graphs that have been published have either ignored the changes in the formulation of the subject or have been rough compendia of papers from the literature. (Exceptions to this statement may be found in some of the more recent texts on quantum mechanics, in which very brief introductions to particle collision theory may be found.)

To fill this gap Goldberger and Watson seek, on the one hand, to provide the student with a more careful presentation of the physical description of scattering processes and, on the other hand, to provide the reader with a thorough exposure to the formal theory of scattering so as to enable him to read the current literature on the subject. The first aim is ably fulfilled in the first few chapters, using the language of wave packets. This formulation is most appropriate to particle scattering where the scattered particles are actually counted in finite-size counters. The remainder of the book is devoted to the second aim.

Following the introduction to the physical description, the formal theory of scattering is presented in detail, with some reliance on the previous, more physical presentation to clarify some of the more obscure points. The role of symmetry principles in scattering theory is also clearly presented and applied to the two-body problem, with both central and noncentral interaction forces. The presentation of the theory of the decay of unstable particles which follows serves to collect in a coherent form material that has been available only in the literature; some of the techniques developed here serve as a basis for a subsequent chapter on the detailed treatment of the scattering of systems of particles. The use of dispersion relations as an analytical tool in the treatment of scattering problems is then discussed in detail and applied to both nonrelativistic and relativistic problems, in particular, to the scattering of pi-mesons by nucleons.

Finally, a word of caution is necessary: this is not a book for the casual reader or the beginning graduate student. Its study, however, is a must for anyone interested in obtaining a greater insight into the theoretical description of collision phenomena. It is excellently written and will take its place with the other classics of the growing literature on physics.

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Molecular Genetics: An Introduction to Gene Action

Gene Action. Philip E. Hartman and Sigmund R. Suskind. Prentice-Hall, Englewood Cliffs, N.J., 1965. xiv + 158 pp. Illus. Paper, $2.95; cloth, $4.95.

The great and rapid changes that have occurred in certain areas of genetics during the last 20 years have made it impossible for any geneticist to keep up with even a small part of the advances being made in genetics. This has been particularly true of molecular genetics, however one may wish to define it. For the most part books and review articles covering this area have become outdated while in press. Now, however, signs of a plateau, not in cerebral and laboratory activity but in the rate of accumulation of significant basic facts that relate to the functioning of genes, are evident. The time has come to introduce gene action to the beginning student of genetics from the point of view of molecular genetics. This book, a volume in the Prentice-Hall Foundation of Modern Genetics Series, attempts to do just this, and it does it very well.

The authors present a well-written, clear discussion of protein structure and of protein synthesis as it is now believed to occur in vivo in cells under the dictation of DNA and messenger RNA. They also present clear descriptions of intragenic complementation and its probable significance, the current views of regulation of protein synthesis in microorganisms, the significance of the primary structure of proteins, and the current status of ideas and facts concerning the genetic code. The secondary consequences of gene action, as they are reflected in gene mutation, have been given short shrift, as has gene interaction; but this is understandable in view of the fact that the authors have made every attempt to present their analysis strictly from the molecular point of view.

The authors conclude with a short chapter on the application of the present knowledge of gene activity, as it has been determined in microorganisms, to problems, such as development, encountered in studying higher organisms.

The pedagogical value of this book, and of others of its type, remains to be tested by use in genetics courses. However, there is no doubt that it will enable any biologist who is not well acquainted with the field that it represents to obtain a logical, concise, authoritative description of our present ideas concerning gene action.

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Soils: Mineral Analysis, Morphology, Spatial Arrangement

Fabric and Mineral Analysis of Soils. Roy Brewer. Wiley, New York, 1964. xiv + 470 pp. Illus. $15.

This book, which is mainly an extension of the techniques of petrography to the descriptive study of soils (pedography), is a clear demonstration that the division of petrology and pedology into separate academic categories does not reflect any real barrier in the subject matter of earth science. Although intended mainly for students and practitioners of pedology, I strongly recommend the book to petrologists, for it puts the study of soils into a frame of reference with which they are familiar.

A third of the subject matter is concerned with mineral analysis; the remainder, with the morphology and spatial arrangements of soil features. Four chapters are used to summarize size, shape, and roundness of mineral grains, quantitative estimation of mineral proportions, and calculations of soil formation, mineral stability, and weathering. Much of this material is based on the work of sedimentary petrographers. Brewer devotes nine chapters to discussion of the analysis of structural and textural features observable in soils; these chapters are the culmination of his original work in this field during the last decade or so. The concluding chapter relates fabric and mineral analysis to soil genesis and classification. A useful appendix describes methods of collecting, preparing, and analyzing soil samples.

The treatment of fabric is largely descriptive, for the chapters are arranged by pedological features rather than by generic soil types. Although Brewer treats features that are ob-

served on different scales, ranging from field observation to the electron microscope, his emphasis is on what is seen best in thin sections, under the petrographic microscope. More than a hundred clear and well-selected photographs and photomicrographs support the descriptions given in the text. Many new terms are introduced, but the profusion of terminology is only a reflection of the complexity of natural soil features. Some may not accept Brewer's terms or even the basis of his terminology, but a giant step has been taken toward putting pedography into an orderly framework.

Offsetting the complexity of the material are the clarity and honesty with which it is presented. Every term, beginning with *soil* itself, is defined after appropriate discussion of previous usages. The descriptions of pedological features are separated from the interpretations of their origins. Brewer has been careful to give the assumptions involved in making the logical jump from observed features to inferred processes. And he has made clear the contradictions in the available information, the uncertainties of current methods, and the gaps in the existing knowledge.

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Review and Résumé

Theoretical Physics. A. S. Kompaneyets. Translated from the second Russian edition by George Yankovsky. Gordon and Breach, New York, 1964. 392 pp. Illus. $9.50.

This English translation of the second edition of the original book, which was published in Russian, is a fairly standard work covering a range of topics in theoretical physics that one normally expects to find in a book with this title. In fact, one gets the impression that the book is intended as a miniature *handbook* of physics rather than as a textbook for use in the classroom.

The book is divided into four major fields, three of which are classical—that is mechanics, electrodynamics, and statistical physics—and a fourth which covers quantum mechanics and the quantization of fields. The style is terse and correct, if somewhat uninspiring, and the amount of material covered in the various sections is quite adequate. However, the treatment is never very deep or penetrating. The author is satisfied with stating physical laws and indicating some of their consequences, directly and precisely, without indulging in much discussion.

According to the preface to the first edition, the book is aimed at "engineer-physicists," biophysicists, chemists, and those in related fields—an audience more interested in the general structure and capabilities of theoretical physics than in specific details. If the book is read and evaluated on this basis, one feels that the author has succeeded remarkably well in producing a readable account of what theoretical physics is all about. The first chapter lays the foundation of mechanics of systems of particles. Generalized coordinates and Lagrange functions are introduced almost immediately, and the rest of the discussion is largely based on Lagrange's equations. Central field motion, collisions of particles, and small oscillations problems are all treated briefly, and brief mention is made of variational principles in mechanics. Chapter 2, which introduces the Maxwell equations, is preceded by a useful introduction to vector operations and vector identities that occur in the later development of this chapter. In fact, a useful feature of the book is the maximum use that is made of vector notations and vector manipulations. Users in this country may be worried by the unfamiliar bracket notation [A, B] for the vector product of A and B, and the use of "rot" for "curl."

The last two chapters, on quantum mechanics and statistical physics, form the most useful part of the book. The section on quantum mechanics touches most of the standard problems in this field, introduces and discusses electron spin, and even considers many-electron systems and the quantum theory of radiation. The last chapter provides a concise account of the ideas of statistical physics and thermodynamics and of their application to equilibrium (and some nonequilibrium) problems.

Of course this book will have to compete with the many excellent textbooks that are already available in the various domains of theoretical physics.

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Hybrid Computers

Electronic Analog and Hybrid Computers. Granino A. Korn and Theresa M. Korn. McGraw-Hill, New York, 1964. xxiv + 584 pp. Illus. $17.50.

In the recent history of computing the enthusiasts for analog and for digital computers have often been loud in their claims for their favorite and almost totally ignorant of the advantages of the other machine. The experts who prefer the analog machine have slowly adapted some of the digital techniques to their needs, but the corresponding observation cannot be made with respect to the experts who prefer the digital machine, for they are usually still quite ignorant of the use and advantages of analog computers. Fortunately there is a small, but active, school (including the authors of this book) who are expert in analog computers and well aware of digital computers and are therefore prepared to use the two in a hybrid combination. Hybrid computing, when well done, uses the advantages of both but at the same time recognizes that some of the disadvantages of both must be accepted. Although the hybrid field is not new, little is known about it because so few capable people have worked in the field. Fortunately this book treats both analog and hybrid computers.

The book begins with an excellent section, Principles of Electronic Analog Computation (74 pp.). In this section the authors treat the usually vexing topic of scaling (especially time) quite well, and the presentation of this material reflects the effect of more than a decade of polishing.

The main part of the book, Design of the Basic Computing Elements (296 pp.), is undoubtedly the finest part. Here the authors speak with real authority on both vacuum-tube and solid-state circuits, and, to my pleasure, they frequently give their personal opinions, based on their long experience, about various matters.

The third part of the book, Analog Memory, Hybrid Analog-digital Computation, and Computer-system Design (132 pp.), covers the vast array of special circuits that occur in modern analog and hybrid computers; it also contains a bit about how to put them all together to get a good machine.

The fourth part, Advanced Computer Utilization (48 pp.), covers hybrid computers among other things, and provides