

relationship. There are but few slips in the book; but some readers will doubtless consider that the discussion starting on p. 14 as to whether the fetus of the mammal is to be regarded as a parasite involves stretching the meaning of the word parasite beyond legitimate biological limits. Indeed, it runs against the grouping of animal associations set out on p. 2, where parasites are placed in associations of animals belonging to "different zoological species".

This, however, is a minor point in a most interesting, readable and very useful book. It will appeal to specialists and general zoologists alike, and certainly should be read by all students whose courses include a consideration of animal parasitism. Even the lay reader will be able to follow its clear style without too much difficulty and find in it much that is of interest and thought-provoking.

ELECTRICAL BREAKDOWN OF SOLIDS

Dielectric Breakdown of Solids

By S. Whitehead. (Monographs on the Physics and Chemistry of Materials.) Pp. xv+272+18 plates. (Oxford: Clarendon Press; London: Oxford University Press, 1951.) 25s. net.

ONE may often read of the need for greater interest, in Britain, in the applied sciences and for a more widespread appreciation of their value in education and in industry. Indeed, it is sometimes almost possible to detect, even in authoritative articles, the reiterated outline of a standard complaint. There is, however, little doubt that more attention should be paid, primarily in universities, to applied physics, for example, and the well-known Oxford series of "Monographs on the Physics and Chemistry of Materials" is contributing notably to that end.

The present book, by Dr. S. Whitehead, director of research of the Electrical Research Association, is one of the latest additions to the aforementioned series, and covers as fully as possible in 272 pages the important subject of electrical breakdown in solids. This is apparently the only modern book of its kind and follows an earlier one written by the same author some twenty years ago.

The purpose of the book is to review recent fundamental work in a form suitable for physicists working in university, government or industrial laboratories. It will probably be little used at the present time by undergraduate students in most universities; but research students and graduates in general, working on the solid state, will find it of great value.

The author is an outstanding authority on his subject and, with his colleagues in the Electrical Research Association, has been responsible for many advances, especially in the study of the effects of small voids in solid insulation. It is therefore not surprising to find in the book a masterly, but necessarily condensed, treatment of the subject. The chapters deal with intrinsic breakdown, including a full treatment of the theory of breakdown in simple crystals, which is one of the most fundamental parts of the book; thermal breakdown; breakdown caused by discharges, external or internal to the solid dielectric; electrochemical deterioration; and, finally, dielectric breakdown in technical practice. It is, perhaps, surprising that more space was not devoted to surface sparkover, in view of its great

technical importance, even though this is not strictly a problem in breakdown of solids and is controlled greatly by the nature of the electrodes, which diminishes its attraction as a basic general problem. The description of the effects of internal discharges in dielectrics is particularly comprehensive. It seems unfortunate that, having achieved the impossible once, Dr. Whitehead should not have achieved it again by including even one or two chapters on breakdown in liquids.

The book has exceptional value in many respects, but perhaps especially in directing attention repeatedly to the lack of experimental data obtained in controlled and simplified conditions. This applies even to the relatively simple case of electrical breakdown in ionic crystals, and to the study of thin films, where the work of a very few investigators stands out. It is remarkable, as Dr. Whitehead's book so clearly shows, that such an important subject as the electrical breakdown of solids has attracted, with a few notable exceptions, such a small number of research workers. This excellent work should do much to stimulate others.

STATISTICS AND THE CHEMIST

Statistical Methods for Chemists

By W. J. Youden. (Wiley Publications in Statistics.) Pp. x+126. (New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1951.) 24s. net.

IN this short book, chemists are shown not only how to use statistical analysis but also why to use it and how to plan investigations so that numerical observations will be made to the best advantage. Dr. W. J. Youden writes as one of the few chemists who have studied and practised modern techniques of statistics: his book is full of the wisdom that comes from long experience of his subject-matter.

The book is elementary and well suited for a reader without previous knowledge of statistics. Theory and proofs are almost entirely absent, yet the logical basis of the methods discussed is always clear. The first chapter displays the need for proper statistical treatment of chemical data by showing—a favourite theme of mine—that often the man who refuses to use statistics is in reality using inefficient statistical methods when better ones are readily available. Subsequent chapters relate to the various concepts that enter into analysis of variance, regression analysis, and experimental design, together with short sections on sampling. In the main, the presentation is of the kind familiar in texts of biological statistics; but it takes on a distinctive character because the illustrations are drawn from chemical investigations. Dr. Youden rightly insists that a proper understanding of the functions of statistics in chemistry can be attained only by study of practical problems; he therefore puts before his readers a fine and varied selection of experimental data, largely from pieces of research with which he has been personally concerned. Especially valuable are the explanations of experimental designs and their uses. Dr. Youden gives an excellent introduction to incomplete blocks and complete and incomplete replications of factorial schemes; but the emphasis is on general principles rather than details of interpretation, and the chemist concerned with elaborate experiments would probably need further guidance from another book.