

take appropriate steps in curbing such tendencies.

A major topic of discussion in BPR's editorials pertains to management of water resources in the country. Everybody agrees that water scarcity is going to be a major problem in India in the coming years, which will have serious political ramifications. Parts of India which used to be self-sufficient are now becoming water deficient mainly due to the unscientific utilization of precious water resources. BPR puts forward a number of suggestions to alleviate this problem, mainly centred on conservation involving people's participation. Another major area of discussion in the book is about mineral exploration and its utilization. The author is critical of the lop-sided planning in mining industry, mostly interested in making quick money by exporting raw minerals rather than developing our indigenous expertise on production of end products. His ideas on the gold mining industry outline a strategy to make India a major producer of the yellow metal (eight articles in this book deal with gold). In all these endeavours of prudent resource utilization, he visualizes an active role for the geologist in helping the people formulate sustainable ways of developing resources at the local level. He lists a number of areas of research where geological knowledge can be applied to improve the life in rural areas (see article on role of earth sciences in solving problems of our countryside). Through such innovative programmes, BPR believes that the society would also become more aware of the role of geology in developmental work. Following these suggestions, it will be a good idea for the national organizations like GSI to think about setting up regional cells consisting of young geologists, on their probation, who will work in rural areas along with local NGOs in water harnessing, cadastral-level resource mapping, land use, soil conservation, environmental degradation and a number of other issues, where welfare of the people is directly involved.

In many articles, BPR eloquently discusses about the age-old vibrant culture of India. He writes about the Cambay archaeological find, presumed to be related to an 8000-year-old settlement (see 'Glimpses of lost Indian civilizations'). Obviously, this find is only a preliminary interpretation and as he admits, many scientists have not accep-

ted this theory. His own table on Holocene chronology for this period (p. 319) shows 'megalithic graves and mounts and a land peopled by forest dwellers and hunters'. This discrepancy raises a question: was this advanced Cambay settlement an isolated urban centre, which developed without receiving sustenance and cultural interaction with the surroundings? Such missing links indicate the need to conduct more systematic geoarchaeological and geological studies. Clearly, this is an interface where archaeologists and Quaternary geologists can work together to unravel the prehistoric past.

In a concluding chapter, 'India unbound', BPR ends his musings on India with a note of optimism. He says, 'We must realize our inherent strengths as well and create an environment for talented youth to forge ahead to become a prosperous, tolerant and creative nation of a billion people'. He sees silver linings of a bright future in the emerging entrepreneurship in the country. But the question is who will ensure its social responsibility and what mechanism will check the unbridled market forces. And, would it not open the doors to foreign capital and eventually to their domination? Would this not run counter to BPR's vision of village-centred development? This scenario reiterates the need to evolve an indigenous system that is sensitive to a socially complex country like India – a view that is propagated in many articles of this book.

A few things set this book apart – its scholarship, its simple and clear prose without being rhetorical, and an underlying continuity of thoughts despite the fact that this is a collection of stand-alone articles. The above qualities would help to catch the attention of even a lay reader having only a nodding acquaintance with geology. The publishers can take pride in the fact that the book is elegantly simple and without any obvious typographical errors. However, I think the book would have been much more attractive if the articles were arranged subject-wise rather than in chronological order. An exhaustive index is given at the end of the book, although it misses some important names discussed in the book. An apt introductory article written by M. S. Rao, the present editor of the *Journal of the Geological Society of India* increases the value of the book. This book should not be restricted to only earth

scientists as it also deserves to be read by those who worry about Indian science and related developmental issues.

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Plant Viruses as Molecular Pathogens.

Jawaid A. Khan and Jeanne Dijkstra (eds). Food Products Press, An Imprint of Haworth Press, 10 Alice Street, Binghamton, New York 13904-1580, USA. 2002. 167 pp. Price not mentioned.

'The discovery of truth and its transmission to others belong together, and their joint exercise can afford satisfactions greater than either one practiced by itself.'

– Joel Hildebrand

This is a quotation reproduced from the above book, which is an endeavour by a number of pioneers in plant virology to transmit the truth they have discovered.

Virus diseases cause serious losses worldwide in horticultural and agricultural crops. Molecular strategies for generating resistant plants have benefited from progress in plant molecular virology that has enhanced our understanding of the molecular basis of plant viral diseases. The above book intends to provide insights into molecular processes whose end result is pathogenesis. The authors have achieved this intention quite successfully.

The book begins with the guiding principles of plant virus nomenclature. This will prove convenient to the virologists involved in teaching and research. Viruses are classified according to the type of genome and are fully referenced in the index. The section on 'How to write

the names of viruses?’ will be useful for writing research papers and theses.

The sections on the transmission of viruses by insects, nematodes, fungi and seeds are presented with useful diagrams of virus pathways within transmitting insects and of fungal vector life cycle. Some of the features of nematode transmission, namely that the retention and not the ingestion is specific for the virus–nematode combination, make interesting reading. The chapter on fungal transmission of viruses provides new insights into possible mechanisms of transmission. The terms *in vitro* and *in vivo*, hitherto used in a rather confusing manner for fungus-transmitted viruses, have been renamed appropriately as ‘externally-borne’ and ‘internally-borne’. The molecular basis of virus transmission through seeds is well presented.

Molecular biology of plant virus movement has been clearly presented under the two main headings of ‘Coat protein-dependent movement’ and ‘Coat protein-independent movement’. The host factors involved in virus movement are also discussed.

The section on the mechanism of RNA synthesis by viral RNA-dependent RNA polymerase (RdRp) concludes that the RdRps follow the same ordered set of steps followed by DNA-dependent RNA polymerases. A number of experimental results (mainly autoradiograms) are presented to shed light on the relatively dimly-lit pathways of RNA synthesis.

This book highlights novel aspects of plant virus gene expression strategies. This section can enthuse any reader to learn more about these clever strategies, especially those used by luteoviruses, which are a ‘translational goldmine’. After discussing the replicase-driven template switching as the mechanism for RNA recombination events in plant viruses, the book proceeds to trace the evolution of *Potato virus Y*, the type species of *Potyvirus* genus of the largest plant virus family *Potyviridae*.

The chapter on the molecular epidemiology of begomoviruses suggests that customized disease resistance can be engineered based on virus epidemiology. However, the geminivirus disease complexes, which are an emerging threat, are only touched upon in passing, perhaps because this book was published just before the flood of publications on geminivirus satellites.

The book then focuses on the sophisticated mechanisms of ribosome shunting,

leaky scanning and activated reinitiation adapted by plant pararetroviruses. The chapter on the recombination in plant DNA viruses presents the interesting finding that begomovirus as well as badnavirus-derived sequences are found in the plant genome. The role of replication in recombination is clearly presented.

My vote for the best chapter in the book goes to Valkonen’s description of natural resistance to viruses. The responses of plants to virus infections are lucidly presented.

The chapter on engineering resistance to plants discusses the mechanisms of pathogen-derived resistance: both protein and RNA-mediated.

The expression of antibodies in plants is a chapter that talks about protecting not only plants from virus infections, but also about making anticancer antibodies in plants. Use of plant virus vectors for vaccine development is another important application discussed in this chapter.

The final section of this book is devoted to the detection of plant viruses, (including those present in vectors) and viroids by nucleic acid hybridization and PCR. This section will be useful for practical virology classes.

In short, this book affords satisfaction to the reader, in addition to being a guide for teaching and research on plant virology.

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Photosynthetic Nitrogen Assimilation and Associated Carbon and Respiratory Metabolism. Christine H. Foyer and Graham Noctor (eds). *Advances in Photosynthesis and Respiration* (Series Editor Govindjee, University of Illinois at Urbana Champaign, USA). Kluwer Academic Publishers, Dordrecht, The Netherlands. 2002. vol. 12. 284 pp. Price: US\$ 135.

Kluwer Academic Publishers have not only shown their leadership in publishing high-ranking journals and advanced

books in plant sciences, but have also taken bold steps in bringing out some high-impact trendy series on plant biology. One such series *Advances in Photosynthesis and Respiration* (AIPH), is being published under the supervision of Govindjee, University of Illinois at Urbana-Champaign, USA. This series has already published eleven volumes.

The latest book (vol. 12) under review is not only novel in its approach, but also in its content and get-up. Like vol. 11 of the series (reviewed in *Curr. Sci.*, 2003, **84**, 235–236), it emphasizes the regulatory interlinking processes involved in photosynthesis-driven carbon and nitrogen metabolisms. Regulation of biological processes, including signal perception and transduction is the frontline research area in plant biology. The establishment of a structure–function correlation or reaction mechanism in a metabolic process like nitrogen assimilation is not enough. The editors aptly point out in their preface that nitrogen assimilation is a key cellular function in plant cells, that works in tandem with respiration and photosynthesis. The evolution of oxygenic photosynthesis may be closely linked to nitrogen utilization in the plant and algal cells. In order to poise the cellular redox balance, the plant cells adjust for the optimal energy balance between chloroplasts and mitochondria as well as partitioning of assimilate in various plant parts. The obligatory cooperative interaction of multitudes of metabolic reactions occurring in chloroplasts and mitochondria not only requires intricate adjustment of metabolic fluxes for recycling of metabolites among organelles, but more importantly, for their integrated spatial–temporal controls. With the emerging technologies and ‘pressure’ on producing genetically engineered crops, the understanding and appreciation of the physiological regulation is vital; and both research and teaching of plant biology thus call for new approaches.

This book is a timely publication. It contains 16 critical overviews contributed by 37 authors (including three from India). These overviews discuss photosynthesis, nitrogen-use efficiency, the control of nitrate and nitrite metabolisms, regulation of ammonia-assimilation, carbon–nitrogen cycling in photorespiration, significance of mitochondrial function in light in terms of carbon and nitrogen interactions, regulation of carbon and nitrogen through gene expressions and

Bacteria as plant pathogens. The Plant Health Instructor. DOI: 10.1094/PHI-I-2004-0809-01 Anne K. Vidaver and Patricia A. Lambrecht
Department of Plant Pathology, University of Nebraska, Lincoln, NE Introduction Bacteria are single-celled microorganisms, g...
Plant pathogenic bacteria cause many serious diseases of plants throughout the world (Vidhyasekaran 2002; Figure 2), but fewer than fungi or viruses, and they cause relatively less damage and economic cost (Kennedy and Alcorn 1980). Most plants, both economic and wild, have innate immunity or resistance to many pathogens. However, many plants can harbor plant pathogens without symptom development (asymptomatic).
Molecular characterization of 16S ribosomal RNA also may distinguish bacteria from one another.

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