

LETHAM, D. S., GOODWIN, P. B., HIGGINS, T. J. V. (ed.): *PHYTOHORMONES AND RELATED COMPOUNDS: A COMPREHENSIVE TREATISE. VOL. I. THE BIOCHEMISTRY OF PHYTOHORMONES AND RELATED COMPOUNDS.* — Elsevier/North-Holland Biomedical Press, Amsterdam—Oxford—New York 1978. 641 pp. Dfl. 224.00, US \$ 99.50.

Plant growth regulators represent, undoubtedly, one of the most important and much studied area in plant sciences, not only from the theoretical point of view but also owing to their extensive practical use. This book — an effort of a team of specialists — covers a broad field of our detailed knowledge of the naturally occurring plant growth substances in relation to their biochemistry and physiological role at subcellular, cellular, tissue and organ levels of plant growth and development as a whole. The biochemistry and physiology of the phytohormones and related compounds have been grouped separately into two different volumes.

Volume I dealing with biochemistry can be divided into three different parts. The first includes the introductory chapter primarily intended for the beginners and comments on some historical and critical assessment of the field. Chapters 2—7 (second part) contain a systematic description of each of the different naturally occurring plant growth regulators — auxins, gibberellins, cytokinins, ethylene, abscisic acid and relatively less studied other growth regulators. Each chapter is restricted mainly to the chemical structure, occurrence, biological and chemical assays, structure-activity relationship, biosynthesis, metabolism, transport, site of synthesis and the effect of environmental factors and other hormones influencing their respective activity.

Chapter 7 is devoted to different plant metabolites (including fungal metabolites), which are active enough in the growth regulation of lower and higher plants (examples: Sex hormones of fungi and algae, phenolic acids, flavonoids, fatty acids, sterols, CAMP).

The last four (8 to 11) chapters can be included in the third part of the volume reviewing the role of phytohormones at cellular, subcellular and molecular levels. The 8th chapter describes the phytohormone-caused subcellular, structural modifications including membranes and receptor sites, long distance transport, (re)arrangement and redistribution of cellular components, cell wall and protoplasmic streaming. The influence of phytohormones on selected aspects of cellular metabolism is discussed in chapter 9. The last two chapters discuss one of the complex but most important effects of phytohormones on the nucleic acid metabolism up to the level of protein synthesis, post-transcriptional and translational events.

The whole volume provides a very clear and comprehensive survey of the fundamental processes which are of prime importance and can be of much use to the scientists and students not only in the field of biochemistry of phytohormones but equally in that of plant growth and development.

Subject index serves for rapid orientation in the choice of the material.

J. ULLMANN (*Praha*)

LETHAM, D. S., GOODWIN, P. B., HIGGINS, T. J. V. (ed.): *PHYTOHORMONES AND RELATED COMPOUNDS: A COMPREHENSIVE TREATISE. VOL. II. PHYTOHORMONES AND THE DEVELOPMENT OF HIGHER PLANTS.* — Elsevier/North-Holland Biomedical Press, Amsterdam—Oxford—New York 1978. 632 pp. Dfl. 224.00, US \$ 99.50. (I and II Dfl. 400.00, US \$ 177.75).

In Volume II the physiological problems of hormonal control of growth and development including dormancy and stress phenomenon are discussed. Based on the different physiological aspects involving the important role of hormones, the book is divided into thirteen chapters written by eighteen authors. It starts with the role of phytohormones in growth and differentiation of cells and tissue, *in vitro*.

The hormonal control of growth and development of vegetative organs in intact plants is described in the next chapter. Root growth, short apical growth, stem elongation, leaf formation, vascular differentiation and formation of storage organs are discussed separately. The roles of auxins, kinetin, GAs, ABA, ethefl and other related compounds are dealt with, being based on their effects and on the data of their endogenous contents. The growth and differentiation pattern of each organ is described and correlated with the endogenous level of the phytohormones. The hormonal control of floral differentiation is critically discussed in a separate chapter. Two chapters deal with the action of phytohormones in fruit growth including fruit setting, fruit morphogenesis, and fruit ripening. Another chapter is devoted to growth correlations and hormonal signals responsible for the coordination of growth and development in the integrated plant systems. Due attention is paid to the important root-shoot interaction. The regulatory role of phytohormones in senescence and abscission is described on the basis of physiological changes in senescing tissues. Two of the chapters form the matter of discussion of phytohormone-regulated seed and bud dormancy, respectively. The stress phenomena and their hormonal

control are among the other topics discussed thoroughly in this volume. The hormonal control of tropisms and the mechanism underlaying rapid responses are also included to complete the range of physiological aspects in which phytohormones play a very important role. The concluding chapter deals with the present commercial perspectives of the application of phytohormones and related compounds in crop production.

The two volumes represent an excellent, highly informative and critically up-to-date manual of biochemistry and physiology of phytohormones. They provide a good source of necessary orientation in the present state of knowledge and in the forthcoming crucial problems. The treatise is of primary importance to all scientists engaged in research and teaching plant morphogenesis and is to be recommended to all plant physiologists including those engaged in crop production.

FRIDETA SEIDLOVÁ (*Praha*)

VALLERON, A.-J., MACDONALD, P. D. M. (ed.): *BIOMATHEMATICS AND CELL KINETICS*. (Developments in Cell Biology, Vol. 2). — Elsevier/North Holland Biomedical Press, Amsterdam 1978. 431 pp. US \$ 61.25.

The book contains the proceedings of the workshop held in Paris, February 27–28, 1978. It clearly illustrates the increasing trend to a deeper application of mathematical means for solving very special biological problems. In fact, nothing new can be found here from mathematical point of view. Nevertheless, the presented applications have a great value in their detailness and concreteness. The common feature of all papers is a tendency to solve real problems on the basis of experimental data.

The editors have arranged the book according to the biological classification and divided it into seven sections. The first one devoted to general mathematical and computer methods consists of four papers only. Each of them, though of general character, pays great attention to experimental results.

The second part concerns the modelling of the cell cycle; here, of course, the application of all biological knowledge available is the crucial point. Stochastic as well as deterministic models are presented in this section. The third part has the title "Development, differentiation and ageing". It starts with Lindenmayer's paper applying the formal languages theory to the description of the cell growth. The following section, entitled "Diurnal rhythms", is a considerable pell-mell of papers ranging from experimental data reports, through data analysis to modelling based on the compartment theory.

The fifth and sixth chapters are devoted to special topics — namely haemopoiesis and tumor models. Deterministic and stochastic models are presented in both of them. The paper of Lefever and Garay, concerning immune tumor rejection, should be recommended to the reader's attention in the sixth section. The last part reviews some flow cytometry methods and statistical analysis of data obtained by them.

The set up of the book seems to be advantageous for specialists in different branches of cell kinetics, but causes some trouble for mathematically oriented readers. Since the analysis of data, stochastic and deterministic modelling are mixed together, the application of different mathematical means in different areas of cell kinetics research is difficult to trace.

In general, the book provides quite a detailed picture of the applications of biomathematics in studying cell kinetics. Some preliminary knowledge in the field is necessary before its study and thus it can hardly be recommended to beginners. For the more advanced researchers, on the other hand, it may serve as an invaluable guide how their problems can be dealt with by using mathematics.

I. DVOŘÁK (*Praha*)

SINGH, S. R., VAN EMDEN, H. F., TAYLOR AJIBOLA, T. J. (ed.): *PESTS OF GRAIN LEGUMES — ECOLOGY AND CONTROL*. — Academic Press, 1978. 454 pp. US \$ 30.45.

The book is based on lectures presented at an International Symposium on Pests of Grain Legumes at Ibadan, Nigeria in 1976. It contains 39 contributions by 46 authors from the tropical countries where grain legumes form an essential part of protein supply. Numerous reports on the impact of local pests on various types of legumes in individual countries present an entirely new look at the economy of damage caused by pests (in different countries) and indicate the different approaches to very similar problems of protection. Chemical methods, use of resistant strains of plants and of entomophagous insects are discussed. The yields of the crops are more and more relevant with the growing importance of plant proteins for the nutrition of the overpopulated regions of SE Asia and S. America and the significance of soya in the economy of America. The

publication reflects the evaluation of pests by the criteria of local specialists and the measures taken locally against the pests. Some articles are dealing with bionomics of more important pests, biology of yield in food legumes. Of special interest are to a botanist the papers on the effect of defoliation and removal of reproductive structures on growth and yield of tropical grain legumes by H. C. Wien and T. O. Tayo, Resistance to pests of cowpea in Nigeria by S. R. Singh, or a parallel treatment of resistance to pests of grain legumes in the U.S.A. by E. Horber. A valuable contribution is the Ecological information necessary for pest management of grain legumes by H. F. van Emden or the Soybean pest management in the U.S.A. by M. E. Irwin. In several contributions there are data on transmission of diseases of grain legumes by pests and information concerning the impact of pest damage on further development and production. More than 40 pages of references bring a rich documentation of papers from international journals and local periodicals. A series of tables serves a further illustration of the topic. The articles included in this book are of basic importance for a broad international cooperation proposed by the International Institute for Tropical Agriculture, Ibadan, where it will form a basis for a deeper analysis and synthetic evaluation.

J. WEISER (Prahá)

DYER, A. F. (ed.): THE EXPERIMENTAL BIOLOGY OF FERNS. — Academic Press, London 1979. 657 pp. US \$ 79.—.

The "Experimental Botany" series of monographs edited by prof. Suttcliffe in the London branch of the Academic Press Publ. House, has already issued a number of outstanding volumes. Let us mention at least the monographs on gene expression, experimental embryology, cell division, which fall in the sphere of interest of the reviewer. One of the last volumes devoted to the physiology of pea provided an adequate up-to-date survey of physiology with due regard to the specific character of the plant discussed. The book under review is conceived similarly but treats the matter more widely. The aim of the authors is explained in the intelligent foreword of prof. Heslop-Harrison, which also introduces the reader into the problematics. Besides the chapters on physiology (*i.e.* organ and organism level) there are chapters on the cell biology and methods of gametophyte cultivation *in vitro*. We can find there most — if not all — information about ferns as experimental material which, as the authors write, has proved highly promising.

The book should be read primarily by all plant physiologists, because the study of ferns has recently brought many relevant results. This is true particularly of the physiology of differentiation and development; the problems of transport seem to be somewhat neglected. The publication will also provide useful information for the scientists of other branches. Those engaged in study of cell biology will be certainly interested in the contributions of professor Bell. I wish a little more of the space had been devoted to the development of the concept of the evagination of nucleus during egg maturation. The book will be doubtless much sought after in the libraries of scientific institutions and universities. Regrettably, the reproduction of some EM photographs is not of the highest quality, at least in the copy available to the reviewer.

K. BENEŠ (Prahá)

SVESHNIKOVA, V. M.: DOMINANTY KAZAKHSTANSKIKH STEPPEI. Èkologo-fiziologicheskaya Kharakteristika. [DOMINANTS OF STEPPES IN KAZAKHSTAN. Ecological and Physiological Characteristics.] — Nauka, Leningrad 1979. 192 pp. Rbl. 2.10, in Russian.

Results of four years' ecological and physiological investigations of the plant communities in different steppes of Kazakhstan are presented in this monograph. The main research topic was the most important element of viability of plants in these regions — their water regime. In the dominant plant species, values of leaf water content, water saturation deficit, osmotic potential, transpiration rate, stomatal aperture, *etc.*, and their changes during the days or during the vegetation periods were compared. Simultaneously growth characteristics of these plant species were measured and movements of their leaves were observed. The data obtained are arranged in 39 tables and 59 figures. Their analysis allowed the author to demonstrate different possibilities of plant adaptation to dry conditions and to explain the dominant position of respective species in plant associations of these steppes.

In conclusion it may be stated that this interesting book will be very useful not only to scientists working in this field but also to practical agronomists in their endeavour to increase plant productivity in similar regions.

JANA POSPÍŠILOVÁ (Prahá)

HAUPT, W., FEINLEIB, M. E. (ed.): *PHYSIOLOGY OF MOVEMENTS*. Encyclopedia of Plant Physiology. New Series. Volume 7. — Springer-Verlag, Berlin—Heidelberg—New York 1979. 731 pp., DM 198.—, US \$ 108.90, in English.

University teachers as well as research workers in many scientific branches will certainly welcome the further volume of the New Series of Encyclopedia of Plant Physiology dealing with movements of plants. This book emphasizes those fields of plant movements where substantial progress in understanding has been made since the first edition of the Encyclopedia, which reviewed the physiology of plant movements in two books (in 1959 and 1962), or where major new aspects are evolving.

Although movements of plants embrace very different processes (from cytoplasmic streaming or bacterial motility to nyctinastic leaf movements or phototropism and gravitropism) there are some general aspects common to all of them. They are presented in the first section of this book. Firstly, it is a single reaction chain, starting with the perception of a stimulus, continuing with the signal transduction and resulting in the observed response, *i.e.* movement or change of movement. At the same time it is accentuated that similar or identical fundamental processes can lead to completely different types of movement and, on the contrary, the same type of response may be controlled by completely different mechanisms in different organisms or even in different organs. Endogenous rhythms are other common features.

The second section "Intracellular Movements" begins with the chapter on microtubules. The further three chapters are devoted to actomyosin filaments (which are very similar to their muscle analogs) and their function in cytoplasmic streaming. Cell organelles are capable not only of random movements within the cell, but also of the directed migrations in response to internal and external stimuli; the last chapter of this section reviews present knowledge of migrations of chloroplasts and nuclei. Light-induced distribution of chloroplasts maximizes the absorption efficiency in weak light and minimizes it in strong light and nuclear migrations are clearly important for normal plant development.

The chapters of the third section "Locomotion in Microbial Plants" describe different types of movements of unicellular plants (by means of flagella, cilia, gliding movements) and their control (phototaxis and chemotaxis).

"Movements Using Turgor Mechanisms" is the name of the fourth section. The first chapter deals with the movements of stomata in response to changes within the plant and in the plant environment. As the stomatal movements regulate uptake of CO₂ by the plant and loss of water and heat from the plant, the recognition of the mechanism of these movements is extremely important. Rhythmic leaf movements in nyctinastic plants, more rapid seismonastic movements and thigmonastic curling are the content of the second chapter. All these movements depend upon differential turgor changes in key cells in the organ of curvature, which may be the pulvinus of a nyctinastic plant or the tendril of a vine.

The first two chapters of the last section ("Growth Movements") concern the movements directed by light. One of them is devoted to the induction of polarity, the second to phototropism. This chapter begins with dose-response relations and action spectra, continues with the photoreceptors and transduction of stimulus and is concluded with the hormonal induction of growth redistribution. This section also pays attention to gravitropism in single cells as well as on multicellular level. Again, the whole reaction chain from the perception of stimulus to the response is followed. At the end there are two chapters dealing with growth movements not directed primarily by external stimuli: circumnutation and epinasty.

The individual chapters are excellent reviews of present knowledge in the fields which they cover. Their texts are illustrated with many figures and tables (185 figures and 19 tables in the whole book) and accompanied by detailed lists of references. All together they constitute an impressive entirety. Despite considerable progress in these fields, many questions are, of course, still unanswered and this book will certainly stimulate further research.

JANA POSPÍŠILOVÁ (*Praha*)