Laboratory Procedures

Progress in Microbiological Techniques. C. H. COLLINS, Ed. Plenum, New York; Butterworths, London, 1967. x + 231 pp., illus. $11.

Progress in Microbiological Techniques is another volume dedicated to presenting some of the techniques which have become commonplace in the microbiological laboratory. It is not a review of the progress made in developing new techniques in this field but rather an account of the current status of technology in the various facets of the science. A wide array of topics are included, as follows: "Complement fixation" (C. E. D. Taylor); "Fluorescent antibody techniques" (G. V. Heimer); "Freeze-drying methods" (D. W. G. Busby); "Assay of vitamins and amino acids" (S. A. Price); "Analysis of the bacterial cell" (A. C. Baird-Parker and R. C. S. Woodroffe); "Standardization of biological products by microbiological and serological methods" (P. B. Stones); "Gel diffusion and immuno-electrophoresis methods" (W. D. Brighton); "Yeasts and asexual fungi: some technical methods applying to their use in the brewing and antibiotic industries" (M. Richards); "Bacteriophage typing of *Staphylococci*" (Elizabeth H. Asheshov); "Recent advances in the bacteriological examination of water" (N. P. Burman); and "Serological methods in mycology" (A. G. Proctor).

Many manuals as well as books are already available wherein each of the above topics is dealt with more fully. Hence one might question the appropriateness of a short, single volume ranging from cytology to mycology to immunology. The virtue of the present volume may be in the very precise fashion in which the procedures are given. Numerous illustrations, protocols, and tabular data facilitate comprehension of the techniques.

Each chapter includes a substantial list of references which in itself is a valuable feature. Numerous citations are also made to sources of materials which are required for the performance of a specific procedure. This volume will, no doubt, provide a useful service to many individuals who find occasion to engage in areas of research outside their specific fields of specialization.

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Many-Body Method

A Guide to Feynman Diagrams in the Many-Body Problem. RICHARD D. MATTUCK. McGraw-Hill, New York, 1967. xii + 294 pp., illus. $10.50.

The purpose of this book, most concisely described by its preface, "is to help bridge the pedagogical gap by providing an easy introduction to just one aspect of many-body theory, i.e. the method of Feynman diagrams." It succeeds very well. A beginner in the field can learn just through a reading of it what the crucial terminology means, how to interpret a diagram and translate it into mathematical terms, and what classes of diagrams might be considered most important in certain systems. For example, a term such as "quasiparticle," which tends to confuse the novice continually subjected to it at colloquia, is given a very reasonable, understandable description. The concept of a propagator and its importance to the many-body problems are worked out in nice physical terms so that it becomes a believable entity, rather than part of the credibility gap between experimentalists and theorists. Familiar, important problems are worked out in the new language at appropriate points (the Hartree and Hartree-Fock theories, for example, are incorporated in the chapter on Fermi systems).

The organization is also sensible. The first few chapters give enough information and examples to let the reader go into the structure of occupation number formalism, the Dyson equation, and finite-temperature situations with a feeling of confidence—no small accomplishment in a subject that has intimidated those who would like to understand it without becoming specialists. The possibilities for classroom use should be rather wide. The book could easily be adopted in graduate solid-state physics courses as a good supplement to lectures and as a reference. With lectures on general field-theoretic methods it could be used as supplementary reading to provide an example of a practical application of the abstractions studied.

A word should be said of the style, which is communicative, good-natured, and occasionally amusing in a pleasant unphysics-like way (none of those dreary quotations from *Alice in Wonderland* that seem totally unrelated to the chapter headings they follow).

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Nuclear Reactions

Interaction of High-Energy Particles with Nuclei. Proceedings of the International School of Physics "Enrico Fermi," Course 38, Varenna, June–July 1965. T. E. O. ERICSON, Ed. Academic Press, New York, 1967. xiv + 330 pp., illus. $16.

The title of this course of lectures is somewhat misleading, since not all the material presented concerns the scattering of high-energy projectiles. The most attention is given to the study of elastic and inelastic electron scattering from nuclei, muon capture and muonic x-rays, hypernuclear physics, and some aspects of the theory of nuclear reactions at high energy.

The electron and muon are probes whose interaction with nuclei is well known. For these particles the interaction is weak, and the target structure effects are clearly separated from the description of the interaction mechanism. In the case of electron scattering or muon capture the experimental data provide a good deal of information concerning nuclear structure; properties such as electromagnetic transition rates and nuclear charge distributions are readily extracted from the data. In low-momentum transfer, elastic electron scattering determines the mean-square radius of the charge distribution, whereas high-momentum transfer experiments are sensitive to the charge distribution in the nuclear surface. The three-momentum transfer to the target may be varied for fixed energy loss of the electron; in this manner one can construct the Fourier transforms of the transition charge and current densities.

The study of the correlation structure of nuclei when distances between particles are small has been of continuing interest. In these lectures there is only a rather short treatment of this difficult problem. Some information concerning the influence of correlations on sum rules for electron scattering is presented by D. B. Isabelle. Other authors discuss the nuclear interactions involving an elementary particle and a pair of correlated nucleons.

It is somewhat disappointing that some of the recent work involving ap-