

chapter on the special problems of the insect egg, and just sufficient on the physics of evaporation and the physical chemistry of water transport to point the pitfalls over which serious errors have been made. Professor Edney has achieved a good balance between the representation of insects and the other land arthropods; he has integrated his own considerable research contribution without undue prominence or modesty, and has given proper credit to discovery regardless of its date. This is a valuable reference book, particularly for the tabulation of facts from a scattered literature. Having set out the various theories under each main heading, the author is content to cast his vote in favour of those at present most convincing, and to indicate in a coda to each chapter where the larger gaps in our knowledge remain.

If there is a disappointment, it lies in finding that the chapter headed "Conclusions" is but a summary of the preceding text, in which water loss and

uptake has been considered system by system. But many physiological systems other than those selected for special study in the book, change significantly with the animal's state of hydration; it is a remarkable feature of the insect that it can tolerate huge fluctuations in internal water. Its behaviour changes and its response to its environment is mediated through its humidity receptors. Some of these matters are mentioned briefly in the general text, but one feels that if the book had ended with an essay integrating the material into a consideration of the whole organism, what is unquestionably a valuable review without current rival, would have become an outstanding biological treatise.

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Gas-phase energy transfer

Vibrational and Rotational Relaxation in Gases. By J. D. Lambert. Pp. 142. (Oxford University: Oxford, London and New York, 1977.) £8.75.

PHYSICAL CHEMISTS and molecular physicists have studied how energy is transferred in intermolecular collisions for many years. In the past decade, this interest has been intensified by the development of a variety of molecular gas lasers, whose operation depends on processes of vibrational and, to a lesser extent, rotational energy transfer between the species in the laser media. Not only has the development of such lasers provided an incentive for much basic research, but also the lasers themselves have provided the means to carry out some of this research, through their ability to excite molecules to specific energy levels for direct studies of 'state-selected' processes.

Although the topics of vibrational and rotational relaxation have been reviewed frequently during the past ten years, all the books on these subjects precede the laser era. Some of them, especially Herzfeld and Litovitz's classic, *Absorption and Dispersion of Ultrasonic Waves*, will continue to be valuable, but this is an appropriate time for a new survey of the field, especially as the application of fixed frequency lasers to the experimental study of energy transfer has reached maturity, whereas only very limited use has been

made, so far, of tunable coherent sources

Few people are better fitted to provide a comprehensive review of gas-phase energy transfer than Dr Lambert. In this monograph, he sets out to provide a clear and concise account of the current state of experimentally derived knowledge. Although the book could be read profitably, and without undue difficulty, by advanced undergraduates, it is unlikely to find a large market here, as few universities offer courses in this subject. On the other hand, it does provide an excellent introduction for postgraduate students starting on research in energy transfer, and it will also be read with benefit and enjoyment by more senior researchers.

The introductory chapters give a simple discussion of molecular collisions and review the major experimental techniques. The three main chapters of the book cover vibrational-translational, vibrational-vibrational, and rotational-translational energy transfer. Here the author demonstrates a sure grasp of his subject. A number of systems are chosen for special consideration. Theory is not emphasised, but the systems are carefully selected, and discussed in sufficient detail to bring out clearly those factors, in the intermolecular potential and collision dynamics, that are chiefly responsible for the observed rates of energy transfer. Overall, this book provides a lucid account of an active field of research and it will be widely read.

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Seed pathology

Seed Pathology. By Paul Neergaard. Vols 1 and 2. Pp. 1187. (Macmillan: London, 1977.) £60.

THIS is a valuable and comprehensive contribution which will have wide application as a reference work and practical guide for those concerned with seed pathology, especially those with a direct interest in seed health, disease control measures and seed health testing procedures.

Paul Neergaard is an internationally recognised authority and in this book he has brought together detailed information on seed-borne pathogens, their mode of infection and transmission, and on the subject of their control. Clearly, in writing this book the author had in mind the requirements of workers and teachers in developing as well as developed countries.

It is a pity that the book could not have been organised as a single volume, especially as volume 2 comprises only the glossary, references and index. These extend to no less than 347 pages. The value of the book would not have been seriously impaired with a less extensive glossary and index, and the possible omission of some of the less important references and excessive detail found in certain parts of volume 1.

Volume 1 has been organised in five parts. Part 1 (Pathogens—Diseases—Hosts), which comprises 10 chapters, is a compendium of seed-borne pathogens (including fungi, bacteria, viruses and nematodes) and other economic seed disorders, their distribution and reviews of their harmful effects. Other chapters deal with seed development and seed structure in relation to infection.

Part 2 provides extensive and detailed information on mechanisms of transmission, infection and spread, and on such aspects as the effects of environment on transmission, time of infection, entry and infection of seed parts, systemic infection, pathogenic specialisation, inoculum potential and epidemiological implications of host susceptibility.

The remaining three parts are concerned with the principles of seed-borne disease control, with details of control measures and procedures, and details of equipment notably for chemical seed treatment and seed health testing. The subjects of seed quarantine, tolerance levels and the forecasting of losses from seed-borne diseases are also discussed.

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