control questions and tests.

The book is well printed and arranged with leaving a lot of blank space for notes. Although it is assigned to undergraduates in biology, it can be useful to everybody who wants to renew his basic knowledge in ecology.

DANUŠE HODÁŠOVÁ (*Praha*)

KOIVISTOINEN, P. (ed.): **Pesticides**. [COULSTON, F., KORTE, F. (ed.): **Environmental Quality and Safety**.] Lectures held at the IUPAC Third International Congress of Pesticide Chemistry, Helsinki, 3–9 July 1974. — Georg Thieme Publishers, Stuttgart 1975. Pp. 880. DM 198.—.

Rapid progress of pesticide chemistry and its connection with the most important fields of present biology is well documented in this extensive but condensed book. The Congress which was organized by the Federation of Finish Chemical Industry was attended by more than 1000 scientists who read about 450 scientific papers, 161 of which are presented in this book.

The symposium was focussed on nine scientific topics: (1) Pesticide residue analysis, (2) pesticide residues in food and feed commodities and total diets, (3) impact of environmental factors on the chemical behaviour of pesticides in plants, soils and waters, (4) relationship of chemical structure to biological activity of pesticides, (5) pesticide metabolism, (6) pesticide toxicology and pharmacology, (7) chemistry and activity of naturally occurring pesticidal compounds and related substances, (8) industrial aspects of pesticide chemistry and (9) pesticide legislation in various countries. Lectures included in this book are not divided into special chapters but are presented in the order broadly corresponding to the Congress program. The reader will find here a number of specialized papers dealing especially with analysis of pesticides, their uptake, metabolism and degradation in plants and resistance of fungi and insects to fungicides and pesticides, respectively. A number of papers is devoted to the effects of pesticides on mammals and to ecological problems.

It is a pity that six lectures presented by the invited speakers on the plenary session and some of 16 lectures given on the special symposia were not included into this volume. It is probably because the book would exceed an acceptable extent but such an arrangement would give some common ideas to the very specialized contributions.

The book is well-edited: all contributions are presented in a uniform and short form and nearly 350 clear-cut figures contain all necessary information. It contains a detailed and carefully prepared subject index, which is a good help to specialized readers. With respect to the large number of contributions which cover such a broad region of chemistry and biology, the book

can be recommended as an up-to-date source of information for scientists and teaching staff, as well as to advanced students in plant pathology, plant, animal and insect physiology, agriculture, ecology and chemistry of pesticides.

M. KAMÍNEK (*Praha*)

STONE, J. F. (ed.): **Plant Modification for More Efficient Water Use.** — Elsevier Scientific Publishing Company, Amsterdam—Oxford—New York 1975.

Twenty papers reprinted from *Agricultural Meteorology* 14 (1/2), 1974 and originally presented at the Symposium on Plant Modification for More Efficient Water Use were edited in a book form by John F. Stone, as the first volume of the series *Development in Agricultural and Managed-Forest Ecology*. Arranged in four parts according to the general aims with short summarizing introductions by the editor and coworkers, the papers follow the concisely formulated question on possible ways of designing and breeding crops and growing crop stands with more economic ratio between yield and water use.

The first genetic part (5 papers) gives examples of breeding procedures trying to increase the water-use efficiency. Eslick and Hockett and Ferguson describe isogenic analyses used for breeding barley; Ray, Wendt, Roark and Quisenberry report on genetic modification in cotton, and Hurd emphasizes the respect to the root system in wheat breeding. This part is introduced by a stimulating essay by Reitz, who asks questions from a point of view of the experienced agricultural practice.

First five papers of the second part deal with physiological responses to water deficit and drought (review by Hsiao and Acevedo), with water transport in soil-plant atmosphere continuum by Kaufmann and Hall, with photosynthetic CO₂ uptake and water use in different photosynthetic types of plants (Tinus), and with physiological factors in water stress tolerance and hardiness and their testing (Sullivan and Eastin). Next six papers are devoted to soil and atmospheric factors influencing water stress and water use. Reuss and Danielson discuss physical and chemical barriers in soil to water-use efficiency; Hagen and Skidmore evaluate the artificial reduction of turbulence as a tool to decrease evapotranspiration loss; Namken, Wiegand and Willis examine cultural and genetic measures to moderate negative influence of high temperatures, and Ritchie discusses water plant balance as influenced by atmospheric and soil water. Technique of calculating the evapotranspiration from remotely sensed crop surface temperature is described by Brown; Kanemasu and Arkin relate components of the radiation and energy balance to the growth and the structure of crop canopy.

Four papers in the third part are devoted to modelling techniques for isolating major factors limiting the efficiency of water use by plants: stomatal resistance (de Michele and Sharpe) and light distribution in crop canopies (Lemour and Blad). Splinter models plant growth in order to predict yield. The generally accepted soil-plant-atmosphere model (SPAM) is described and examples are given for looking for the most significant variables (Shawcroft, Lemon, Allen, Stewart and Jensen).

Epilogue (part IV) brings a highly responsible conclusions by Moos, Woolley and Stone. They try to give and evaluate individual physiological and anatomical features as they influence the water-use efficiency and suggest future trends of research in this respect.

Proceedings of the Symposium formulate in a comprehensive form questions concerning the problem given by the title of the book and try to answer them with serious criticism, taking into account most physiological and ecological factors involved. This, of course, is not an easy task. The problems and results presented in the book give a very good starting point.

B. SLÁVÍK (*Praha*)

RUNGE, M.: **Energieumsätze in den Biozönosen terrestrischer Ökosysteme.** — Scripta Geobotanica 4. Verlag Erich Goltze KH, Göttingen, 1973. Pp. 77, 8 figures, 31 tables.

This publication edited by the Chair of Geobotany of the University in Göttingen deals with the energy turnover estimations of six different beech and spruce stands (IBP Project Solling), three meadows plots and a *Lolium multiflorum* field stand.

A great part of the publication describes techniques and procedures and gives results of calorimetric determinations of energy values of plant material in the pertinent stands, the material having been carefully divided into more or less detailed compartments. Average values between 4.1 and 5.5 cal g⁻¹ were seldom exceeded, and stem wood of beech and spruce was found to be very homogeneous (4.70 and 4.85 cal g⁻¹ respectively). Energy content in the living biomass [highest in a spruce stand 15 553 × 10⁵ kcal ha⁻¹], lower in beech stands (about 8000 to

$14\,700 \times 10^5$ kcal ha⁻¹) and lowest in meadows (540×10^5 kcal ha⁻¹); net primary production [highest in *Lolium multiflorum* field (800×10^5 kcal ha⁻¹y⁻¹) and similar in all forest stands and fertilized meadows]; and economic yield [on the average 60 per cent of net primary production] were compared and evaluated in detail and summarized in tables for all stands studied. SI units for energy (joules instead of calories) should have been used.

The publication is a modern descriptive (very laborious and statistically based) ecological work yielding reliable data for the analyses of ecosystems.

B. SLAVÍK (Praha)

WALTER, H., HARNICKEL, ELISABETH, MUELLER-DUMBOIS, D.: **Klimadiagrammkarten der einzelnen Kontinente und die ökologische Klimagliederung der Erde.** — Gustav Fischer Verlag, Stuttgart 1975. 9 large maps and 36 pages of text with 14 figures in a cover, DM 72.—.

Eight maps of individual continental parts of the Earth (scale 1 : 8 000 000) and one summarizing map of all the continents and many islands of the Earth (scale 1 : 30 000 000) were published as supplementing tome 10 of the monograph series: Vegetationsmonographien der einzelnen Grossräumen. The maps depict climate diagrams at places of particular weather stations in individual continents and islands, so that the progressive differences in climate can be revealed at one glance. The scale and the number of the stations made it possible to give a representative review of climatic conditions all over the world with sufficient accuracy and splendid clearness. The well known, generally acknowledged and widely used scheme of Walter's climate diagrams enables the reader to get an impressive picture of the distribution of individual climatic features in their continuous changes in the space.

The ninth map yields ecological classification of the world climates using nine main climate zones described in the text, which in addition gives a very good and concise introduction to the individual maps and a general review of the climate diagrams.

The publication is a very instructive tool for understanding the distribution of climatic conditions on geographical scale in general and in the relationship to plant ecology in particular.

B. SLAVÍK (Praha)

GUNNING, B. E. S., ROBARDS, A. W. (ed.): **Intercellular Communication in Plants: Studies on Plasmodesmata.** — Springer-Verlag Berlin — Heidelberg — New York 1976. 90 Fig. 387 S. 72.— DM.

Vorliegender Monographie liegen die umgearbeiteten Vorträge einer Tagung zu Grunde. Einzelne Kapitel der Monographie wurden als Übersichtsreferate konzipiert und die Herausgeber waren sehr bemüht unnötige Duplikationen zu vermeiden und andererseits ein möglichst vollständiges Bild unserer Kenntnisse über Plasmodesmata und ihre Funktion, von vielen Standpunkten und Disziplinen aus gesehen, entstehen zu lassen.

Der in 15 Kapitel gegliederte Text macht den Leser mit dem Auftreten, der Anzahl, der Struktur, dem Ursprung und der Entwicklung von Plasmodesmata in höheren Pflanzen, in Algen und Pilzen bekannt, behandelt die physikalisch-chemischen und physiologischen Aspekte des Transportes durch die Plasmodesmata, den cytochemischen Beweis für den Ionentransport durch Plasmodesmata. Es folgen Kapitel über die Aufgabe der Plasmodesmata bei der Verbreitung einer Virusinfektion in der Pflanze, beim Transport von Lösungen, von Wasser und Nährstoffen in den Wurzeln, beim Phloemtransport, beim Metabolitentransport während der C4-Photosynthese, bei Wachstum und Entwicklung der Pflanzen. Ein Kapitel beschäftigt sich mit der Geschichte der Plasmodesmataforschung und im abschliessenden Kapitel werden nochmals von den Herausgebern unsere jetzigen Kenntnisse über Plasmodesmata und die wichtigsten offenstehenden Probleme zusammengefasst. Das Buch schliesst mit einer Plasmodesmatabibliographie (cca. 1300 Titel), einem Autoren- und Sachregister. Das Buch ist reich illustriert (viele ausgezeichnete Aufnahmen aus dem Elektronenmikroskop) und in Offsetdruck auf Kreidepapier in tadelloser Ausstattung erschienen. Zu begrüssen sind die Zusammenfassungen und Kurzfassungen der stattgefundenen Diskussion am Ende der Kapitel.

Ich finde diese erste Monographie über Plasmodesmata als sehr gelungen und empfehle sie auf das Wärmste allen Spezialisten, die sich mit der interzellulären Kommunikation der Pflanzenzellen beschäftigen.

INGRID TICHÁ (Praha)