

## Purposeful drift of electrons

*The Diffusion and Drift of Electrons in Gases.* By L. G. H. Huxley and R. W. Crompton. Pp. xxiv+669. (Wiley Series in Plasma Physics.) (Wiley: New York and London, March 1974.) £19.60.

THE volume discusses the diffusion and drift of electrons in gases and little else. Dwelling only momentarily on any topics that may fringe the main theme, it concentrates without distraction on the high precision measurement of diffusion parameters and drift velocities primarily under low  $E/p$  conditions. Thus, for example, scant attention is afforded to transport phenomena under near breakdown conditions; the briefest of consideration is given to the Townsend coefficient; and ionisation and attachment are discussed with only moderate zeal. Indeed, the purpose of the measurements described is largely to provide an indirect and alternative technique for investigating low energy electron collision cross sections, yet even this topic is granted but one chapter at the end of the book and a more detailed and satisfactory account can be found elsewhere. In short then, this book is a powerful treatise on a very narrow subject.

The authors divide the book into two distinct parts dealing with theory and experiment separately. Most of the theory is developed from the Maxwell-Boltzmann equation and is concerned with the precise description of electron motion when a relatively small and constant electric field is present. Chapters are, however, devoted to high frequency fields and mixed electric and magnetic fields. A solitary chapter describing the alternative "free path" approach to the subject is a welcome addition to the section. The theory is developed rationally and the explanatory text is quite lucid. Thus, although the mathematical basis of this section may seem formidable to those not inclined in that direction (and most will find it a little tedious), it is an inevitable feature of the subject, and a more thorough or comprehensible alternative is probably not available.

The experimental section is mainly devoted to the techniques used to measure the basic transport parameters and these are discussed at considerable—perhaps too great—length. Though in precision measurements the experimental detail often distinguishes between success and failure, no reasonable researcher will embark on a new project without having consulted the original publications. In a review—as this book is best described—it is adequate and probably advantageous to

be a little less meticulous. Nevertheless, the value and clarity of the account presented is beyond dispute. Rather inconspicuous chapters concerning the application of transport data to cross-section investigations and measurements of other, less fundamental, transport parameters conclude the section.

The book begins with an interesting historical introduction to the subject as a whole and ends with a useful summary of experimental data on the transport parameters and cross sections for a selected variety of gases. It is reasonably well referenced throughout. About one quarter of the references refer to original publications of the authors. The book will be unquestionably of value to those few with a direct interest in the subject.

R. M. Bull



An unstuffed sneeze neatly captured, if not in a handkerchief, at least by high speed flash-illumination photography. From *Biology*: third edition. By John W. Kimball. Pp. xxiii+898. (Addison-Wesley: London, June 1974.) £5.35.

## Plants and pathogens

*Genetics of Host-Parasite Interaction.* By P. R. Day. Pp. xii+238. (Freeman: San Francisco and Reading, 1974.) £4.50.

IN the first two editions of their book *Fungal Genetics* J. R. S. Fincham and P. R. Day included a chapter on the genetics of pathogenicity; they omitted it from the third edition (1973) stating that the subject had become too extensive for adequate treatment in a single chapter. Dr Day has now remedied this omission with a book which includes both hosts and pathogens.

Chapter I provides a short introduction to the subject. In the remainder of the book theoretical arguments and practical results are brought together to provide a comprehensive review of recent developments in ideas on the genetics of resistance (chapter 2) and pathogenicity (chapter 3), the gene-for-gene concept (chapter 4), gene function in the host-parasite relationship (chapter 5), the genetical consequences of methods of disease control (chapter

6) and genetical aspects of parasite epidemics (chapter 7). The author describes his approach as speculative and at many points throughout the text gives alternative implications of theories and interpretations of results. These are always interesting and add greatly to the value of the book. The majority of examples are drawn from work on fungi but it is most useful to have many relevant references to work on other organisms. This is particularly the case in chapter 6 on biological and chemical control of plant disease where more experience has been obtained with insects than with other organisms.

The book contains over 600 references, mainly of recent origin; a most useful feature of the bibliography is that, after each reference, the numbers of the pages on which the work is quoted are given.

Use of the speculative approach makes chapter 5, on gene action, especially stimulating. In this rapidly developing area the contribution which genetic studies and the use of genetically controlled experimental material can make in helping to disentangle mere correlations from the true causes of disease resistance is emphasised. Theoretical models of gene action are described and their value in suggesting critical areas for study is illustrated. Similar value is attributed, in later chapters, to the production of computer programs for analysis of gene-for-gene relationships, permitting the assignment of genes for resistance to related groups which can then be studied more intensively with conventional methods; it is also suggested that computer simulation of disease epidemics can help to identify factors for which insufficient data are available from practical investigations.

Similarities in the problems caused by genetic variability, common to attempts to control many parasites, are clearly demonstrated. In some cases, however, the application of a method of disease control may have consequences which are not confined solely to direct effects on genetic variability of the parasite. One might, for example, argue that, although destruction of barberry plants in North America did not, as Dr Day says in chapter 3, eliminate genetic variation in *Puccinia graminis*, it affected the overwintering behaviour of the pathogen, necessitating annual movements of spores between north and south, delaying the arrival of inoculum to northern areas in spring and changing genetic aspects of the epidemic; a fitting example for chapter 7 perhaps.

The book will appeal to advanced students and their teachers as well as to research workers and I welcome it as a timely and concise addition to the literature.

R. Johnson