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.

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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.

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