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.

ROBERT H. MEADE
U.S. Geological Survey,
Woods Hole, Massachusetts

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.

R. H. LEMMER
Department of Physics,
Massachusetts Institute of Technology

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

a reasonably clear discussion of the way a problem is broken up into digital and analog parts for such combinations. Numerous illustrations are given in the text, but, in view of the growing importance of the field, the space devoted to this topic seems rather small.

The book as a whole is remarkably complete and thorough, especially with respect to the error analysis of the various undesirable effects in particular circuits. More than 800 circuit diagrams and photographs give the book a pleasing aspect and convey a great deal of nonverbal information as well. Occasionally tables are used to display and complete a discussion. In a few instances the style of writing becomes a bit telegraphic, but most of the time it it remarkably clear and concise; thus, this is one of the best books of its kind available.

R. W. HAMMING
Bell Telephone Laboratories, Murray Hill, New Jersey

Zoology

Arachnida. Theodre Savory. Academic Press, New York, 1964. xii + 291 pp. Illus. $9.50.

Thirty years separate this book from its predecessor, *The Arachnida*. This is not, however, a revised edition but a new version, with much up-to-date material. The book is a marvel of selection and compression, covering all the Arachnid groups in a balanced treatment, including extinct groups as well as those obscure creatures "about which we are not learning very much." The illustrations are clear and precise, in keeping with the lucid style of writing. Obviously Savory enjoyed writing this book, and the reader will encounter a number of succinct, sometimes humorous, *obiter dicta* that a great specialist is privileged to offer.

If we agree that the primary purpose of this book is to stimulate interest in arachnids, the author has succeeded well. He also is aware of the difficulty of keeping up with the flood of papers, which has reached an incredible average of 950 papers a year during the decade 1950 to 1960. In view of his disclaimer that there is little that can help him cope with this material beyond his own industriousness and enthusiasm, it seems unfair to point out that he has touched rather lightly on some of the recent work in arachnid embryology and that occasionally he has forgotten to include a reference to some topic discussed. It is unfortunate that he did not include a precise statement about the occurrence of hemocyanin in arachnid blood because a leading American invertebrate textbook categorically states that arachnids have no respiratory pigment. In so short a book on so large a subject, there is some repetition on the subject of venom, and the index has a number of omissions. Some things are given a passing mention without explanation—for example, the mention of Paleoisopus as a "significant fossil" (p. 147). In the treatment of the Pycnogonida, the two genera cited as "characteristic" lack some of the characterizing features, and the circumstance of multiple gonopores is not mentioned. It is debatable that "today nearly every zoologist subscribes to the belief that the origin of the Vertebrata is to be found among the Echinodermata," but it is true that the Arachnid theory is only an interesting memory. Other specialists will find similar small points to quibble about, but could anyone else have written such a book?

JOEL W. HEDGPETH
Pacific Marine Station, Dillon Beach, California

Nature Library Series

The Land and Wildlife of Tropical Asia. S. Dillon Ripley and the Editors of *Life*. Time Inc., New York, 1964. 200 pp. Illus. $3.95.

The editors of *Life*'s Nature Library Series were indeed fortunate to have naturalist S. Dillon Ripley write the text for this book on the natural environment of Tropical Asia. His is a very readable narrative account, all the more interesting because much of it is based on his personal field observations. Maps, graphic drawings, and splendid photographs combine with Ripley's text essay to give an excellent natural history of this unique area.

The book gives one a vivid feeling of the rain forest with its damp cathedral-like gloom, "its background music of multi-layered life extending from the forest floor to the topmost branches 200 feet or more above, including the blended noises of countless unseen forms of burrowing, creeping, walking, climbing, gliding, flying, leaping life that pervades this richest of all environments." Other chapters deal with "muddy margins of the sea," and with "island hopping" where Ripley describes evolutionary adaptations that have developed as the result of isolation in these natural laboratories. Nor is man left out, because there is a splendidly illustrated chapter dealing with the human landscape.

Although a wide variety of fauna and flora is represented in *Tropical Asia*, the author makes a plea for conservation throughout the book. The plight of such endangered species as the Argus pheasant, pink headed duck, giant panda, giant komodo lizard, and three species of rhino is dramatized.

What is being done to salvage illegally captured animals is well told in a splendid sequence of photographs showing experiments with ways of returning young orangs to their native wilds. The slaughter of helpless orangs to obtain scientific specimens and their capture for zoos has reduced the present wild population of orangs to an estimated 2500 individuals in the tropical forests of Borneo and Sumatra, where the remnants of the wild population can be saved only in national parks or natural areas embracing their natural habitats.

In discussing the problems of endangered species Ripley says that "man has the power to affect irrevocably the nature of his world" and that "we owe it to ourselves not to misuse this power and thereby diminish irreversibly our resources and the future of our planet."

This fine addition to the Nature Library series gives a new dimension to the popularization of the natural history of this truly fascinating and still little-known tropical area of the world, which for political and economic reasons is now demanding increasing world attention as the locale of military actions that affect the peace of the world. Such conditions can only increase the threat to the unique wildlife found in the area, unless strong conservation measures to protect the natural habitats are taken by national governments with the help of international organizations.

This book is of such educational value that it should be in every school and college library.

HAROLD J. COOLIDGE
American Committee for International Wildlife Protection