

WORRES, M.: LEBENSBEDINGUNGEN UND HOLZWACHSTUM IN ZENTRALAMAZONISCHEN ÜBERSCHWEMMUNGSWÄLDERN (Scripta Geobotanica Vol. XVII). – Verlag Erich Goltze, Göttingen 1986. 112 S., 72 Abb., 36,- DM.

In der vorliegenden Arbeit wurden Holzproben von Arten aus den zentralamazonischen Überschwemmungswäldern Brasiliens mit besonderer Berücksichtigung der Zuwachszonen bei 13 Baumarten untersucht und versucht mittels dendrochronologischer Methoden und einer ^{14}C -Altersbestimmung. Zusammenhänge zwischen periodischen Überschwemmungen und Wachstumsrhythmik zu prüfen. Zuerst werden die zwei Untersuchungsgebiete Igapó und Várzea geographisch, klimatisch, ökologisch und vegetationskundlich sowie die angewendeten Untersuchungsmethoden beschrieben. Die Resultate der Zuwachszonenuntersuchungen und Ringbreitemessungen sind übersichtlich angeordnet und werden noch durch einen Anhang mit der holzanatomischen Beschreibung (je Quer-, Tangential- und Radialschnitte) der 13 Baumarten aus Igapó und Várzea ergänzt. In der Diskussion werden die Strategien der Anpassung von Bäumen an Überschwemmungen diskutiert. Angefügt ist weiter ein Literaturverzeichnis mit 184 Zitationen und eine Liste der vorgefundenen Pflanzenarten.

Diese Studie ist ein wertvoller Beitrag zu der Frage, wie Bäume die oft mehrere Monate langen Überflutungen ohne Schaden überdauern und ist besonders für Geobotaniker, Ökologen und Dendrologen von Bedeutung.

INGRID TICHÁ (Praha)

STICKAN, W.: AUSWIRKUNGEN VON UMWELTCHEMIKALIEN AUF DEN GASWECHSEL VON GRÜNLANDPFLANZEN (Skripta Geobotanica Vol. XIII). – Verlag Erich Goltze, Göttingen 1985. 92 S., 46 Abb., 24,- DM.

Auf Grünlandflächen und in Gewächshäusern wurde der Einfluß von Atrazin und Pentachlorphenol (PCP) auf Photosynthese, Dunkelatmung und Transpiration von *Lolium perenne* L. und *Trifolium repens* L. mit Hilfe einer Gaswechselsanlage mit automatischer CO_2 - und H_2O -Registrierung untersucht. Im Freiland wurden noch weitere Kräuter und Gräser in die Untersuchungen einbezogen. Es wurden besonders die Lichtkurven der Nettophotosyntheserate, der Jahresgang des Photosynthesevermögens und die Wirkung von Klimafaktoren wie Strahlung, Temperatur, Luftfeuchte im Laufe des Tages bei gesunden und mit den Chemikalien behandelten Pflanzen untersucht. Atrazin führte kurze Zeit nach Applikation zu einem starken Rückgang der Photosynthese, Transpiration und Dunkelatmung wurden nur geringfügig beeinflusst. PCP wirkte sich auf alle drei Stoffwechselfunktionen aus.

Die in 11 Abschnitte gegliederte Studie ist sehr sorgfältig ausgearbeitet worden, reich illustriert (46 Abbildungen) und mit 148 Zitationen ausgestattet. Vielleicht sollte mit Rücksicht auf konsequente Anwendung der SI-Einheiten $\mu\text{mol m}^{-2}\text{s}^{-1}$ statt $\mu\text{E m}^{-2}\text{s}^{-1}$ für Strahlung, und $\text{mg m}^{-2}\text{s}^{-1}$ statt $\text{mg dm}^{-2}\text{h}^{-1}$ für Nettophotosyntheserate, und Blattmasse statt Blattgewicht angewendet werden.

In der Studie konnte gezeigt werden, daß Ergebnisse von Gaswechselfmessungen bereits zu einem frühen Zeitpunkt Aussagen über potentielle Auswirkungen von Chemikalien erlauben. Sie ist ein wichtiger Beitrag für Geobotaniker, Ökophysiologen, Umweltforscher und Landwirte.

INGRID TICHÁ (Praha)

MULCAHY, D. L., MULCAHY, G. B., OTTAVIANO, E. (ed.): BIOTECHNOLOGY AND ECOLOGY OF POLLEN. – Springer-Verlag, New York–Berlin–Heidelberg–Tokyo 1986. 528 pp. Hard cover DM 129,-

This proceeding volume results from the International Conference on the Biotechnology and Ecology of Pollen held at the University of Massachusetts, Amherst in July 1985. The contributions are original scientific reports reflecting the recent important progress of research on many theoretical and applied

aspects of pollen biology. The papers are organized into 6 sections entitled Gene expression in pollen (7 papers), Pollen biotechnology (20), Self-incompatibility (17), Pollen ultrastructure and development (7), Pollen physiology and metabolism (12), and Gametophytic ecology (15).

Gene expression studies focus on the existence of sequences expressed both in pollen and sporophyte to assess the possibilities of sporophytic responses to selective pressures on the gametophytic generation and to evaluate the potentials of pollen as a model for physiological research and for screening genotypes for stress resistance. The evidence is presented for an extensive overlap between gametophytically and sporophytically expressed structural genes which holds important implications for both basic and applied studies. Papers on biotechnological use of pollen report on some positive relationships between gametophyte and sporophyte response to certain external factors, such as herbicides, ozone, fusarium toxins and heavy metals, but negative results on the possibility of breeding use of pollen selection are also presented. Recorded attempts at gene transfer using DNA and Ti plasmids did not bring conclusive evidence of mature pollen transformation. Research on self-incompatibility concerns interactions between compatible and incompatible pollen, genetics and expression of self-incompatibility loci, pollen surface proteins, mechanisms of incompatibility reaction and relationship between self-incompatibility and incongruity in outbreeding systems, while contributions on pollen structure focus on the male germ unit, structural aspects of male sterility, ultrastructural changes during pollen germination, and sporopollenin biosynthesis. In pollen physiology, the attention was paid to various questions such as pollen water status and storage, biochemical events during germination and some aspects of pollen-pistil interactions, and the section of gametophytic ecology demonstrates increasing interest in pollen competition, indicating some renaissance of the theory of selectivity of fertilization, which was put forward in the 1940' and 1950' as one of the basic principles of the michurinist biology. The volume is of particular interest to research workers in many branches of theoretical and applied botany.

J. TUPÝ (Praha)

GILES, K. L., PRAKASH, J. (ed.): *POLLEN: CYTOLOGY AND DEVELOPMENT*. – Academic Press, Inc., San Diego–Orlando–New York – London–Ontario–Tokyo 1987. 455 pp. Hard Cover US \$ 69.50

This 107th volume of the series of *International Review of Cytology* edited by G. H. Bourne, K. W. Jeon and M. Friedlander is a collection of review articles on pollen biology written by internationally recognized experts, which provides a broad picture on initiation, development and possibilities of biotechnological use of the microgametophytic generation in higher plants.

The presentation of events within the anther leading to pollen grain formation covers the principal aspects of physiology and biochemistry of the meiotic process from initiation in the archesporial tissue to the first stages of postmeiotic development of microspore; special consideration is given to the significance of the tapetum and its function in nourishing the microspore. Pollen germination and pollen tube growth are examined as a series of *in situ* occurring events from pollen hydration through tube emergence, tube wall formation and tip growth to complex interactions with the stylar tissue controlling pollen tube elongation. Information on techniques of pollen culture and on physiology and biochemistry of *in vitro* grown pollen tubes is added. The ecology of pollen dispersal is considered from the aspect of biology and mechanisms of wind pollination, and a review on the nature and control of pollen discrimination in self incompatibility is mainly devoted to the related cellular and molecular events. To change pollen-pistil interactions and overcome incompatibility barriers, the technique of mentor pollen introduced by Michurin at the beginning of the century, received increasing attention during the last two decades. An account of the progress achieved is presented both from the fundamental physiological aspects of pollen-pistil and pollen-pollen interactions, and practical use of various mentor and pioneer pollen technologies. Reviews on biotechnological use of pollen cover various aspects of theoretical and applied problems of androgenesis including ultrastructural, cytological and biochemical aspects of normal, anomalous and embryogenic pollen development, physiological conditions of androgenic haploids

production, and possibilities of use of pollen-derived plants in crop improvements. Another important field of pollen biotechnology reviewed concerns cryopreservation of pollen and pollen embryos and establishment of pollen banks for breeding purposes. The book is written authoritatively and provides instructive and stimulating source of information to be highly recommended to research specialists.

J. TUPÝ (Praha)

WALLER, G. R. (ed.): ALLELOCHEMICALS. ROLE IN AGRICULTURE AND FORESTRY. ACS Symposium Series, 330. – Amer. Chem. Society, Washington, D. C. 1987. 589 pp. US + Canada \$ 94.95; export price \$ 113.95.

In the Introduction the editor records the most ancient description of plant interrelationships and their significance for agriculture by Theophrastus (285 B. C.) and later, Pliny the Elder.

At the present time, the character of allelochemicals, mechanism of their activity and the manner of emission from the aggressive plant, their fate in the soil, their uptake, translocation and mode of action of plants are in the limelight not only of physiologists, ecologists but also of agricultural practice.

The application of allelochemicals in the last-mentioned field may lead to the reduction of the usage of herbicides, fungicides and insecticides, and serve as a basic material for their synthesis. It may also diminish pollution of the environment.

This brief overview itself shows the broad extent of problems dealt with in these Proceedings of the Amer. Chem. Soc. Symposium (1985). The introductory papers discuss general questions of allelopathy, plant pathology, natural and artificial ecosystems, agriculture, chemistry of allelochemicals, microbiology and physiology.

The subsequent papers inform on the successful studies of allelopathy in various countries of the world (Japan, the USSR, Mexico, etc.). They concern the identification of allelochemicals in fungi, phenolic acids, the share of microorganisms in the synthesis of allelochemicals, and the influence of these on the growth of corn and rice (India). The contributions from Mexico report on the effects of the extracts from pepper and other plants on the growth of cultivated plants. The identification of rhizosphere of barley and its root exudates using gas chromatography is the subject of another study. Further works discuss the effects of oat extracts on germination and growth of certain plants; the inhibition activity of tricarboxylic acid trimethyl esters, and the influence of hydroxamic acids on the resistance of wheat, Triticale and maize to Aphides. Of interest are the papers on allelochemicals in *Cyanophyta* and algae, which obviously may affect the algal associations. The ARCO Plant C. R. Inst. considers the allelochemicals as new sources of natural biologically effective substances. The idea of using the gene engineering for the production of allelochemicals, e. g. esters of ferulic acid, deserves attention. A number of substances having allelochemical properties originate at the decomposition of post-harvest plant remains, as refers the report from Australia.

The papers dealing with allelopathy in forest environment report on the regeneration of forest growths, on the relation of mycorrhiza to allelopathy, and on the toxic effects of exudates from roots and leaves of black walnut on plants and trees.

A comprehensive chapter is devoted to the relations of plant: plant, plant:soil:plant. It involves e.g. glucosylation of salicylic acid and its detoxication, the effects of substances isolated from *Euphorbia esula* and *Centaurea diffusa*, and of the cumaric acid. A synoptic contribution acquaints the reader with the effects of phenolic acids, coumarins, flavonoids on the metabolism of isolated mitochondria chloroplasts. The works on the effects of glycosides from *Passiflora* and of purine alkaloids provide new information on allelochemicals and their influence on the biochemical processes in plants. The interference between cereals and weeds, separation of allelochemicals (monoterpenes, phenols) and their identification by mass spectrometry are the topics of another contribution. The text also covers such subjects as inhibitors from *Vaccinium macrocarpum*, rapid plant tests of inhibitor effects, development of phenolic substances with inhibitory effects in soil at the lignin decomposition, etc.

The group of papers on the plant: insect interaction refers on natural substances (rotenone), on the resistance of cereals to insects, and on attractants.

Of practical importance are the works on the plausible industrial application of allelochemicals, metabolic detoxifications of furanocoumarins by caterpillars, the structure of natural pesticides of cotton, and on toxic substances from mangrove plants.

Included in the volume are materials on the plants-microbes and plants-animals relationships at the production of toxic substances by microorganisms in the post-harvest period, which may affect the germination and growth of plants; on the ecology of some alkaloids; physiological effects of diterpenoids, 2,6 dimethoxy-p-benzochinon from sorghum roots; and on the isolation of an insecticidal substance from marine algae and sponges. The paper on tannin as an antifeedant due to the interaction of tannin with proteins provides new data on this component of plants, of the tea-plant, in particular.

This brief overview of contributions written by a number of authors of various scientific orientations shows the significance on the allelopathy problem not only from the theoretical but also practical, agricultural points of view.

The volume contains many original scientific works and its value as a relevant publication for allelopathy studies is enhanced by the comprehensive list of literature dealing with this question.

F. POSPIŠIL (*Praha*)

BRAUNE, W., LEMAN, A., TAUBERT, H.: PFLANZENANATOMISCHES PRAKTIKUM I. EINFÜHRUNG IN DIE ANATOMIE DER VEGETATIONSORGANE DER SAMENPFLANZEN. Fünfte überarbeitete Auflage. – Gustav Fischer Verlag, Stuttgart-New York 1987, 283 pp. 427 figs. DM 39,-.

The very fact that this handbook issues in the fifth edition indicates its success. Thus not the changes included in this updated edition but the overall character of the book in which it exceeds other handbooks dealing with the same problems are of basic importance and are decisive for its value.

In general, the extremely careful classification of facts needed for the management of both the technical problems and plant anatomy observations must be stressed and underlined. The profoundly dealt with and well devised system of abbreviations, symbols and references enabled the authors to concentrate a vast amount of factual material in a relatively small space without deteriorating the quality of good arrangement and comprehensiveness.

In the first part of the book where the reader is acquainted with the microscope and with microscopic techniques, I would like to draw attention especially to the chapter devoted to the drawing of microscopic structures, which is to a large extent original and also can inspire advanced workers. The second part which contains instructions how to conduct proper anatomical observations includes four thematic regions relating to the cell, stem, leaf, and root. Each of these chapters, or each of the thematic or logical units is preceded by a theoretical introduction, documented with semischematic or schematic drawings. Their inclusion into the text allows a profound understanding of the problems and the formation of a dynamic conception of the structures which are to be studied in due course.

The book is not devoted solely to the observation and description of the basic structures. It contains considerable details in a number of cases and emphasizes the development and physiological significance of various anatomical structures. The whole structure of the handbook, the procedure, a suitable selection of the basic and complementary material offer to a serious student of plant anatomy a solid basis for extensive and long-term work in which he permanently will find new facts. The explication is accompanied by perfect microphotographs with parallel drawings to instruct the observer how to distinguish properly the structures studied.

The excellent lay-out of the book must also be mentioned. Perfect reproduction of microphotographs of hand sections contributes to the realization of the author's intentions similarly as the arrangement of the text and figures.

I wish this excellent book finds many new enthusiastic users and admirers and reaches further successful editions.

J. PAZOUREK (Praha)

ZEIGER, E., FARQUHAR, G. D., COWAN, I. R. (ed.): STOMATAL FUNCTION. – Stanford University Press, Stanford 1987. 503 pp., US \$ 65.00

The past decades have brought major advances in our understanding of properties of stomata and their function in plant. For this reason, in April 1983 scientists interested in stomata research organized at the East-West Center at Honolulu, Hawaii an international forum for an active exchange of new data and ideas of this subject. This voluminous book, based on contributions presented on this meeting, is intended as a summary of the present state of knowledge.

In the introduction professor E. Zeiger sums up the role of stomata as a model system to explore basic cellular properties and as a main factor regulating carbon gain and plant adaptation or acclimation to environmental conditions. Professor H. Meidner in the first chapter pointed out that stomata are a classical object of botanical research and draw attention to scientists whose work during three hundred years has stood the test of time and forms the background for today's research into stomatal physiology and function. Professor H. Ziegler reviews the evolution of stomatal apparatus as the pores with the ability to regulate the width and in this way allow CO₂ exchange and simultaneously prevent water loss. F. D. Sack's chapter is focussed on structural properties of the guard cell walls, the morphological changes that accompany the variations in turgor, the structure of cuticle, the component organelles and the role of cytoskeleton in stomatal development. P. J. H. Sharpe and co-workers present a survey of mechanical properties by which guard cells open and close the pore. In the shortest chapter of the book (10 pages) professor W. H. Outlaw, Jr. overviews the unique biochemical adaptations that distinguish guard cells from other leaf cells in order to fulfill their crucial role in plant physiology *i. e.* to effect a compromise between water loss and CO₂ uptake. E. A. C. MacRobie presents an integrated picture of the ionic relation of guard cells of *Vicia faba* and *Commelina communis* and reviews the progress towards understanding of the processes involved ionic relation. The analysis of guard cell energetics by S. M. Assmann and professor E. Zeiger, examine the primary energy-dependent processes in guard cells and evaluate their energy balance. This analysis provides a framework for the examination of bioenergetics of stomatal movements and emphasizes information for further progress.

The further chapters discuss stomatal sensitivity to external and internal stimuli. The recent efforts to answer the questions to what degree the response of stomata in the intact leaf is direct or mediated by CO₂, what are the photoreceptors for a direct response and mechanisms of light transductions in stomatal opening are reviewed by T. D. Sharkey and T. Ogawa. Recent findings on the mechanisms underlying the blue-light response of stomata based on the demonstration of blue-light activated proton pump at the guard cell plasmalemma are presented by professor E. Zeiger et al. Intercellular CO₂ concentration and stomatal response to CO₂ are dealt with by J. I. L. Morison. Evidence that supports the hypothesis that ABA plays a key role in the stomatal control of plant water loss is presented by professor K. Raschke. Hypothesis which assumes that cytokinins have a primary effect on the ion fluxes through guard cell membranes is treated by L. D. Incoll and P. C. Jewer, with the aim to stimulate discussion how cytokinins act on stomata. New data on the influence of auxins on stomata are presented by W. J. Davies and professor T. A. Mansfield. In a comparatively short chapter responses of stomata to drought, a major environmental factor influencing plant growth and performance in both natural vegetation and managed crops are described by the experts at this problem – professor E.-D. Schulze, N. C. Turner and co-authors. The use of gas exchange to study stomatal behaviour and leaf conductance diurnal variation in natural environments, interpreted in terms of their significance for the growth of particular species in particular habitats, is treated by professors J. D. Tenhunen, R. W. Pearcy and O. L. Lange. The role of stomata in adaptation of plants to extreme environments (*e. g.* of CAM plants) is briefly reviewed by I. P. Ting.

Information concerning the effect of leaf age on stomatal conductance and other leaf functions, especially photosynthesis is summarized by C. B. Field. In the most comprehensive chapter (46 pages) J. J. Finnigan and M. R. Raupach concentrate attention on the interaction between the aerial canopy environment and transfer processes in relation to stomatal characteristics. H. G. Jones reviews approaches that can be used in breeding for stomatal characters, summarizes what has been achieved and identifies those characteristics and methods that are most potential promising for the future. In the concluding chapter J. T. Ball considers leaf gas exchange experiments and the calculation results to obtain fluxes of carbon dioxide and water vapour, stomatal conductances to these gases and concentrations of CO_2 and H_2O in the intercellular air spaces and at the leaf surface.

The book is surely one of the most remarkable monographs on plant physiology that appeared in the last years. Because of its encyclopedic character, it is highly recommended to those working in botany, plant physiology, ecology and related fields.

JARMILA SOLÁROVÁ (Praha)

HEYNE, E. G. (ed.): *WHEAT AND WHEAT IMPROVEMENT*. Second Edition. Number 13 in the Series Agronomy. – American Society of Agronomy, Inc., Crop Science Society of America, Inc., Soil Science Society of America, Inc. Publishers, Madison 1987. 765 pp., US \$ 44.00 + 0.75.

The first edition of this book (Quisenberry, K. S., Reitz, L. P. (ed.): *Wheat and Wheat Improvement*) published twenty years ago, contains many facts and much information still useful, but advances research and amount of newly published materials demand the updating of the original version. The matter is divided into ten chapters. The introductory chapter brings general information on wheat crop, which provides more nourishment for man than any other crop, and its production and commerce around the world. The next three chapters deal with morphology and anatomy, vegetative and reproductive development, carbon and nitrogen relationships, frost resistance, winter survival, high temperature and water stresses. The next four voluminous chapters (of 90 to 172 pages) are divided into sections. Chapter five is devoted to the evolution of the genus *Triticum* and the origin of cultivated wheat, molecular genetics, genetic and biochemical studies of enzymes and nonenzymatic endosperm proteins, chromosome banding methods, standard chromosome band nomenclature and application in cytogenetic analysis, aneuploid analysis in tetraploid wheat, gene location and gene mapping in hexaploid wheat, and linkage map of hexaploid wheat. Chapter six consists of seven sections dealing with cropping systems and rotations, soil management – tillage, seedbed preparation, and erosion control, soil acidity, alkalinity and salinity, nutrient requirements and fertilizer use, wheat stand establishment, water relations and irrigation and weed control. The introductory section of chapter seven covers procedures that can be used in a normal wheat breeding program. In the following sections several special topics related to wheat breeding are discussed – mutation breeding, hybridization, interspecific and intergeneric hybridization, transferring alien genes to wheat and novel approaches to wheat breeding, including the induction of haploids from pollen, somatic tissue cultures and N_2 fixation. The next chapter on wheat diseases is divided into sections dealing with diseases of roots, crowns and lower stems, bacterial and fungal blights of the foliage and heads, rusts, smuts and powdery mildew, and virus diseases. In chapter nine insect and mite pests of wheat are reviewed and the concluding chapter brings the definition of wheat quality and review of quality characteristics of hard (for bread), soft (confectionary goods) and durum (pasta production) wheats.

This well arranged and printed book is highly recommended to scientists and research workers in genetics, plant physiology, biochemistry, breeding and human nutrition as well as to agronomists working directly in crop production.

JARMILA SOLÁROVÁ (Praha)

M. MARTIN ET AL.
PREPARATION OF CHLOROPLAST DNA

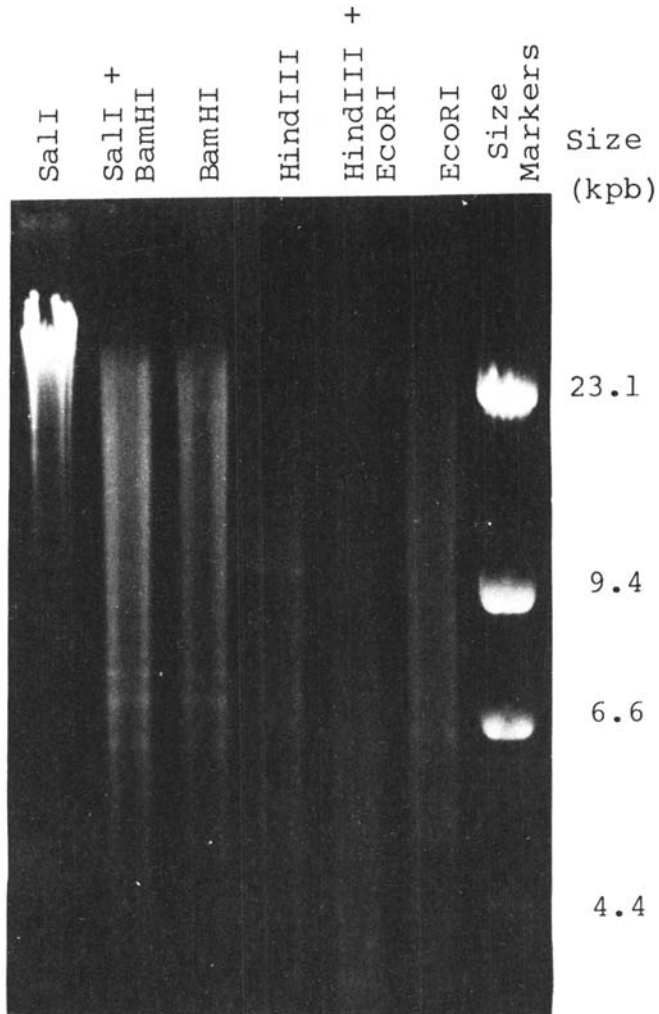


Fig. 4. Double restriction digestion of lettuce chloroplast DNA. BamHI + SalI and HindIII + EcoRI digestion fragments are compared with the fragments produced by each single enzyme. Size markers were as in Fig. 2.

M. MARTIN ET AL.
PREPARATION OF CHLOROPLAST DNA

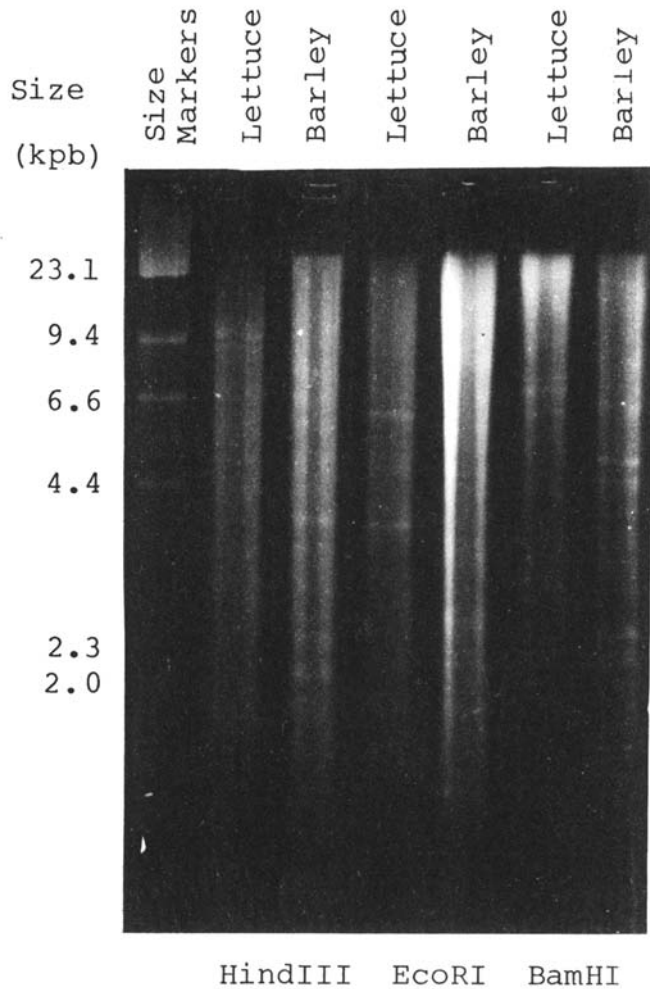


Fig. 3. Comparison of the restriction endonuclease fragments produced by BamHI, EcoRI and HindIII in barley (cv. Hassan) and lettuce chloroplast DNA. Size markers were as in Fig. 2.

M. MARTIN ET AL.
PREPARATION OF CHLOROPLAST DNA

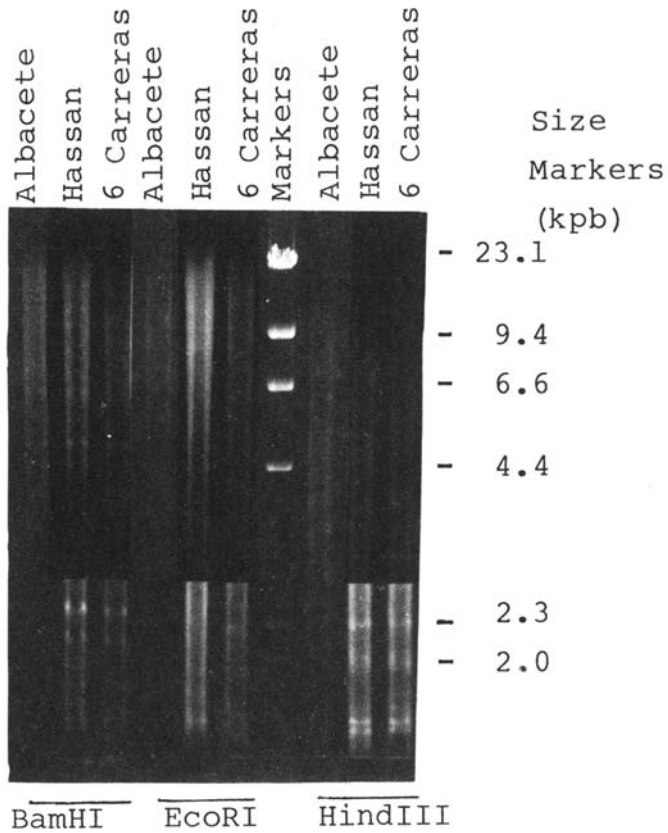


Fig. 2. Restriction endonuclease digestions of barley chloroplast DNA. Barley cultivar and restriction endonuclease are indicated for each lane. Sizes of markers (HindIII fragments of lambda phage DNA, lane 4) are indicated at left in kilo base pairs (kpb).

M. MARTIN ET AL.
PREPARATION OF CHLOROPLAST DNA

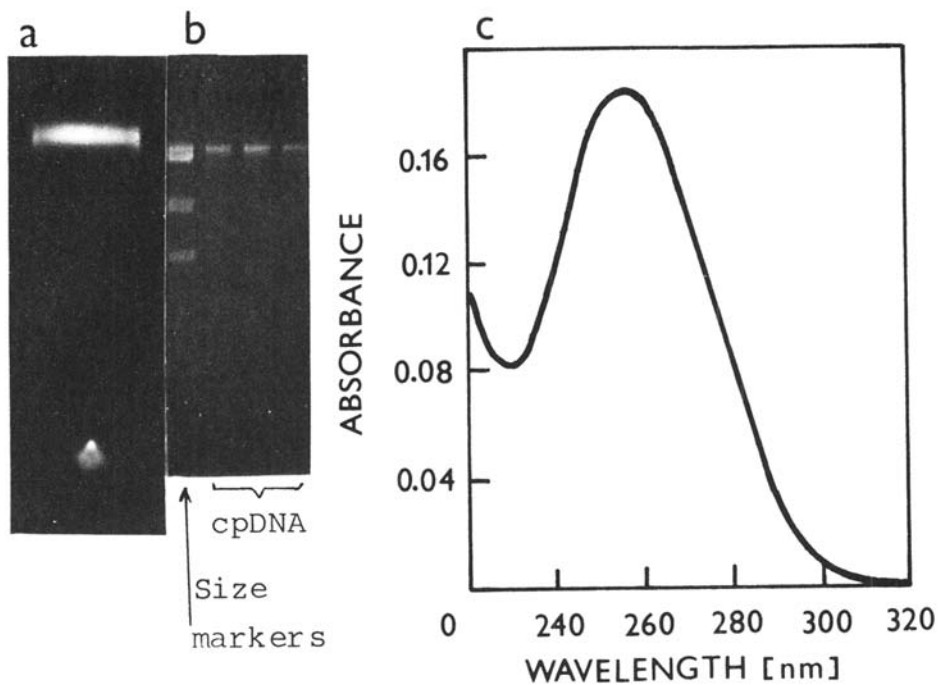


Fig. 1. Ethidium bromide-CsCl equilibrium sedimentation (a), integrity (b) and absorption spectrum (c) of chloroplast DNA. The results correspond to chloroplast DNA prepared from the barley cv. Hassan.

E. DOMAŽLICKÁ, Z. OPATRŇY
EFFECT OF CADMIUM ON TOBACCO CELL CULTURE

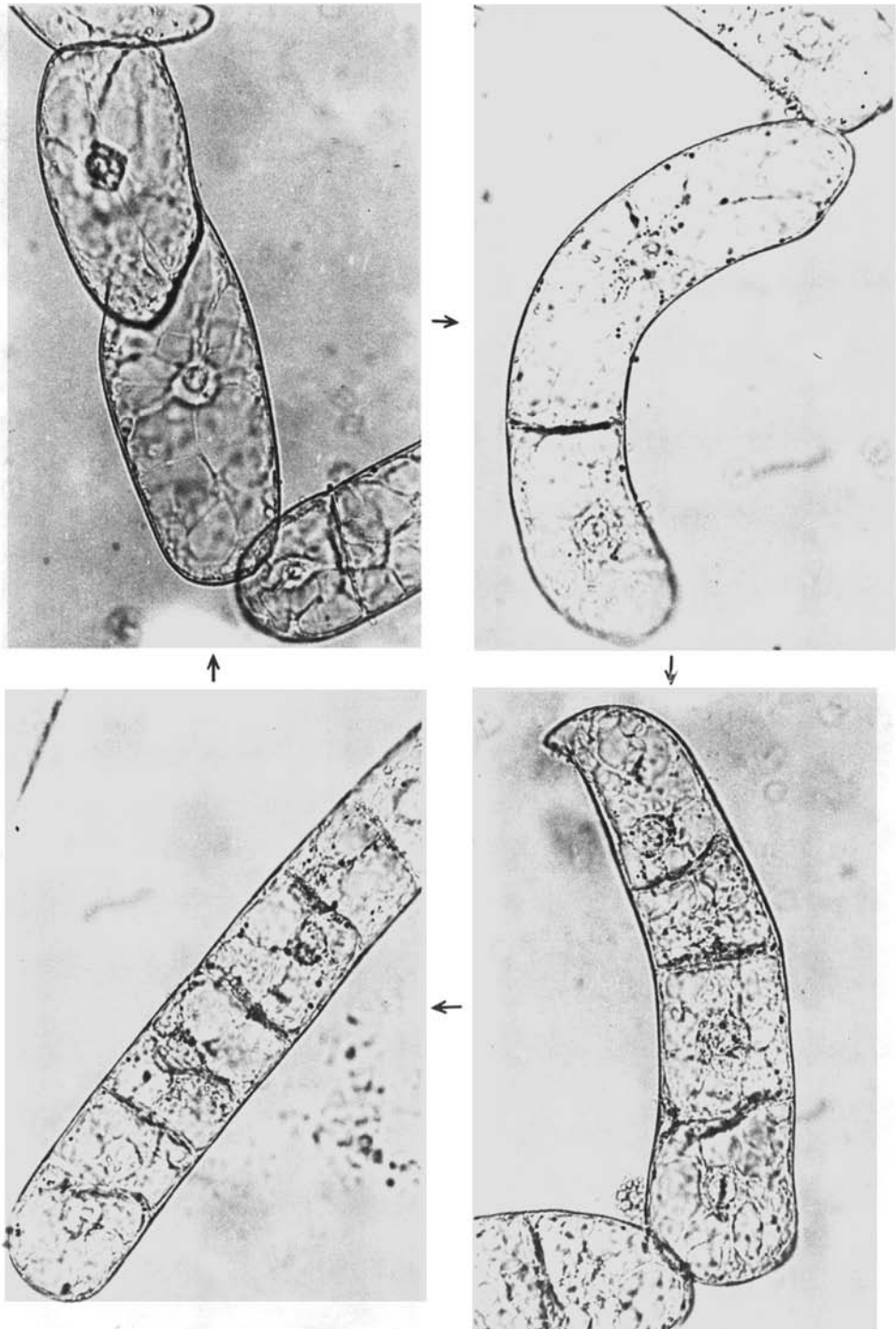


Fig. 2: Phenotype changes of VBI-O cell suspension culture during regular subculture interval. - Oriented cell division by which cell files