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BOOK REVIEWS

North American Terrestrial Vegetation: edited by M. G. BARBOUR and W. G. BILLINGS, University Press, Cambridge, 1988. 434 pp. $49.50.

This is a straightforward review of the plants and vegetation of the North American Continent from the Arctic North through the rockies and the prairies to Mexico and Costa Rica. It has been achieved by dividing the Continent into some 13 geographical zones (e.g. chaparral, arctic tundra, etc.), each commanding a separate chapter. Inevitably there is some overlap in the vegetation represented in these zones but this does not lead to repetition since the editors have carefully monitored the individual contributions. The only omission is a summary chapter, focussing on the vegetation of the entire continent—an awesome task considering the enormous range of habitats and the species diversity and one which the editors have perhaps wisely not attempted. There are a number of black and white illustrations printed on the same paper as the text but these do not really do justice to the magnificent flora. Forest canopy scenes come out reasonably well but desert landscapes suffer most from the lack of definition.

While written primarily for an ecological audience it should be of interest to other plant scientists as well. There are many biochemical problems awaiting solution in particular habitats. For example the relative infrequence of C4 or CAM compared to C3 plants in the Californian deserts is surprising and deserves further study from the photosynthetic point of view. Again, there is evidence of allelopathic effects in the suppression of growth of annuals by shrubs in the chapparal, but more work is needed on what is still a largely unsolved mystery. In some regions the allelopathic effects are complicated by the outbreaks of fire and the regeneration of vegetation after such fires is another fascinating phenomenon deserving biochemical and physiological investigation. Finally, the sheer wealth of plant species in any given geographical zone is still a challenge to North American phytochemists; it is doubtful whether more than a few per cent of species have been examined properly for their secondary constituents up to the present time.

School of Plant Sciences, University of Reading JEFFREY B. HARBORNE

Gas Chromatography and Lipids: A Practical Guide: by W. W. CHRISTIE, The Oily Press, Ayr, Scotland, 1989. £30.*

This book is the latest offering from Bill Christie—an author who is well known as an expert (and author) on lipid analysis. It is also the first product from a new (and appropriately named!) publishing house. For these reasons I read the volume with great interest.

At first sight it seems unusual to have a book in which analysis is based on one technique. However, this allows an in-depth treatment which would not be possible otherwise. Since the analyses described and techniques detailed apply to lipids, then the various examples given seem relevant and do not end up as a mere catalogue of results. In the main opening chapter, in particular, Christie gives enough information about ancillary or preliminary methods to allow the (final) GC analysis to be seen in context.

All the obvious aspects of GC seem to be covered. A first part gives a clear and quite comprehensive description of basic fatty acid and lipid structures as well as including details for extractions of lipid classes. This is followed by a chapter describing the theory of gas chromatography, the types of instruments and details of their parts (detectors, injector systems etc.).

The remainder of the book is divided into two sections—dealing with the analysis of fatty acids and of lipids other than fatty acids. Within the former section are chapters on the preparation of (volatile) derivatives, of the gas chromatography (GC) of such derivatives, the use of spectroscopic and chemical degradative methods and the use of GC-MS. There is sufficient detail within the various parts of this section for someone to identify properly fatty acids without recourse to other analytical texts.

The section on lipids other than fatty acids contains two chapters on methods for separating molecular species as well as a closing chapter on the separation of particular lipids or products (fatty alcohols, ether lipid products, cholesterol, glycerol, long chain bases) by gas chromatography. The sections on molecular species are up-to-date and very comprehensive but the section, as a whole, is much less complete than that on fatty acids. The researcher needing advice on complex lipid separation, identification and quantification would probably have to refer to other books for more details. Nonetheless there is much sound advice to be gained here also.

Now to some criticisms. I was disappointed by the appearance of the text in many places. The format and

*May be ordered directly (post free) from Oily Press, 36 Woodend Road, Alloway, Ayr, Scotland KA7 4QR.

style has an 'old-fashioned' look which detracts from the thoroughly modern and up-to-date advice given. Some of the typeface—e.g. Greek letters in Tables—is very unusual and distracting. In particular the many figures are poorly reproduced. Some are not straight on the pages, many of the lines have been printed too thick and in some structures it is difficult to distinguish points of detail such as double bonds. It is a great pity that such a well-written and useful book is spoilt by poor publishing. It is to be hoped that further offerings from The Oily Press are improved in that regard.

In summary, this is a very useful and comprehensive book which should be added to every laboratory's bookshelf. Full marks to Bill Christie for his writing but 'please try harder' for the publishing.

Dept. of Biochemistry, University of Wales College of Cardiff. JOHN HARWOOD

Nitrogen Fixation With Non-Legumes: edited by F. A. SKINNER, R. M. BODDEY and I. FENDRIK. Volume 35 in the series **Development in Plant and Soil Sciences.** Kluwer Academic Publishers, Dordrecht, 1989. 336 pp., £65.

This book is a collection of the papers presented at The Fourth International Symposium on Nitrogen Fixation with Non-Legumes held in Rio de Janeiro, 23–28 August 1987 organised jointly by groups in Brazil and Hannover. The 36 papers are grouped into 10 sections corresponding to the sessions at the Symposium.

In the opening paper, Janet Sprent and S. M. de Faria compare the mechanisms for the infection of plants by nitrogen fixing microorganisms, noting a striking similarity of intercellular infection processes between rhizobia and *Frankia*. In the second section the host specificity of *Frankia* isolates, and the ultrastructure of *Frankia* strains isolated from three species in the Rhamnaceae are presented. All members of this family except for *Adolphia* will nodulate with *Frankia*. Another paper reviews the work on *Parasponia* (Ulmaceae; Urticales), a pioneer species with considerable agronomic importance which is the only non-legume to be susceptible to *Rhizobium*. The third section concerns the aquatic fern *Azolla*, which is grown as a green manure for rice in China. This forms an association with *Anabaena*, a blue-green alga, various strains of which have now been isolated. Several aspects of the algal/fern symbiosis have been studied and a structural function has been suggested for the mucilage secreted by the bacteria found in the leaf cavities. It is now possible to produce *Anabaena*-free *Azolla* and reinfection can be achieved with new strains of the alga. Section four concerns the root associated nitrogen fixing bacteria, notably *Azospirillum*; a new osmotolerant strain of *Klebsiella*, and a new species of *Acetobacter* isolated from sugar cane which tolerates a very low pH. Sections five and six include the physiology and genetics of *Azospirillum* and of other diazotrophs, and section seven considers the association of nitrogen fixing bacteria with roots of kallar grass, sorghum and rice. The following section reviews the response of crop plants to inoculation with *Azospirillum*. The effect of *Azospirillum* inoculation under field conditions in terms of yield which is the subject of section nine is variable and often rather disappointing, though very encouraging results were obtained by Indian workers. Obviously a greater understanding of the factors affecting the plant/diazotroph interactions is necessary for further progress in agronomic exploitation. The final section concerns the effect of genotype and of the environment on associative nitrogen fixation.

The book is well presented and contains many high quality photomicrographs. A general summary is provided at the end, together with a list of the 40 posters by author and title which were also presented at the meeting. It is especially useful to have the titles of the articles cited in the references. Although the published proceedings have taken 18 months to appear in print, this book should be invaluable to all concerned in the investigation of nitrogen fixation. Prospective purchasers should bear in mind that the book is printed in large format (20 × 27 cm). It is to be hoped that the high price will not make this book unavailable to researchers in the third world where the utilization of the knowledge which it contains could have the greatest impact.

Long Ashton Research Station, Bristol. TERENCE A. SMITH