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## BOOK REVIEWS

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**Genetic Manipulation for Crop Improvement** by V. L. Chopra, Oxford & IBH Publishing Co., 66, Janpath, New Delhi 110 001, Bombay and Calcutta. 1985, pp. 326, Price: Rs. 165-00.

If any names were to be associated with the green revolution in India, the name of Dr M. S. Swaminathan would be easily one of the very few that would come to mind. Small wonder that he has a large band of *aficionados*, some of whom have contributed articles for this volume to felicitate him on the occasion of completing 60 years of his life. Dr B. P. Pal, who was a pioneer in this field and whose presence in the field of genetics and plant breeding has always loomed so large, has written the Foreword. He points out that the main reason India was saved from famines (in spite of the increasing population) is because of the development of high-yielding varieties and the science-based agrotechnology. V. L. Chopra has packaged all the articles including one of his own which exemplify the range of techniques now available to the plant breeders. There are the time-honored methodologies like polyploidy (R. S. Rana), Mutation Breeding (V. L. Chopra and R. P. Sharma), gene transfer through chromosomal manipulations (J. L. Minocha), use of male sterility (S. S. Virmani) etc. However, in the 1970's not only the technology of gene cloning was worked out but also it became apparent that the sequence and gene organization of eukaryotes including plants is quite complex and will require new strategies for solving problems of gene manipulation. Present-day estimates of nomadic DNA sequences in plants have ranged from 20–50% and no less than half a dozen distinct transposable elements in plants have been characterized. Moreover, Barbara McClintock's hypothesis that agents which cause *genome stress* mobilize transposable elements has also been invoked for somaclonal variation and for mutations induced following certain viral infections in plants.

Amongst the new technologies, a whole gamut of plant tissue culture methodologies are covered by S. Bhaskaran. These range from the haploid production to protoplast fusion. C. R. Bhatia *et al* describe the new vectors, specially the ones utilizing *Agrobacterium Ti* plasmid and its derivatives. The potential of these new gene transfer methodologies is so great that they are bound to be used extensively. Reports have already appeared about the successful transfer of

herbicide resistance and biocide genes to plants. Since rice is so crucial to the sustenance of 2 billion people in Asia, A. T. Ganesan's article paraphrases M. S. Swaminathan's point (Scientific American, 1984) that there is a special need for the application of the new techniques of genetic engineering for improvement of rice. Other articles cover the basic and remaining applied aspects. All in all the book gets high marks and credit for this should go to V. L. Chopra who does things well and on time.

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**Essentials of Plant Technique** by J. N. Dvivedi and R. B. Singh, Scientific Publishers, Jodhpur 342 001, pp. 175, Rs. 75/-

I was amused by the title and only after perusing through the book did I understand its meaning. The authors have attempted to list out the techniques used by students in Botany. The accent is on histochemistry but the details are inadequate.

No reference is given to technical details on tissue culture, protoplasmic fusion culture, anther culture, isolation of organelles from plants, enzyme technology and immobilized cell technique. Although chromatography is discussed, gas liquid chromatography is given a cursory treatment. Electrophoresis finds no mention. The techniques on the isolation of bacteria and fungi require explanation, as I am confident, if any student tries the methods outlined in the book, he will not succeed in isolation!

On the whole it is a disappointing book and at Rs.75, it can hardly be recommended to the student!

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**Recent Trends in Botanical Research** by R. N. Gohil, (Published by Scientific Publishers, Maan Bhavan, Ratanlal Road, Jodhpur, 342 001, India), Hardbound, 1985, pp. 332, Price: Rs. 250/-

The book under review contains 37 papers presented in the All India Seminar on "New Approaches to Plant Science Researches" during October, 1982. The Editor mentions that "only those papers which either deal with the problems that are yet unsolved or those based on new techniques/tools" are included. As most of the biological problems can not be claimed as solved, it has taken care of inclusion of papers covering practically any aspect of plant sciences. The title 'Recent Trends' seems to have been taken to indicate the work being done presently in different laboratories without any discrimination for quality. The Editor also mentions that all the papers were refereed and they include changes/alterations suggested by the referees. However, the papers show marked variations in the quality of presentation; some are written clearly and crisply and some with full of ambiguities.

The papers have been grouped under Cytogenetics, Plant Physiology, Environmental Science and Radiation Botany. The volume contains short reports (3-4 pages) highlighting an important outcome, full length papers of original research (some of them covering work already published), and a few brief reviews. A few papers report very preliminary and limited observations. Some of the papers which fall in this category are those on application of laser in plant biology (p. 93), localization of DNA and histones in hypertrophied inflorescence axis of *Brassica* due to *Albugo* (p. 97), aerobiological studies of urban areas (p. 229) and the frequency of binucleate cells in *Cosmarium* after gamma irradiation. Many of the papers are repetitive types. Under Radiation Botany, for example, many papers just report radiation induced variations in many taxa. Although the reviewer does not deny the importance of such studies, yet he feels that they are not well suited for a volume of this title.

Nevertheless, there are many papers which are interesting. To mention a few, the paper by Cowsik and Jayachandra presents interesting results on the resistance induced by presowing hardening of seeds of many crop plants to the allelopathic influence of *Parthenium* weed. Swamy and Pillay have presented a comprehensive account of the work on the characterization of cytoplasmic and organellar tRNAs and aminoacyl tRNA synthetases of aromatic amino acids

in soybean. I find that some of the small reports such as simple techniques of giving water stress to nodules without stressing the plant (p. 175), *in vitro* culture of fruits (p. 179), and comparative development of male and female gametophytes in pearl millet (p. 49) to be more interesting than many full length papers. Printing and overall get up of the volume is fairly good and the printing mistakes are not too many.

I am not sure as to how far this volume, and many other volumes recently being published containing original research papers and brief reviews covering many disciplines of Botany, are useful to research workers. It is true that many multidisciplinary volumes such as 'Recent Advances in Botanical Research' which are very useful are being published. However they contain comprehensive reviews by international authorities and are indispensable to the beginner as well as the established research workers in the field. The present volume cannot be compared to such publications both in content and utility.

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**Annual Review of Pharmacology and Toxicology** Vol. 25, 1985 - Robert George and Ronald Okun (Co-editors) and Arther K. Cho, Associate Editor, Published by Annual Reviews Inc. 4139, Elcaminoway, Palo Alto, California 94306, USA, pp. 799, Price: \$29.00 & \$30.00.

The Volume under review contains a rich fare on mechanisms of action of chemical agents, pharmacokinetics, structure-activity relationship, developmental pharmacology, organ-specific and function-specific pharmacology, techniques and environmental toxicology. Two of the three prefatory chapters are autobiographical and are extremely valuable as personal testaments of the eye-witness accounts of the growth of experimental and clinical pharmacology. The third one projects toxicology in perspective and highlights the dilemma of reconciling cost of testing an ever increasing number of environmental chemicals and their validity of the Data generated, with the mounting public concern about the safety of the tested chemicals. Arthur D. Welch, drawing from the rich experience of a "long series of careers spanning forty-four years of involvements with the administration of

four departments of pharmacology and the research and development activities of two pharmaceutical organizations" presents nostalgic accounts of the early efforts to isolate the active principles of the adrenal medulla and the stabilization of catecholamines by ascorbic acid, the early indication of the presence of acetylcholine receptors, the discovery and standardization of sulfa methyl pyrimidine, nematocides, the intrinsic factor in pernicious anaemia, mitochondrial location of the storage site of catecholamines, beta blockers and other fascinating milestones. Louis Lasanga identifies the role of major pharmaceutical companies, the National Institutes of Health and the Research Foundations in developing the discipline of clinical toxicology in U.S.A.

In a most provocative chapter: Perspectives in Toxicology Maynard B. Chenoweth makes the following quotable quotes: "*Very toxic or hazardous materials can be defined promptly, but to prove that a less-obviously toxic material could never do anything, to anybody, any time, is totally impossible.*"

"*Today, toxicology is of major social value primarily as a predictive science. We must know, as best we can, what will be: What was is too late.*"

Again, still in the grip of the aftermath of the Bhopal tragedy (December 3, 1984) the following conclusion of Chenoweth is of pertinent significance: "*Data from accidental poisoning cases are of value, even though they may be described by some as a series of one case. Data from one case are much better than no data at all. Unfortunately, most of these data are difficult to interpret and only rarely reach the scientific literature.*"

"*Prepublication publicity, minimum facts and maximum press confuse the public.*"

"*Special interest groups do not trust governmental agencies and exert as much pressure as they can to obtain their way. One such group is often in opposition to another or others. Meanwhile, the general public, which only wants to be protected against unreasonable hazards, does not know where to turn and can panic easily.*"

Two chapters respectively by Arthur S. Keats and John R. Bend *et al* deal with two complementary aspects of respiratory pharmacology/toxicology, namely, drugs on respiration in the healthy individual versus in the diseased individual and the uptake and biotransformation of xenobiotics by the lung. From

the mechanistic angle, the overviews on the role of hepatic glutathione in detoxication of chemicals foreign to the body, oxygen radicals in tumor promotion and the regulation of gene expression by steroids will prove to be thought-provoking.

For those concerned with environmental toxicology, the chapters on formaldehyde and smoke and fire provide new insights. Formaldehyde is used in the manufacture of adhesives, plastics such as urea-formaldehyde and phenol-formaldehyde resins which all end up as consumer products. Hence the current concern about its potential to cause squamous cell carcinomas. The chapter on the toxicity of smoke from both natural and synthetic polymeric materials used in building and transportation industries gives one glimpses into the profound depths of our ignorance of the toxicity generated when the materials are burnt deliberately or accidentally. Thus, one learns the grim fact that, weight to weight, the smoke produced from the man-made polyethyl fluoroethylene is nearly thousand fold as toxic as the smoke produced from Douglas fir wood. In the normal mice the  $LC_{50}$  values for the thermal decomposition products of GM-41 isocyanate foam (Foam material made from polymers of alkyl isocyanates – possibly including methyl isocyanate (MIC) one of the super-star performers of the Bhopal tragedy) is just 6.4 ppm compared to 166 ppm of hydrocyanic acid or 3500 ppm of carbon monoxide.

Besides the chapter on alternatives to animal testing procedures, other reviews in this volume also contain valuable discussion on methodologies related to testing of chemicals on the respiratory system and the static and dynamic chamber techniques for inhalation toxicology of smokes and fires. The usual feature Review of Reviews surveys the release of new review series in psychopharmacology, opiate and other receptors, the state of art of caffeine toxicity and drug dependence. Another useful effort is the five year author and subject indices and titles of chapters appearing in Ann. Rev. Pharmacol. Toxicol 21–25, *i.e.* for the five year period of 1980–1985.

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