came by the cartloads, and the pure joy of doing basic research overcame everything else.

Towards the end of the golden years, dark clouds hovered over the horizon. Science at NRC got into the hands of politicians. The Short Road Down came. Herzberg fiercely defended the freedom of the researcher by speaking out against political interference. According to Herzberg, 'Scientific research of the purest kind is an intellectual activity, which like art, music, literature, archaeology, and many other fields helps us to understand who we are'. How true, and one fervently wishes that this realization comes to everyone, especially science policy makers, everywhere.

The golden years ended with a great personal loss for Herzberg, the sudden death of his wife Louise Herzberg, in the summer of 1971.

Herzberg was awarded the Nobel Prize in Chemistry in 1971. The Swedish Academy's citation says it all. 'It is quite exceptional in the field of science, that a single individual, however distinguished . . . Can be a leader of a whole area of research'. Herzberg means spectroscopy, spectroscopy means Herzberg.

Herzberg as an illustrious scientist is known to thousands of researches all over the world. But only the few who have been fortunate to be associated with him would have known Herzberg, the person. Stoicheff, in the many incidents he has brought out, has admirably succeeded to bring out this side of the magnificent personality that Herzberg was. We read about how Herzberg had kept in contact with all his friends and colleagues throughout, how he helped and encouraged the younger scientists (many of whom later became well-known spectroscopists in their own rights), and how he made enormous efforts to provide relief and reduce suffering in post-war Europe. One is particularly touched by the simple fact that such a great personality had music as his main hobby. In spite of all difficulties, troubles and problems he faced in life, Herzberg often talked about his good luck only.

Stoicheff has brought out this biography of Gerhard Herzberg, a giant among scientists of the twentieth century, for all of us to read and enjoy. He is successful in conveying to the reader the thrills, joyous moments and pure pleasures Herzberg must have felt while doing his research. I sincerely wish this book is made 'a must read' for all students of science.

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Air Pollution: Development At What Cost? Yogesh T. Jasrai and Arun Arya (eds). Daya Publishing House, New Delhi 110 035. 2003. 231 pp. Price: Rs 550

Air pollution is a problem faced by both developing and developed countries alike. Rapid industrialization for economic development to meet the specific requirements of the ever-increasing population is proving to be extremely dangerous for human life, ecosystems and cultural assets. Air pollutants do not respect any national boundaries. The complex interplay of natural forces, industrial emissions and transportation is not easily quantifiable. Specific pollutants such as carbon monoxide, sulphur dioxide, nitrogen oxides, particulate matter, ozone and other organic gases and vapours at ppm and sub-ppm levels exhibit a fascinating chemistry and molecular dynamics in terms of their degradation products and ultimate fate in the presence of ever-changing meteorological conditions such as humidity, temperature, radiation and atmospheric transport phenomena which are poorly understood. Given such a scenario, it requires a congregation of fertile scientific minds to enumerate, evaluate and analyse the data to discern the trends. Several aspects of air pollution need to be adderssed, including sources, monitoring, impact assessment, technological remedies, and effect on plant and human health. This is the aim of most symposia on air pollution, but at the end of it all, a nagging feeling of 'not done enough' still remains.

The book under review is an outcome of a national seminar organized by the Indian Association of Air Pollution Control on 16 October 1999 to discuss such issues related to 'pollution and development', as emphasized in the preface by the editors. It is a collection of 29 scientific papers, each constituting a chapter. Of these, 19 are technical papers and the others are invited review papers. The editors have converted the whole proceedings into a book without weeding out some papers of poor quality. Neither has any effort been made in collating the papers into specific sections.

Section I begins with a chapter on air-pollution monitoring and does not contain any new information. Chapters 2, 7 and 8 are investigations on the air quality, soil quality and effect of particulates from cement kiln industries. The authors have measured SO_2, NO_x and SPM in Nayagaon–Kohr, Sawa-Shambhura and Gotan areas. They have concluded that the pollutants concentrate around 1000 m radius rather than in the immediate vicinity, depending upon the season. Variations in the soil characteristics such as pH, conductivity, osmotic pressure and salinity percentage were studied. Black cotton soil and red laterite showed higher pH, whereas sandy soil at Gotan exhibited heigher osmotic pressure. Chapter 8 is a detailed study of the epidermal features of dusted leaves. There was a general decrease in the number of epidermal features of dusted and control leaves. A decrease in the number of epidermal cells and stomatal frequency was observed but an increase in stomatal index and trichome frequency was also noticed. Probably, this is a defence mechanism and adaptation of the leaves to regulate transpiration as well to control the entry of harmful pollutants.

Chapters 3–5 refer to the ecological aspects of air pollution, namely biodeterioration control, green-belt plant scavengers for air-pollution control and behaviour of wheat and weeds with respect of SO_2 toxicity. The authors used leaf extracts of eucalyptus oil, Godawaj powder, neem, lantana, lemon, pudina and Bel for *in vitro* control of fungi in museum objects. Among these, only Godawaj powder was found to be effective for all the test fungi. Chapter 4 lists some of the specific pollutant-tolerant plants and crops which need to be maintained around industrial green belts. The pollutants covered include SO_2, NO_x, ozone and carbon monoxide.

Sulphur dioxide toxicity at 1310 mg/m^3 concentration to wheat varieties (*A. fatua*, *S. glauca* and *P. minor*) was measured by Kumawat and coworkers. The effect of pollutants on stomatal con-

ductance, foliar SO_2 content, buffering capacity, nitrate reductase activity, foliar protein, proline content and lipid peroxidation was studied. The authors have concluded that grassy weeds were studier than dicot weeds.

Chapters 6, 9 and 10 deal with vehicular pollution. Rao and coworkers, have presented data on monel metal and sponge iron catalysts for the control of emissions in spark-ignition engines. The conversion efficiency for CO was 65 and 70%; for sponge iron/monel and for hydrocarbons the conversion efficiency was 70 and 55% respectively.

However, vital questions such as life of the catalysts, recycling and poisoning aspects were not addressed. Bhatt and Washi have presented a study of the environmental impact assessment for Baroda–Ahmedabad expressway link using the Gaussian model, and air pollution index to predict Si values for CO, NO_2, photochemical oxidants, total suspended particulates, SO_2 and noise levels. This is a review type of paper. Strategies to control diesel emission is also a review paper which lays stress on the combined use of EGR and methanol fumigation to control NO_x and particulate emissions.

Chapters 11, 12, 15, 17–19 address the ecological aspects of air pollution. Undoubtedly, these are the most informative chapters in the whole book with all the authors from the faculty of science at M. S. University of Vadodara. The most interesting article in this category is the study of aeromicroflora of an Egyptian mummy chamber. Among zygomycotina, ascomycotina and fungi imperfecti, only ascomycotina was found to be dominant which produced white-coloured patches on the fingers of the mummy. Among the eight fungi isolated, a new fungi type, *E. nivea* was detected. What is important is the confirmation of *E. nivea* by Agarkar Research Institute, Pune.

A similar study of the aerospora affecting ornamental plants indicated the presence of two potential plant pathogens, viz. *Colletotrichum gloeosporioides* and *N. sphaerica*. The identification was confirmed by the Indian Type Culture Collection, IARI, New Delhi. Again, this is a new occurrence in ornamental and medical plants.

In 1984, IPCL set up an eco-farm with a pond filled with treated effluents, and 70 varieties of plant species comprising grass, shrubs, trees, bamboo groves and roses were planted. A small forest area was also created. Padate and Sapna conducted a survey of potential avifauna sheltering arboreal and terrestrial species. They identified 94 bird species. Of the total 123 species listed, 52 had been identified in a 1988 study and 44 new bird species were found during the present study. The impact of untreated effluents on birds is well-known and the fact that 31 species of aquatic birds were spotted all through the year is indicative of the success of the eco-farm using treated effluents. This could serve as a model for other industrial units. Chapter 18 deals with the removal of toxic metals by Gyanoderma, a fungal biosorbent. Since the binding capabilities of biomass are comparable to commercially available synthetic cation exchangers, biosorption is an effective means of concentrating and removal of toxic heavy metals. Unfortunately, the paper does not provide any experimental data even on laboratory-scale.

Chapter 19 refers to the effect of acid rain on wheat plants. The authors have presented results on simulated acid rain studies on a split plot under standard conditions of humidity and temperature. It is an exhaustive study recording the morphological parameters of two plant species, viz. *T. aestiumm*, CVM 213 and Sonalica varieties. Using acid rain of pH 5.6, 4.5 and 3.0, the authors were able to quantify the yield reductions also. Such studies are important to understand the impact of acid rain on plants. More investigations are needed on a variety of plants. Probably, the yield quantity is also an important factor which could have been studied.

Section II is a collection of invited papers on pollution monitoring, assessment and solutions. Chapter 20 addresses these problems. Unfortunately, the paper does not contribute any additional knowledge. Environmental legislations, legal framework, pollution abatement policy and governance are briefly described in the next chapter. Details of ISO 14001 and 14031 are described in the next two chapters, which again disappoint in terms of contents. The same is true of the monitoring of man-made pollutants and environmental audits described in the next two chapters. Only elementary considerations are described in chapters 26, 27 and 29 on environmental health effects, role of monitoring and population explosion and pollution. On the other hand, chapter 28 on ozone depletion is somewhat up-to-date within its technical concepts.

However, all this is not to say that the matter presented at the symposium is of poor quality. It is quite possible that the deliberations of the symposium might have contained state-of-the-art information, but when converted into the book form the value of the symposium stands diminished. Some typing and printing mistakes are also seen, but they are few and far between. I would recommend the book to libraries for keeping track of air pollution research in India.

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In Vitro Plant Breeding 2002. Acram Taji, Prakash Kumar and Prakash Lakshmanan (eds), Food Products Press, An Imprint of Haworth Press, 10 Alice Street, Binghampton, NY13904-1580, USA. 2002. 167 pp. Price not mentioned.

In Vitro Plant Breeding is one among several books published in this area of intense research. However, what makes it special is its attempt and approach at filling in the gap in understanding among the mushrooming number of molecular plant breeders. The emergence of plant biotechnology has resulted in the required impetus to the area of plant molecular biology. Yet what is often overlooked is that the success to genetically engineer plants with desired traits depends entirely on one's ability to regenerate plants from the transformed cells/tissues. Thus, for the modern-day plant breeder this book will form an integral source of the basic concepts of plant tissue culture and its applications, and complement the conventional methods of plant breeding.

This text serves multiple purposes. It serves as a reference book for the undergraduate students, highlighting the basic principle and the application of a diverse array of topics. It also acts as a guide to more experienced researchers in the areas of traditional plant breeding and modern molecular biology, wanting to learn the potential and applications of various *in vitro* tools and techniques.