

Book Reviews

Advances in Nitrogen Fixation Research. Edited by C. VEEGER and W. E. NEWTON.
Pudoc, Wageningen: Martinus Nijhoff/Dr W. Junk. 1984. 782 pages.
US \$87.50. ISBN 90 247 2906 8.

The organizers of the conference, the editors and, not least, the publishers are all to be congratulated on the speedy production of this account of the proceedings of the 5th International Symposium on Nitrogen Fixation. One can think of similar volumes that have taken two or three years to produce, and the issue of this after four months shows what can be done.

It must be expected that such expedition would be achieved at some cost and we should not therefore expect perfection. The book is produced by photoreproduction of the typescripts. This is well done and the figures in the text are clear and well produced. There is an author index but no subject index. Neither is there a full table of contents, but with the synthesis papers and the poster paper abstracts grouped together under the different subject headings this has been found to lead to no difficulties. The whole of one section of poster papers is not represented in the author index, a fact of which it is well to be aware.

A useful feature of the book, in most cases, is the brief account of the poster discussions that precede each group of poster abstracts. On the whole the poster abstracts are of sufficient length (one page) to be useful, but with over 340 given there is bound to be variation in quality.

The presented papers were slightly disappointing. The reason for this is that they were rather short, they average about 10 pages each and suffer in comparison with the rather longer articles published after previous nitrogen fixation meetings.

The topics treated are the same as in previous volumes arising from this series of meetings though the amount of material on each topic is different from that which has gone before. The chemistry of nitrogen fixation is given relatively little space due to the lack of poster papers on this subject. The nuances of the chemistry of dinitrogen transition metal complexes and of the chemistry of the FeMo cofactor are beyond the reviewer; but, as it is intimated in the discussion of the poster papers that substantial progress has been made over the last two years, one must assume that here is material of interest for those with the background to appreciate it.

The section on the enzymology of nitrogenase is better supported, and although questions are still not answered more ideas are produced and theories put forward to explain the known properties of the enzyme. Because of the complexities of the enzyme structure and of its mode of action, proofs are hard to come by but the Sussex group, as well as producing an interesting computer model based on the kinetics of *Klebsiella* nitrogenase reactions, also provide additional evidence that the stoichiometry of the reaction is one hydrogen produced for each nitrogen fixed. The conclusion that can be drawn from this is that it is highly likely that hydrogen evolution is an essential part of the reaction sequence, and thus attempts to reduce hydrogen evolution further are not likely to succeed.

The physiology of nitrogen fixation is discussed in several sections, that of the free-living diazotrophs being separated from the symbiotic systems. There are also sections dealing with the ecology of diazotrophs. The physiology papers concentrate on oxygen protection, hydrogen metabolism and energy requirements. In connexion with oxygen protection the recent discoveries of haemoglobin in *Casuarina* nodules and *Parasponia* nodules are dealt with, and the implications with regard to the evolution of these proteins are the subject of interesting comment.

The main concern of research, since it costs money, is with the investigation of nitrogen-fixing systems that are of economic benefit. Investigations of systems that are out of the way can sometimes produce information of use in understanding those with more economic benefit. Papers on stem nodules and nodules on cycads are there and are to be welcomed. The amount of effort still being expended on the understanding of *Azospirillum* associations is however surprising. This research has been going on some time now, and though it has its interest no one has so far shown it to be of economic importance; yet there are 38 contributions concerned one way or another with this organism. They do not dispel the view that, economically, *Azospirillum* associations are of no account. The group that is of more importance, the woody non-legumes, was much more poorly supported with only 14 contributions. It is however clear from the presentations that now *Frankia* can be cultured, great strides are being made in this part of the subject.

The evidence for lectins being concerned in the primary recognition events in plant microbial interactions has always been best for the legume-*Rhizobium* association, and a section on recognition provides further evidence on this point. There is also evidence in this section and elsewhere in the book that other bacterial polysaccharides than those concerned with lectin binding may have an effect on the initial stages of infection.

In relation to previous symposia there is a larger emphasis on the genetics of nitrogen fixation with sections on the host genetics, the genetics of free-living diazotrophs and of the microsymbionts. The genetics of the free-living diazotrophs is mainly concerned with the interaction of the nitrogen control genes *ntr* and the *nif* genes. This makes an interesting if complex story. The understanding of this is not helped by the fact that agreement does not seem to have been reached with regard to the nomenclature of some of these genes. Thus we have in one paper *glnF(ntrA)* and in the following paper *ntrA(glnF)*. The identification of the nodulation and nitrogen fixation genes on a plasmid in the fast-growing rhizobia, together with the technique of transposon mutagenesis, has led to rapid progress in the understanding of the genetics of rhizobia in relation to nodulation. The fact that there are over 40 contributions on this topic shows that it is a focus of interest to geneticists. There are few offerings dealing with the genetics of the slow-growing rhizobia, where the genes appear to be on the chromosome. But the presence of a very large plasmid cannot be ruled out at the moment, and everyone will be relieved when the whereabouts of the genes in these organisms are finally decided.

All in all there are good things in this book whatever one's speciality within the subject. The very great merit of this book is its immediacy, and for those who wish to get or keep up with the latest research in nitrogen fixation it will be very useful indeed.

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Banbury Report 14. *Recombinant DNA: Applications to Human Disease*. Edited by C. T. CASKEY and R. L. WHITE. Cold Spring Harbor Laboratory. 1983. About 375 pages. \$55 U.S. (\$66 outside U.S.) ISBN 0 87967 214 6.

The Banbury Report series started a few years ago as the records of small and select meetings on biological subjects, with emphasis on the real and potential dangers of environmental agents to human genetic material. The first thirteen Reports followed this general plan quite closely; Number 14 breaks new ground by plunging directly into one of the most exciting and fast-moving areas of modern biology, the application of the new recombinant DNA technology to human genetic and quasi-genetic disease. The meeting was held in October 1982, and the contributed papers together with full transcription