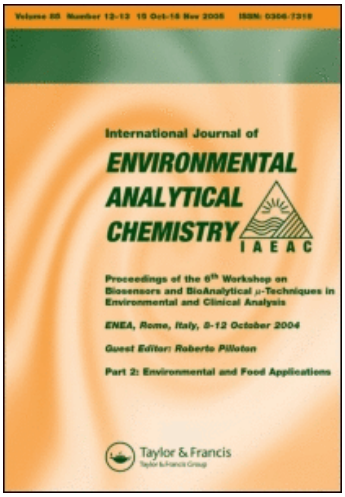

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BOOK REVIEWS

Plant Stress From Air Pollution, *by Michael Treshow and Franklin K. Anderson, University of Utah, U.S.A.*, 283 pages (including 18 figures, 17 tables, 31 pages of references (and suggested reading added to the chapters), two appendices on scientific names of plants and on conversion of concentration units, and a good index of 14 pages), format 236 × 157 mm, hard cover, ISBN 0-471-92374-5, John Wiley & Sons, Chichester New York Brisbane Toronto Singapore (1989), £39.00.

The useful volume starts with some botanical background and addresses the origins of air pollution. Problems began in the cities, most notably when they were based on industry. Sulfur dioxide from coal smoke and industrial stacks found to be the main pollutant killing the lichens, and, in many areas, the forests as well. Later fluorides caused problems wherever soils or ores that contained them were processed. Beginning in the 1950's research has been addressed to photochemical air pollution, including ozone and oxides of nitrogen. But we still lack precise data of the concentrations and exposure periods that cause a given effect, and information on interactions (synergistic to mitigating) of the many climatic, soil and other potential abiotic and biotic stress factors. Other trace pollutants—such as pesticides, mercury compounds, and hydrogen sulfide—are important in local situations, but the book concentrates more on regional and global risks, including problems with carbon dioxide, methane fluorocarbons and stratospheric ozone. Natural atmospheric processes including "Greenhouse" effects and potential impacts on plants are thus covered, as well as forest decline, tropical subjects related to air pollution, and reduction in crop yields. Responses of plants to air pollution—from the molecular level through organismal and ecosystem responses—are discussed, and the book is thus of interest to non-specialists, to decision makers in regulating agencies, and to those who have already many answers. As quite often, it is however a certain disadvantage that the language barrier prevented from the introduction of many important newer references of European scientific publications.

The very good review includes after the introduction and before the air quality standards and the prospects 14 chapters on plants and damage to plants, lichens (study barometers), the early days, effects of sulfur dioxide and heavy metals, origins and effects of fluorides, smog (the discovery of PAN as a photochemical pollutant), ozone as an air pollutant, ozone research and discovery come of age, air pollutant interactions, environmental interactions, forest decline and acid rain, ecosystem responses, natural atmospheric processes, and the costs of air pollution damage. For instance in the chapter on forest decline and acid rain climatic factors, acid rain and

fog, nutrient relations, biotic pathogens, and gaseous pollutants are discussed as causes. The bark beetle is only mentioned very shortly, whereas interactions with fungi are better described.

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Reviews of Environmental Contamination and Toxicology, Volume 114, *edited by George W. Ware, College of Agriculture, University of Arizona 85721, Tucson, U.S.A.*, 171 pages (including 1 figure, 33 tables, references added to the four contributions, and an index of 9 pages), hard cover, format 237–156 mm, ISBN 3-540-97207-2, Springer-Verlag New York Berlin Heidelberg London Paris Tokyo Hong Kong (1990), DM 90.00.

This volume contains again four reviews: the first one on cadmium inhalation and reproductive toxicity has been written by H. A. Ragan and T. J. Mast, Experimental Pathology Section, Battelle Pacific Northwest Laboratories, Richland, Washington 99352. Because the retrospective presentation of the published literature (mostly of the 1970's) contains 15 pages only, it is rather an introduction to the topic, and the new important European studies are practically not mentioned. Pharmacokinetics, target organ toxicity, inhalation exposure, developmental toxicity, effects on development of the male reproductive system, and carcinogenicity are discussed in some detail.

George Ekström and Malin Åkerblom, National Food Administration, S-75126 Uppsala present many tables on pesticide management in food and water safety (international contributions and national approaches), including informations on importance, on risk classification, on restrictions, on acceptable daily intakes, on residue limits, and on monitoring.

The longest contribution on illness, injuries, and deaths from pesticide exposures in California 1949–1988 (of 66 pages) origins from Keith T. Maddy *et al.*, Californian Department of Food and Agriculture, Sacramento, California 94271–0001, U.S.A. The chapters and the tables deal with factors to consider data, with estimates and with incidents. Interesting figures for disinfectants, sanitizers, sulfur, oils and distillates, and adjuvents—often not included in reports—are also presented. Occupational illness/injury cases are compared with suicides (about 1/4 with arsenicals), homicides and undetermined causes. Systemic symptoms play a great role. Possible cancer induction, developmental effects, and reproductive effects are however not discussed.

Finally Kenneth P. Bentson, USDA Forest Service, Corvallis, Oregon 97331 analyses the fate and dynamics of xenobiotics in foliar pesticide deposits. A very interesting table of five pages (with many references) is included on conditions and factors investigated that bear on the environmental fate of herbicides deposited on foliage. The author discusses compartments of leaf-deposit-air system, modelling, foliar penetration, volatilization, and photodegradation. Of special value are the six

pages of references of literature (up to 1988). The very important review bridges particularly the gap related to the disposition of pesticides in foliar deposits.

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Polychlorinated Dibenzo-Para-Dioxins and Dibenzofurans Icps/WHO, *Environmental Health Criteria No. 88, by a Task Group under the Chairmanship of Prof. A. D. Dayan, St. Bartholomew's Hospital Medical College, London, U.K.*, 409 pages (no figures, including 73 tables, 79 pages of references, a French summary, but no index), paper back, format 210 × 140 mm, ISBN 92-4-154288-8, World Health Organization Publications, CH-1211 Geneva 27, Switzerland (1989), SFr. 40.00, US$32.00.

The well-balanced and well-analyzed publication (more than 800 studies were critically assessed) is structured into the twelve chapters

—Identity, Physical and Chemical Properties, Analytical Methods

—Sources of Environmental Pollution

—Environmental Transport, Distribution, and Transformations

—Environmental Levels and Human Exposure

—Kinetics and Metabolism of 2,3,7,8-TCDD and other PCDD's

—Effects of TCDD and other PCDD's on Experimental Animals and in-vitro Test Systems

—Effects of PCDD's on Human Beings—Epidemiological and Case Studies

—Toxicokinetics of PCDF's

—Effects of PCDF's on Animals

—Effects of PCDF's on Human Beings

—Evaluation of Health Risks from the Exposure to Chlorinated Dibenzo-p-dioxins (PCDD's) and Dibenzofurans (PCDF's)

—Evaluations by International Bodies and the Concept of TCDD Equivalents

These compounds are not produced intentionally, but are formed as an undesired side reaction during many reactions, including incineration. Regarding analytical chemistry sampling strategies, sampling methods, extraction procedures, sample clean-up, isomer identification (including preparation of analytical standards), quantification, and confirmation are well discussed. Biodegradation, metabolic transformation, systemic effects of PCDD's in humans, toxicokinetics of PCDF's, and human body burdens and kinetics are carefully explained, but this information is unfortunately spread arbitrarily over several chapters and therefore difficult to find, all the more the differentation between animals and humans complicates literature research. This is also true for the various effects, and one really misses an index. It is for instance difficult to find the relevant information on mechanisms with Ah receptors, but the authors conclude anyway that dose/effect relationships in human

beings cannot be determined, and no clear-cut persistent systemic effects other than chloracne have been observed. Other consequences of poisoning in animals may be failure of normal growth, keratosis, epithelial lesions, immunosupression, reproductive and teratological effects, effects of vitamin A deficiency, and may be some incidence of hepatocellular carcinoma. Of particular value are the recommendations on p. 304/305, which deal also with validation, and needs for further studies, also because humans are often exposed to complex mixtures.

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Advances in Soil Sciences, Volume 9, *edited by B. A. Stewart, USDA Conservation and Production Research Laboratory, Bushland, Texas 79012, U.S.A.*, 219 pages (including 66 figures, 27 tables, references added to each contribution, and an index of five pages), hard cover, format 242 × 162 mm, ISBN 3-540-96781-8, Springer-Verlag New York Berlin Heidelberg London Paris Tokyo (1989), DM 154.00.

The series fills a gap between scientific journals and comprehensive reference books. This forum allows to develop and identify principles that have practical applications to agriculture. The importance of scientific information is assessed and additional research needs are identified. Each contribution includes an introduction and final comments. Half of the valuable volume is dedicated to a review by I. Shainberg (Bet Dagan, 50250 Israel) and co-authors from the U.S.A., South Africa and Brazil on the use of gypsum on soils. In semi-arid regions and in equatorial tropics the mineral is a calcium source on legumes and a soil conditioner on sodic soils (among other consequences by lessening runoff and erosion). On acid soils fertility in subsoil is improved. On the other side gypsum may have a depressive effect on root proliferation of some crops. Further research is needed to clarify processes, although insight has already been gained for instance on calcium/aluminum interactions.

The other half of the book contains three interesting contributions:

—Heavy Metals in Soils and Their Environmental Significance, by K. G. Tiller, Glen Osmond, South Australia 5064

—The Use of Extractants in Studies on Trace Metals in Soils, Sewage Sludges, and Sludge-treated Soils, by P. H. T. Beckett, Oxford OX1 3PF, Great Britain, and

—Using Soil Survey Data for Quantitative Land Evaluation, by J. Bouma, NL-6700 AA Wageningen, The Netherlands.

Especially the third-last and the second-last reviews are significant for environmental and analytical chemists, and for ecotoxicologists. K. G. Tiller has especially discussed cadmium, lead and zinc pollution of soils, particularly their sources, mobility, transfer, and effects on biological activity. Valuable summarized additions on the evaluation of long-term effects (with five complex interacting factors) and legislative approaches have been made. It is recommended to couple information on analytical soil data with critical soil factors. The author discussed for instance cadmium concentrations in fertilizers, mobilization, and uptake by plants.

P. H. T. Beckett insists in the importance to know the principal forms of combination of extractants and the likely transformations of these combinations for the prediction of the long-term fate of trace metals, particularly when "specific sites" are saturated and bioavailable forms are thus more likely. With specific extractants—the author distinguishes 23—combination forms of trace metals in sludge or soil may be identified. In a very systematic way he discusses the main effects of specific extractants, but more effort is still required to develop optimum extractants. Reimmobilization—e.g. of iron—must also be considered. Perhaps additional ultrasonic dispersion could be helpful. Final recommendations are not made (and some conclusions within the European Communities or by Dr. Eugen Häni (Liebefeld, Switzerland) are not yet discussed). The results of the 1st and 2nd IAEAC Soil Residue analysis Workshops in Winnipeg (8–10 August 1988; Proceedings International Journal of Environmental Analytical Chemistry 39(1/2), 1-208, 1990) and in Lausane (11–13 March 1991) must also be considered.

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Immunochemical Methods for Environmental Analysis, *ACS Symposium Series No. 442, edited by Jeanette M. van Emon, U.S. Environmental Protection Agency, Las Vegas and by Ralph O. Mumma, Pennsylvania State University, University Park, Pennsylvania*, 229 pages (including 65 figures, 36 tables, references added to the chapters, and a subject index of 8 pages), hard cover, format 234 × 159 mm, ISBN 0-8412-1875-7, American Chemical Society, Washington, D.C. 20037 (1990), US$ 49.95.

This volume, which is urgently needed summarizes the results of an ACS Symposium held at the 198th National Meeting in Miami Beach, Florida, to which fifty American, Canadian, German, and Swiss authors contributed. After an introduction on antibodies the 18 chapters are structured into three parts

—Immunoassay Evaluation Guidelines

—Academic Advances in Immunoassay Technology

—Academic Activities in Industry.

The case studies are mainly directed to agriculture and food, that is to say to the identification and determination of pesticides, antibodies and hormones, and their metabolites.

The book fulfills the need for an update on important technological advances in the use of antibodies as analytical reagents and for a basic understanding of the methods. Rapid, sensitive, and cost effective analyses for a variety of environmental contaminants are provided, but concerns such as data quality, availability of specific antibodies, reagent stability, and methods evaluation must be addressed to gain widespread acceptance. The regulatory community must thus be versed in the advantages and limitations of immunochemical methods. Nevertheless immunochemical technology is rapidly advancing in many areas: development of field-portable

formats, specific antibody generation, detection systems, quality control, and quality assurance measures. Recent advances such as the production of antibody binding fragments in genetically engineered bacteria and the monitoring of hapten-antibody interactions in anhydrous organic solvents will be of practical use in the future development of immunoassays. Immunoassays for lipophilic water insoluble molecules may be carried out in anhydrous organic solvents, too.

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Identifying and Regulating Carcinogens, *by the Office of Technology Assessment Task Force, Congress of the United States, Washington, D.C.*, 249 pages (including 8 figures, 41 tables, four appendices on the Statutory Authority for Regulating Carcinogens, Chemicals Listed in Annual Reports on Carcinogens and NCI/NTP Test Results, Acknowledgements, and Acronyms, and 15 pages of references), hard-bound, format 268 × 211 mm, ISBN 0-87371-152-1, Lewis Publishers, Inc., Chelsea, Michigan, U.S.A. (1988), £29.65.

The Office of Technology Assessment (OTA) was created in 1972 as an analytical arm of Congress. OTA's basic function is to help legislative policy-makers anticipate and plan for the consequences of technological changes and to examine the many ways, expected and unexpected, in which technology affects people's lives. In fact, there is an interest of many Federal agencies, programs, and activities in reducing and preventing exposures to carcinogenic chemicals, and therefore in regulating food additives, drugs, consumer products, occupational exposures, air and water pollutants, drinking water contaminants, pesticides, toxic chemicals, and hazardous wastes. In the publication the necessary differentiation among hazard identification, risk characterization, and risk management is described. A concise focal point for the scientific, technical, and lay reader seeking to understand the current Federal position on carcinogen identification, testing, assessment, and regulatory requirements is given. After the Introduction and the Summary, the volume is thus structured into the four chapters

—Policies for Testing, Assessing, and Regulating Carcinogens

—Federal Agency Assessment and Regulation of Carcinogens

—The National Toxicology Program

—Agency Responses to the Annual Report on Carcinogens and NCI/NTP Test Results.

The lists of identified and potential carcinogens (with interpretation), the test design issues, and the critical evaluation of test methods are of great value. The influence of "Lifestyle" factors is also discussed, but one misses comparisons with foreign approaches.

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