

BRIGGS, W. R., JONES, R. L., WALBOT, V. (ed.): ANNUAL REVIEW OF PLANT PHYSIOLOGY AND PLANT MOLECULAR BIOLOGY, Vol. 40, 1989. – Annual Reviews, Palo Alto 1989. 613 pp. US \$ 34.00 (U.S.A.), 38.00 (outside U.S.A.).

The annual reviews series bring traditionally excellent reviews of progress in various topics of a given research branch. And thus the last volume on plant physiology and molecular biology brings 19 review papers dealing with problems at various levels of organization from molecules to whole plants (in the Contents erroneously called "whole parts"). In addition to these reviews, a prefatory article brings interesting reminiscences of the Japanese plant cell physiologist Noburô Kamiya who spent his youth at Japanese (Tokyo), German (Giessen), and U.S. (Philadelphia) universities.

The review papers deal with water stress and freezing induced xylem cavitation and embolism, role of plastids in biosynthesis of isoprenoid substances (among other themes growth regulators, carotenoids, and constituents of electron transport chains), plasma membrane ATPase (with special attention to yeast mutants, protein kinases and their function in proton pump mechanisms), starch biosynthesis and degradation (dealing with the respective enzymes and pathways, cereal seed reserves and extrachloroplastic starch), the sink-source problem (including also the development of leaf vein system, carbon balance and phloem loading), and xyloglucans in the primary cell wall (touching also the questions of growth regulation by auxins and acids). The following papers are on photomorphogenesis in lower photosynthesizing plants (dealing mainly with action of phytochrome and blue-radiation absorbing pigments), symbiosis of *Azolla* with *Anabaena* (including taxonomy, occurrence, sexual cycle, photosynthesis and nitrogen metabolism, and agronomic aspects), interactions between nuclear and plastid genomes (e. g. carotenoid deficiencies, chloroplast development mutants, communication between the genomes), roles of polyamines in all phases of plant and organ development including senescence, techniques of measurement of intracellular pH and its importance in cell activities, mobilization of endosperm reserves during germination of cereal grains (including the roles of gibberellic and abscisic acids, enzymes and inhibitors, and regulation of gene expression), and phenylpropanoid (flower pigments, phytoalexins, UV protectants, insect repellents, signal molecules, etc.) metabolism in parsley, bean, potato and other plants. In the third part of the volume, the review papers deal with the specificity of mitochondria, their metabolism (respiratory chain, enzymes) and genetics, *rbcS* genes that encode the small unit of ribulose-1,5-bisphosphate carboxylase (RuBPC) in various higher plant species, development of herbicide resistance in agricultural plants (with special attention to photosynthesis inhibitors atrazine and bromoxynil and resistance in transgenic plants), protein transport into chloroplasts (including precursors of RuBPC), carbon isotope discrimination in various types of photosynthetic carbon fixers and the genetic and environmental effects on these processes (including water-use efficiency), and the physiology of ion channels and electrogenic pumps in higher plants (mainly those through plasma and vacuolar membranes, and in chloroplasts).

As usually, the reviews were written by outstanding scientists (mainly from the U.S.A.). The papers contain large lists of full references to the related literature (the authors are listed in the Author Index). The volume is supplemented with a good subject index and cumulative indexes for the volumes 32–40 (why not 31–40 ?).

I have only two comments to this valuable volume: (1) The choice of article titles is not always successful, e. g. the title "Chloroplastic Precursors and their Transport across the Envelope Membranes" (p. 471) does not contain the important words peptides and proteins. (2) The sequence of individual reviews which I keep here (see above) seems to be fortuitous, and in the volume contents the papers are arranged in another way – they are divided into three parts (Molecules and Metabolism; Organelles and Cells; Tissues, Organs, and Whole Parts). Why not arrange the papers according to this more logical sequence?

NEURATH, H. (ed.): *PERSPECTIVES IN BIOCHEMISTRY*. VOL. 1. – American Chemical Society, Washington 1989. 259 pp. US \$ 17.95.

Review papers dealing with biochemical topics in all fields of biochemistry are continuously presented in the journal *Biochemistry* published by the American Chemical Society. 36 reviews published in the years 1987 and 1988 are reprinted in the volume reviewed.

The introductory paper deals with the general problem of development and present status of biology and chemistry, the components of biochemical science. Nine papers are on the structure and function of proteins, their genetic basis and stability, folding of peptide chains, analysis by nuclear magnetic resonance methods, photosynthetic reaction centres of purple bacteria and photosystem 2 of higher plants, phospholipid- and membrane-binding proteins, metallothioneins of animal, plant and microorganism origin, relationship between the Bohr effect and hemoglobin structure, and analysis of biochemical reactions using fast atom bombardment mass spectrometry. Five papers deal with enzyme catalysis which includes the roles of radicals in biological reactions, nickel enzymes (urease in plants), inhibitors of renin and DNA topoisomerases, and peculiarities of the ATP synthase. Three papers are on polysaccharides and oligosaccharides (e.g. as recognition signals for expression of defensive genes in plants). Signal transduction in animals (five papers) is the next topic. The topic "Biological Regulation" includes three papers on morphoregulatory molecules, chemotaxis as a model second-messenger system, and deoxyribotide synthesis. Four further papers deal with biochemical genetics (tyrosyl-tRNA-synthetase, 16S ribosomal RNA, mammalian DNA polymerases, and genetics of phenylketuronia). The transmembrane phenomena (three papers) include coat proteins and leader peptidases, protein turnover and membrane transport. The last section (three papers) deals with cellular functions (lipids in epithel, lymphocyte mediated cytolysis, cachectin).

The above overview shows that the reviews deals with all types of organisms, nevertheless, plants are in the minority. Some of the review articles are overspecialized, do not explain the basic terms and problems for researchers working on other problems. Original references of the reprinted articles are not supplemented, and hence the same article may be cited in two forms, with a different year affiliation (1987 or 1988, and 1989). A rather detailed subject index is included; the author index gives only names of authors of the 36 reviews. According to its content, this is a useful volume for university libraries, but not really necessary for libraries of plant science institutes.

Z. ŠESTÁK (Praha)

CROSS, B., SCHER, H. B. (ed.): *PESTICIDE FORMULATIONS. INNOVATIONS AND DEVELOPMENTS*. – ACS Symposium Series 371. American Chemical Society, Washington, DC 1988. 288 pp. US + Canada \$ 64.95, export \$ 77.95.

The amount of agrochemicals released into the environment has risen 1900 % in the 50 year's period between 1930 and 1980. The aim of this ACS publication based on papers presented at the 194 Meeting of the American Chemical Society, New Orleans 1987, was to review the new developments achieved in the production of modern pesticide formulations that could decrease the amount of pesticides applied. The introductory paper written by H. B. Scher reviews new concepts and developments in the use of surfactants and polymers in pesticide formulations and in controlled release pesticide formulations. The subsequent 20 chapters of the book are divided into four sections. The first covers the effects of surfactants on pesticide wetting, penetration and transportation in plants and includes topics such as the foliar penetration and translocation, permeability of plant cuticles, adsorption and translocation of herbicides. The second and third sections focussed on the toxicity reduction through formulation and on the emulsion technology and techniques to select surfactants. The concluding part of the book reviews general topics such as the release control of insecticides and pesticide formulations and other parameters affecting dose

transfer. This publication will be a welcome addition to the libraries of all those interested in the development of the new techniques of pesticide application.

T. GICHNER (*Praha*)

ARNASON, J. T., MORAND, P., PHILOGENE, B. J. R., (ed.): *INSECTICIDES OF PLANT ORIGIN*. A.C.S. Symposium Series 387. – American Chemical Society, Washington, DC 1989. 213 pp. US \$ 44.95 (U.S.A. + Canada), US \$ 53.95 (export price).

Natural so called botanical pesticides represent a promising alternative to synthetic compounds, reducing environmental and health risks. Various aspects of botanical insecticides are described and discussed in this book which resulted from a symposium held at the Third Chemical Congress of North America in Toronto, Canada, June 5–11, 1988. It contains 14 contributions dealing with history and prospects of botanical pesticides in general, evaluation of various plant species, genera and families from different geographical areas (North America, China, Africa) as sources of novel insecticides. Interesting are the reports on systematic screening of new insecticides covering hundreds of plant species against a number of indicator pests and investigation of naturally occurring mixtures of substances which may slow down the development of resistance in insects. These mixtures prepared from natural sources are much cheaper than highly selective juvenile hormones. All these reports demonstrate the present busy research activities in the field of natural insecticides. However, one cannot expect that botanical insecticides are always safe for animals and man. The high toxicity of rotenone to fish indicates that there is a long way from the discovery of promising insecticides to their final registration. Information presented in this book may be stimulating for further research of biogenesis of active compounds which may serve as a basis for the preparation of transgenic plants exhibiting multigenetic resistance to particular plant insects, preventing the development of insect tolerance.

Similarly to other volumes of the ACS Symposium Series this book consists of well prepared photo-reproduced manuscripts containing numerous graphs and chemical formulas. It is supplemented with author, affiliation and detailed subject indexes. It can be recommended to research workers, advanced students and teachers who are dealing with problems of plant pesticides and their relation to agriculture, plant protection and ecology.

M. KAMÍNEK (*Praha*)

SCANNERINI, S., SMITH, D., BONFANTE-FASOLO, P., GIANINAZZI-PEARSON, V. (ed.): *CELL TO CELL SIGNALS IN PLANT, ANIMAL AND MICROBIAL SYMBIOSIS*. – Springer-Verlag, Berlin-Heidelberg-New York-London-Paris-Tokyo 1988. 414 pp. DM 238.–.

Understanding of the nature of different symbiosis systems consisting of plant and other organisms or exclusively of plant constituents is based on the progress of our knowledge of cell signalling and recognition. This knowledge may be useful not only for understanding the interactions of cells of different species but also of different cells of an individual plant organism. Contributions dealing with cellular interactions presented in this book are divided into four sections (1) Physiology and Morphology of Cell-to-Cell Interactions, (2) Signals in Plants, (3) Signals in Animals and (4) Recommendations for Further Research and Applications. Corresponding to the present state of knowledge the first chapter is focused mostly on morphological and anatomical aspects of cellular interactions including induction and formation of dinitrogen fixing root nodules, functional morphology of cell-to-cell interactions in lichens and mycorrhizae, differences and similarities of cell structures of plant, animal and microbial symbionts and evolution of symbiosis.

Plant scientists will find valuable information about the molecular basis of plant cell recognition in the second chapter summarizing data on the recognition signals and triggered processes in different plant symbionts and pathogens. Prospects of genetic engineering, monoclonal antibody technology and immunohistochemical methods are described in the last chapter. The application of these methods including DNA technology may help us to overcome problems arising from the negative impact of the massive use of chemicals in agriculture which has disrupted natural symbiotic interactions.

The book is published as Proceedings of the NATO Advanced Research Workshop held in Torino, Italy, May 19–22, 1987. It contains 21 contributions reproduced directly from the submitted manuscripts containing numerous graphs and photographic illustrations. In addition to original experimental data most contributions present a survey of recent literature which make the book interesting to researchers, students and teachers concerned not only in cellular interaction but also in biology in general.

M. KAMÍNEK (*Praha*)

NOLLER, H. F., JR., MOLDAVE, K. (ed.): *METHODS IN ENZYMOLOGY, VOLUME 164, RIBOSOMES*. – Academic Press, Inc., Harcourt Brace Jovanovich, Publishers, San Diego–New York–Berkeley–Boston–London–Sydney–Tokyo–Toronto 1988. 859 pp. Hard cover US \$ 89.50.

This new volume of the well known series of *Methods in Enzymology*, formerly under the chief editorship of S. P. Colowick and N. O. Kaplan and now edited by J. N. Abelson and M. I. Simon, is contributed by a number of experts and deals with modern methods of ribosome analysis. A selection of 51 specialized articles is organized into 10 sections and presents a supplement to the basic methodology on preparation, characterization and function of ribosomes, already described in several volumes on protein synthesis (XXX, LIX, LX and 101) within this series.

The biophysical sections (1, 2) are devoted to the use of electron microscopy, crystallography, neutron scattering and nuclear magnetic resonance in the analysis of structure and function of ribosomes, rRNA and ribosomal subunits, and describe electrophoretic and immunoblotting techniques for identification of protein-protein cross-links together with the methods of fluorescence labeling of rRNA and proteins. Much attention is paid to the study of ribosome structure by means of physical and biochemical techniques (s. 3,4), particularly to the preparation of specific rRNA and ribosomal protein fragments, the analysis of protein-rRNA interaction and intra RNA and RNA-protein cross-link sites, *in vitro* reconstitution of ribosomes from its components, and to affinity labeling of ribosomes, peptidyltransferase and of tRNA for identification and topography of specific binding sites.

An important approach in the studies of ribosome structure and function consists in the use of specific probing methods (s. 5), such as the binding of cDNA to specific regions of the rRNA or mRNA, surface protein labeling with tritium bombardment, the identification of RNA regions located on the surface of rRNA by site-specific cleavage, and structure-specific reaction between RNA and chemical or enzymatic probes to analyse RNA-protein interaction and RNA structure through RNA–DNA hybridization. The elucidation of the structural organization of the ribosome has also greatly profited by immunoelectron microscopy using antibody probes of ribosomal RNA and polyclonal or monoclonal antibodies specific to ribosomal proteins (s. 6). For isolation of ribosomal proteins various HPLC methods of fractionation are described (s. 7). Information on kinetic approaches to the study of ribosome function (s. 8) cover such topics as protein phosphorylation, the use of fluorescent tRNA for the determination of ribosomal translocation, the measurement of tRNA binding to ribosome and of translational kinetic parameters, ribosomal template-free peptide synthesis, and poly(U)-dependent synthesis of poly(Phe).

The genetic aspects of ribosome research (s. 9) concentrate on mutations of rRNA and ribosomal protein genes, 5S RNA structure and function, and on cloning and identification of ribosome protein genes in chloroplast DNA. Examination of mathematical approaches for evaluation of analytical data (s.

10) include computational aspects of storage and processing of RNA sequence data and the analysis of phylogenetic relationships on the basis of rRNA sequences.

The volume is of a high scientific and technical standard usual for this series and will certainly be of great value as a basic methodological handbook to research specialists involved in biochemical, biophysical and ultrastructural ribosome analyses and related studies.

J. TUPÝ (Praha)

KUNG, S. D., ARNTZEN, C. J. (ed.): *PLANT BIOTECHNOLOGY*. – Butterworths, Boston – London – Singapore – Sydney – Toronto – Wellington 1989. 423 pp., hard cover £S 60,-.

This book appeared as the 11th volume of the Biotechnology Series, the only one fully devoted to plants. It comprises 18 chapters covering our current basic knowledge of plant biotechnology. The book is divided into 4 parts: I. Basic Techniques in Plant Biotechnology, II. Regulation of Gene Expression in Plants, III. Prospects for Manipulation of Chloroplast Genomes, and IV. Applications of Biotechnology in Plant Systems. Part I covers not only all necessary techniques for genetic transformation of plant cells and regulation of the expression of transferred genes but also basic techniques of plant cell and tissue culture such as clonal propagation, mutant isolation, protoplast fusion, etc. (Vectors for gene transfer in higher plants – F. F. White, Techniques in plant cell and tissue culture – D. A. Evans, Selected topics in the genetic manipulation of the nuclear genome – R. J. Griesbach, Regulation of expression of plant genes in microorganisms – A. A. Gatenby). Part II deals with special aspects of the regulation of gene expression in plants and describes besides the basic structure of genes and their functional organization also special cases of storage protein, light-induced, stress-induced, nodulation and housekeeping genes. Special attention is devoted to gene expression in somatic embryogenesis, to photoregulation of gene expression at the level of both nuclear and chloroplast genes and to the effect of phytohormones (gibberellins, abscisic acid, auxin and cytokinins) on gene expression (The molecular architecture of plant genes and their regulation – K. Elliston, J. Messing, Induction, commitment, and progression of plant embryogenesis – J. H. Choi, Z. R. Sung, Photoregulation of gene expression in plants – J. C. Watson, Hormonal and stress regulation of gene expression in cereal aleurone layers – T. D. Ho, Auxin-regulated gene expression in plants – A. Theologis, Cytokinin-modulated macromolecular synthesis and gene expression – C.-M. Chen, Organization and expression of genes for photosynthetic pigments – protein complexes in photosynthetic bacteria – Y. S. Zhu, J. E. Hearst). Part III is devoted to chloroplast genome, namely to its organization and expression also from the evolutionary point of view, and to the possibility of its genetic manipulations. Special attention is devoted to molecular biology of Rubisco (Organization and expression of the *Nicotiana* chloroplast genome – M. Suguiwa, Genetic manipulation of the chloroplast genome – J. C. Gray, A perspective on the biotechnology of ribulose biphosphate carboxylase/oxygenase – H. Roy, Application of nucleic acid electron microscopy and *in situ* hybridization techniques in the study of plant genomes – M. Wu, Molecular evolution of *Nicotiana* chloroplast genomes – S.-D. Kung). The only chapter of the last part (Genetic engineering for crop improvement – R. F. Fraley) describes some cases of using biotechnology in crop improvement, such as producing herbicide-, virus- and insect-tolerant plants.

In general, the book represents an excellent survey of our latest knowledge and progress in understanding the principles of plant molecular biology and also some ideas for its practical use. It can be highly recommended not only to all research workers and students in the field, but also to all plant physiologists as a survey of basic knowledge.

IVANA MACHÁČKOVÁ (Praha)