In the illustrations, of which most are good and many outstanding, the author has made good use of his skill with his camera and microscope. One cannot help feeling that some must have lost certain of the finer detail and acquired excessive contrast in the process of reproduction. It seems a pity, also, that some of them have been reproduced quite so small.

some of them have been reproduced quite so small. The publisher says that the book "is intended for those generally interested in the subject, as well as for the more serious student". For the former of these groups it should prove a useful handbook; for the latter a sound introduction which, however, they will outgrow before long. Mr. Clegg is to be congratulated on having done a difficult job with a very considerable measure of success. H. C. GILSON

INTRODUCTION TO QUANTAL STATISTICS

Éléments de physique moderne théorique

Par Georges Guinier. (Bibliothèque de la Science moderne.) 3 : Statistiques quantiques. Pp. 313-488. (Paris : Libr. Bordas, 1951.)

THIS book, the third and final volume of Prof. G. Guinier's "Éléments de physique moderne théorique", being largely independent of the preceding parts (which dealt chiefly with the quantum mechanics of atoms and molecules, see *Nature*, June 14, p. 983), forms a self-contained introduction to statistical mechanics.

In the first chapter the basic distribution laws of Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics are derived through the device of assuming each energy-level to be highly degenerate so that Stirling's formula can be employed. The procedure is partially justified by a nice numerical discussion of the translational energy-levels of a particle in a box, and is certainly the most suitable for an introductory book of this kind. Subsequent chapters deal with applications : first to the specific heats of solids and gases and then to black-body radiation and the theory of metals. In keeping perhaps with the strictly physical emphasis of the book, there is no account of the Bose-Einstein phase-change.

Within its scope, the book is reasonably ambitious and well planned. The chapter on the specific heat of solids contains a useful introduction to Brillouin zone theory, which is, of course, taken up again in the final chapter on the electronic theory of metals. This last chapter deals not only with electronic specific heat and thermionic emission but also with transport phenomena and the Wiedemann-Franz law. It is, however, somewhat surprising in view of the emphasis on spectroscopic aspects of the earlier volumes that rather little is said about the intensities of spectral lines; and polyatomic molecules are dealt with only very summarily.

Detailed criticism is perhaps out of place in a review of this kind, though the use of H for an electric field is sufficiently extraordinary to deserve comment, and there are other instances of none too happy notation. More serious, in my judgment, is the lack of references to primary sources (which was true also of the previous volumes). This is particularly unfortunate since not infrequently, particularly in the later sections, formulæ are quoted which are not derived in the text.

Nevertheless the book, with its freshness and vigour, is a useful addition to the literature not only

on quantal statistics but also on the electronic theory of metals. If, as is my opinion, it is more suitable for introducing a mathematician to theoretical physics than a physicist to theory (for the mathematics is somewhat uneven), that is not necessarily a serious defect.

The book ends with appendixes on the values of fundamental physical constants (derived from R. T. Birge's 1941 article) and a table of contents for all three volumes. G. S. RUSHBROOKE

ORGANIC CHEMISTRY FOR DEGREE STUDENTS

Textbook of Organic Chemistry

By Prof. Carl R. Noller. Pp. ix + 643. (Philadelphia and London : W. B. Saunders Co., 1951.) 29s.

OR nearly a century now the integrating theory FOR nearly a century now the inconstruction of organic chemistry has been the theory of gross structure, correlating the reactions and physical properties of organic molecules with the kinds of atoms present and with the order in which the atoms are bonded to each other in the molecule. This theory has been exceptionally fruitful and has led to the determination of the constitution of very complicated molecules and to the synthesis of hundreds of thousands of new compounds, many of which have important practical uses. Nevertheless, the development of the theory of the electronic structure of atoms and molecules has provided a more detailed picture of the nature of the forces holding atoms together, with the result that now it is often possible to give a consistent interpretation of the behaviour of organic molecules. Consequently, organic chemists are concerning themselves more and more with how organic reactions take place, that is, with the mechanism of reactions. It is these aspects of organic chemistry that Prof. C. R. Noller stresses in his new text-book. The introduction into basic text-books of organic chemistry of any consideration of reaction mechanisms has been very slow, and Prof. Noller is to be congratulated upon placing considerable emphasis on the explanation of physical properties and on the mechanism of organic reactions. It is most desirable that students graduating in chemistry and allied sciences should be acquainted with the current ideas and language of organic chemistry.

In the earlier chapters the student is introduced to the subject-matter gradually. No compound is used in the methods of preparation or in the reactions unless its structure has been discussed previously. For example, when alkanes and alkenes are first considered, no methods of synthesis are given. Instead, discussion of these procedures is delayed until the student is familiar with the methods of preparation and with the reactions of alcohols and alkyl halides. Reactions which are pedagogically bad, such as the halogenation of alkanes, are not presented until the student is able to see them in their proper perspective. Monofunctional aliphatic compounds are considered first, then monofunctional and polyfunctional aromatic compounds, and finally a return is made to polyfunctional aliphatic compounds. This progression permits the requirements of different students to be met by a single course. The text contains an amount of material that can be covered in ninety to one hundred lectures.