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BOOK REVIEW

SHARMA, A. K., SHARMA, A.: CHROMOSOME TECHNIQUES. Theory and Practice. Third Edition. — Butterworths, London—Boston—Sydney—Wellington—Durban—Toronto 1980. 711 pp., £ 50.00.

Knowledge of the eukaryotic chromosomes, as the bearers of the hereditary material, is fundamental to an understanding of diverse aspects of biology. A serious handicap to the cytologist was the absence of a comprehensive single treatise on the methodology of all aspects of chromosome structure and behaviour in various organisms and at different stages of differentiation. The aim of the third, revised edition of this manual was to present methods applied in the study of the physical and chemical nature of chromosomes along with an account of their advantages and limitations. A considerable amount of theoretical discussion has also been incorporated in each chapter. The book is divided into Part I: Physical nature of chromosomes, and Part II: The chemical nature of chromosomes. Part I presents methods applied mainly in studying the chromosome structure, including various methods of pre-treatment, hypotonic treatment, fixation, processing, staining, mounting, and representative schedules for direct observation of chromosomes of plants and animals. This part also includes a chapter on microscopy, including phase and interference, polarisation, X-ray, fluorescence and electron microscopy, light microscope and high resolution autoradiography, microspectrophotometry *etc.* Further chapters deal in detail with the analysis of chromosomes following short and long term cell and tissue culture. New chapters, not included in the previous editions consider methods studying the sister chromatid exchange and cell fusion protoplast cultures. The second part of this book presents methods used in chemical analysis of chromosomes and its components: nucleic acids, proteins and enzymes and methods of isolation and extraction of nuclei and chromosomes. A special chapter deals with molecular hybridisation *in situ*. The book is designed to meet requirements of research workers, teachers and students interested in chromosome studies on plants, animals and human beings.

T. GICHNER (*Praha*)

JUNGERMANN, K., MÖHLER, H.: BIOCHEMIE. EIN LEHRBUCH FÜR STUDIERENDE DER MEDIZIN, BIOLOGIE UND PHARMAZIE. — BIOCHEMIE. ÜBUNGEN UND PRÜFUNGSFRAGEN. BEGLEITTEXT ZUM LEHRBUCH BIOCHEMIE. — Springer Verlag, Berlin—Heidelberg—New York 1980. 733 pp., 665 figs., and 229 pp. DM 98.—, approx. US \$ 54.90 and DM 19.80, approx. US \$ 11.70.

The book is a university textbook for students of medicine, biology, and pharmacy. It is supplied by 665 comprehensive four-coloured diagrams and figures and by 149 tables. The interpretation of the subject matter is based on a dynamical and functional conception of metabolic pathways and their regulation with aspects to human physiology. The division of chapters and their sequence are likewise arranged from the physiological point of view. The content of the book is divided into 3 fundamental parts and 12 chapters. Part I consists of the Introduction into the biochemistry of metabolic processes, involving the fundamentals of kinetics and the mechanisms of metabolic regulation, metabolic cycles and general energetic viewpoints. Part II — Metabolism and energy consumption deals with the organization of energy metabolism, ATP production in homogeneous and heterogeneous systems, substrate breakdown and uptake, the formation of energy supplies and their utilization, as well as with final metabolic products and their excretion. The most extensive Part III — Metabolism of working activity — involves the formation and occurrence of cell and organ structures, the formation of molecules for special transport and signal processes, the biological defense (immunochemistry), muscle contraction and motion, and biochemistry of the nerve system. The textbook is supplemented with a booklet containing the test questions and exercises to each chapter with correct answers. In spite of the fact that it is primarily a textbook of medical biochemistry it can be recommended to plant biochemists and physiologists who will surely find there a lot of information. Moreover it can serve them as a good example and suggestion for writing in a similar way a modern objective and didactic textbook of plant biochemistry.

J. ULLMANN (*Praha*)

HARRISON, R., LUNT, G. G.: BIOLOGICAL MEMBRANES. Their Structure and Function. Second Ed. — Blackie Publ. Group, Glasgow—London 1980. 288 pp., 153 figs., £ 7.95.

This tertiary-level biology book represents a reasonably expanded and completely updated version of the already successful and respected textbook. The new edition is designed for advanced undergraduate students of cell biology and biochemistry. Easily understandable, readable and concise text makes this book suitable as an introduction for all postgraduate workers entering the field of membrane research as well as for all research workers in other fields who wish to get basic knowledge in the vast and quickly developing field of biological membranes.

The first six chapters provide all necessary information about membrane components, their function and structural organisation. (Chapters: The cell, Membrane function. Morphology of membranes, Membrane preparations. Membrane components, Structural organization.) The seventh chapter deals with the role of plasma membrane in cellular recognition with special attention paid to the structure and function of glycolipids and glycoproteins. The eighth chapter deals with membrane transport including Mitchell's chemiosmotic theory. The ninth chapter compares different complex membrane-mediated processes such as ATP synthesis (mitochondria, chloroplast), mechanisms of vision, synaptic transmission, action potentials and hormone receptors.

The authors successfully try to treat these problems in a very attractive and interesting way, finding new unusual views and ideas. The last chapter evaluates the principles of all major physical methods commonly used in membrane research — NMR spectroscopy, spin and fluorescence probes, X-ray diffraction methods, Raman scattering and calorimetry.

Each chapter is closed by a brief summary. The whole book is nicely illustrated by 153 well selected pictures, diagrams and models. There is a long list of publications recommended for further reading on the end of the book.

I believe that this textbook does not need any special recommendation as it is an improved version of an already successful edition. I have read this interesting book with great pleasure.

J. SLAVÍK (*Praha*)

RAINS, D. W., VALENTINE, R. C., HOLLAENDER, A. (ed.): GENETIC ENGINEERING OF OSMOREGULATION. Impact on Plant Productivity for Food, Chemicals, and Energy. — Plenum Press, New York—London 1980. 381 pp., US \$ 39.50.

The fourteenth volume of the series Basic Life Sciences, edited by A. Hollaender, proceedings of the symposium of the same name, held at Brookhaven National Laboratories from 4 to 7 November 1979 and supported by a grant from the National Science Foundation. This symposium was one of several which were and are being prepared to deal with possible application of genetic engineering in plant production. As the term genetic engineering stands in the title of the symposium, the editors attempt to define genetic engineering in the context of the meeting: "Genetic engineering of osmoregulation is simply the application of the science of genetics toward osmotically tolerant microbes and plants". "Recombinant DNA is regarded as just another tool along with conventional genetics to be utilized for improvement of microbes and plants". The symposium brought together 86 molecular geneticists, biochemists, plant physiologists, and plant geneticists from Australia (2), Canada (2), Federal Republic of Germany (2), Israel (1), The Netherlands (1), the United Kingdom (2) and the USA (76) to focus their attention on environmental stress as a major barrier to crop productivity on primary and marginal lands. Twenty five papers were grouped into Introduction (4 papers) and seven sections: 1. Osmoregulation in prokaryotic microorganisms (3 papers), 2. Osmoregulation in eukaryotic organisms (3 papers), 3. Osmoregulatory mechanisms in plants (4 papers), 4. Mechanisms of drought and cold tolerance in plants (3 papers), 5. Applications for plant improvement (3 papers), 6. National Science Foundation — Cornell Workshop (1 paper) and 7. Discussion by National Research Agencies (5 papers). The proceedings are complemented by two panel discussions and abstracts from poster session, a list of participants and index of subjects and plant names.

The book is prepared by a very good photoreproduction of typescript, which made it possible to issue it ten months after the symposium. The book will be of value to all interested in the physiological, biochemical and genetic bases of stress tolerance in a biological system.

JARMILA SOLÁŘOVÁ (*Praha*)

OKUBO, A.: DIFFUSION AND ECOLOGICAL PROBLEMS. MATHEMATICAL MODELS. Biomathematics. Vol. 10. — Springer Verlag, Berlin—Heidelberg—New York 1980. 254 pp., cloth DM 78.—; approx. US \$ 46.10.

The new issue of the edition "Biomathematics" brings an excellent monograph of the Japanese author devoted to the diffusion problems in ecology. Although the mathematical description of diffusional phenomena originated in physics, very similar problems are encountered in studying the interaction of living species with their non-living surroundings as well as in analysing the changes of spatial distribution of flies, fish, etc. These problems are similar to those in physics but not the same. The most apparent feature of the book is the author's outstanding ability to detect differences in the biological or physical foundations of the studied phenomena, to trace their influences on the form of mathematical formulas and to point out the causes of resulting differences in dynamical behaviour of the systems in question.

The book consists of ten chapters. After the introductory chapter the following two are devoted to the basic description of diffusion in physical, chemical and biological systems. The fourth chapter analyses diffusion as the means of chemical communication and the fifth studies the biological diffusion on the molecular level (diffusion through membranes). The following three chapters concern the diffusion of biological species (animals, fungi, algae, flies etc.) in ecosystems. The last chapter concerns the population dynamics in time and spatial domains.

The whole book is written with vital style, deep biological knowledge and remarkable mathematical skill. Mathematical techniques from different domains of mathematics are presented appropriately to different biological problems. Numerous examples introducing numerical data illustrate the text and enable the reader to obtain a very deep understanding of diffusion in ecological systems.

Some training in mathematics is necessary for the reading of the monograph, namely in probability calculus and theory of ordinary and partial differential equations. The book can be recommended to everybody who is seriously interested in mathematical modelling in ecology.

I. DVOŘÁK (*Praha*)

MILTHORPE, F. L., MOORBY, J.: AN INTRODUCTION TO CROP PHYSIOLOGY. Second Edition. — Cambridge University Press, Cambridge—London—New York—New Rochelle—Melbourne—Sydney 1979. 244 pp. £ 4.95 (paperback), 15.00 (hard covers).

The useful Milthorpe's and Moorby's book published by Cambridge University Press in 1974 appeared in the second edition. I reviewed the first edition (Biol. Plant. 16 : 480, 1974) and found it not only as an excellent introductory text but also a good reference work for more experienced workers. The second edition has been revised considerably; it was enlarged from 202 to 244 pages and the text has been lightened by the addition of more general descriptions and many new illustrations. At the end of each chapter recent endeavours in the field of quantitative simulations are cited.

In the chapters of the book, the following topics are discussed: General aspects of crop physiology, the environment, the supply and use of water, the absorption and transport of mineral nutrients, photosynthesis and respiration, germination and seedling emergence, vegetative growth, flowering and fruit growth, some aspects of overall growth and its modification and the prediction of responses. Some valuable data are supplemented in appendices called "Glossary", "Some commonly used functions", and "Units and conversion factors". The book is supplied with a subject and plant index and a list of main symbols.

The authors assumed that those using the book have a background knowledge of plant physiology and also of soil science and microclimatology. The main attention is therefore paid to the discussion of main processes on whole-plant and canopy level. Also the ecological aspects of crop productivity are treated in detail. Most of the subject matter concerns agricultural systems, but many of the concepts and approaches are applicable to more complex natural ecosystems. Emphasis is placed on integrating knowledge from many sources and on trying to quantitatively assess the importance of each component in the context of the whole-plant/environment system.

Generally, I find that the reviewed book is more than the second edition of a well-known text. To some extent, it is a quite new and modern summary of recent knowledge in crop physiology; it will surely be useful for students and research workers in plant sciences.

J. ČATSKÝ (Praha)

CHAUSSAT, R., BIGOT, C. (ed.): LA MULTIPLICATION VÉGÉTATIVE DES PLANTES SUPÉRIEURES (ouvrage collectif). — Gauthier-Villars, Bordas, Paris 1980. 277 pp.

This book is a teamwork of fourteen outstanding authors in the field of vegetative propagation. The most interesting problems of the vegetative propagation with many ideas and useful suggestions are involved in twelve chapters representing independent papers. The first five chapters could be characterized as classical. Respect for the plant development stage and emphasis on the knowledge of the morphogenesis when vegetatively propagating the plants, represent an original approach to these problems. The parts dealing with growth regulators and organogenesis outline many interesting and stimulating devices. The last paper in this classical part presents the grafting technique in a very instructive way and with modern aspects in this field. The six following papers could be qualified as modern methods of the vegetative propagation through *in vitro* cultures. Attention is paid especially to four main spheres of application: clonal propagation of improved plants, recovery of plants from virus diseases, breeding of agricultural and horticultural plants and industrial production of diverse plant compounds serving, for instance, to drug synthesis. The last sphere of application forms the basis of the biotechnology which attracts most attention nowadays. The problems and methods of apical meristem or tip cultures, of cell or suspension cultures and of plant protoplast cultures are surveyed in well arranged papers with very instructive examples and useful references. Employment of haploids in plant breeding and the mutagenesis are the topics of further very readable chapters. The concluding chapter is a technical one dealing with practical aspects of vegetative propagation of woody plants.

The purpose of this book is to provide an up-to-date account of the vegetative propagation problems. Exhaustiveness is not aimed at, but rather a considered and carefully balanced account, which will inform the students in biological and agricultural sciences and the technicians and professionals who stand face to face to the problems of vegetative propagation. All chapters are supplied with extensive bibliography enabling acquirement of special knowledge.

MARIE ULRYCHOVÁ (Praha)