ing a rather heterogeneous amount of material.

Although much of the volume is devoted to British methods, the principles developed are sufficiently general to be of universal applicability. The volume fills a need among both chemical and mining engineers.

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The People of Puerto Rico. A study in social anthropology. Julian H. Steward, Robert A. Manners, Eric R. Wolf, Elena P. Seda, Sidney W. Mintz, and Raymond L. Scheele. A Social Science Research Center Study, College of Social Sciences, University of Puerto Rico. University of Illinois Press, Urbana, 1956. 540 pp. Illus. $10.

The People of Puerto Rico is an important book, not only for all those who are interested in Puerto Rico, the islands of the Caribbean, and Latin-American cultures, but also for all social anthropologists and sociologists who are interested in the analysis of complex contemporary cultures and societies. It provides useful and important empirical data on the society and the culture of Puerto Rico. But even more important is its theoretical contribution with respect to the use of the "community study" method for an understanding of national (in this case insular) cultures. Several decades ago, social anthropologists turned from the study of homogenous primitive cultures to communities within the context of great civilizations and nations. Such studies have been undertaken of communities within many modern nations—in Ireland, France, Mexico, Brazil, China, and the United States, to mention but a few. These studies have contributed much to the understanding of the national cultures of the nations concerned. Yet, studies of individual communities, many of them small rural communities, provide a picture of only one small segment of a complex modern society. Often such community studies have not shown the relationship of the single community to the nation; they have tended to treat the community as if it were an exotic and isolated tribe. The present book by Julian Steward and his associates offers a conceptual scheme for integrating studies of individual communities into a national (insular) frame of reference, and the authors have applied that scheme admirably for Puerto Rico.

Concretely, this team from Columbia University undertook studies of four Puerto Rican communities as well as another study—for which they used social anthropological techniques—of the prominent upper-class families who resided in the city of San Juan. Each of these communities was selected to represent an important variant of Puerto Rican culture—or, in other words, a "subculture." Thus, a community that produces tobacco and mixed crops, located in the central mountain region, was studied by Robert Manners; a community that produces coffee, located in the western highlands, was studied by Eric Wolf; a community of workers on a large government-owned sugar plantation was studied by Elena Padilla Seda; and a community of workers on a large corporation-owned sugar plantation was studied by Sidney Mintz. Raymond Scheele carried out the study of the urban, upper-class subculture. These individual studies were closely coordinated; they cover much of the same ground and deal with a comparatively large number of island-wide problems. They are brought into relationship with one another and with Puerto Rican insular institutions by a careful perusal of the historical background and by an excellent comparative analysis of the regularities and variants that appear in the various Puerto Rican subcultures that are covered by the study. Thus, each community is seen not as an isolated and local manifestation of a complex society but in relationship to the whole culture.

This study is a model, so to speak, of group research in social anthropology. There will be social scientists who will argue with some of the theoretical concepts, but all will recognize that this book by Steward and his associates is a major step forward in the adaptation of the methods and theories of social anthropology to national cultures. It may well become a modern classic in social anthropology, comparable in importance, in its time, to Robert Redfield's *The Folk Culture of Yucatan.*

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Marine Algae of the Northeastern Coast of North America. William Randolph Taylor. University of Michigan Press, Ann Arbor, rev. ed., 1957. viii + 509 pp. Illus. $12.50.

For the past 20 years William Randolph Taylor's *Marine Algae of the Northeast Coast of North America* has been a standard treatise on marine algae. The revised edition follows the same format as the first, both with respect to keys and descriptions of orders, families, genera, and species. For each species the description is followed by notes on distribution within the range covered by the book, and by bibliographic references. The new edition contains descriptions of three genera and 14 species not known for the area at the time of the first edition. In addition, information concerning the range of many species is amplified, especially that for arctic species found in the northern portion of the area covered by the book.

Critical studies on type specimens by the author and by other phycologists has necessitated change in certain specific names appearing in the first edition. More modern views concerning relationships of certain families have been followed, and this has resulted in transfers from one order to another.

The revised edition, similar to the first, is not a compilation but is based in large part on study of living and herbarium specimens. Records from the area, given by other phycologists, have been scrutinized with care, and wherever possible herbarium specimens authenticating these records have been studied. The result is a book of the same scholarly quality as the first edition.

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Vergleichende Physiologie. vol. III, *Ernährung, Wasserhaushalt und Mineralhaushalt der Tiere.* W. von Buddenbrock. Birkhäuser, Basel, Switzerland, 1956. 677 pp. Illus. DM. 66.

This is the third in a series of volumes of W. von Buddenbrock's *Vergleichende Physiologie.* The first volume dealt with sense physiology, the second, with nerve physiology and hormones. The first 424 pages of this volume deal with nutrition, feeding, and digestion; the next 127 pages, with water balance (osmoregulation); and the final 67 pages, with mineral economy. Each of the first two sections opens with an extended discussion of the general physiology of the subject. Then follows an account of the function in each principal group of animals, from protozoans through vertebrates. The work is designed for zoologists, and the general physiological discussions do not include many physicochemical details of cell physiology.

Vitamins are treated briefly in the general section, scarcely at all for specific animal groups. Feeding mechanisms and the morphology of digestive systems are well presented, with useful diagrams. Many tables summarize the distribution of digestive enzymes in different animals. Characterization of proteases is by *p*H optima rather than by specific substrates; lipases and esterases are not clearly distinguished. Controversial matters, such as the importance of dissolved organic foods and the relative roles of extracellular and intracellular digestion in pelecypods, are critically examined.

The chapter on vertebrate digestion includes a discussion of the functions of the liver.

The section on water balance is a useful factual account. The ecological applications of osmoregulation are mentioned briefly for each major animal group. Under mineral metabolism are considered the principal inorganic cations and some of the trace elements. The principal functions of each of these are listed, and tables of ion concentrations in various tissues and body fluids in various kinds of animals are given. Some important functions are omitted—for example, the role of cobalt in vitamin B_{12}. Active transport of ions as a factor in regulation is mentioned only briefly.

This book, together with the other volumes comprising the total work, will stand as the classical summary of comparative physiology prior to about 1950. Reviewers of modern literature can refer with confidence to von Buddenbrock for the older material. The text is written in a clear, concise style that can be read by a student who has only moderate facility with German. The book provides a good background for a student entering the field of comparative physiology, and it serves as a reference source for zoologists who seek leads to specific older papers. The literature of physiology is becoming so vast that it is doubtful that one man will ever again be able to write such a broad, multivolume work, and the subject is changing so rapidly that monographs are now replacing the handbooks of past generations. It is fortunate that von Buddenbrock's vast knowledge can be recorded, and his remaining volumes are awaited with interest.

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Matrix Calculus. E. Bodewig. North-Holland, Amsterdam; Interscience, New York, 1956. 334 pp. $7.50.

One reads *Matrix Calculus* with alternating feelings of exasperation and admiration. The book is concerned primarily with the computational aspects of the subject, yet, on page 1, a scalar product of two simple numerical vectors is incorrectly given. This is a simple proofreading error, of course, but hardly an auspicious beginning. Perhaps it will serve to warn the reader to be on his guard in the succeeding pages.

During 1947 and 1948, E. Bodewig published, in the *Proceedings of the Royal Academy of Science, Amsterdam,* a series of papers in which he summarized known methods of inverting matrices and solving systems of equations, comparing them with respect to operational counts and other considerations. This material is reworked and brought up to date in the present volume. Curiously, though, no reference is made to Forsythe's summary, which appeared in 1953 in the *Bulletin of the American Mathematical Society.*

In 1949 and 1950 the author published an analogous summary of methods of obtaining proper values and vectors, this time in the *Atti Seminario Matematico e Fisico dell' Universita di Modena.* It is well worth while to have all this material gathered into a single volume, and those who are interested in computing will find *Matrix Calculus* a useful and stimulating reference book. Nothing else comparable to the Modena papers has been published on the proper value problem.

Presentation of this material is preceded by an introductory section that is intended to supply the required background in matrix theory. Also, this section advocates the use of a system of notation which aims, in particular, at exploiting matrix symbolism to the full and at avoiding, wherever possible, the exhibition of specific elements or coordinates. With this thesis I am in wholehearted agreement. There is no space here to illustrate, but often much can be gained in simplicity and elegance. Unfortunately, the author does not always have the courage of his convictions, and, furthermore, he sometimes introduces irrelevant complexities. Thus, in order to exploit the differential of a matrix, he devotes nearly the whole of page 30 to deriving the standard binomial expansion for $(E+Q)^{-1}$ where E is the identity. This is the essential, although not the stated, content of equations 3.19. Here and elsewhere the differential is only confusing.

On page 32 and the following pages there is a painful derivation, with applications, of a formula for inverting a modified matrix. No reference is made to Woodbury, who proved the formula in its complete generality, although Sherman, Morrison, and Bartlett are mentioned for having given special cases. The author considers only the formula for $(A+B)^{-1}$ where A^{-1} is given and B has rank 1. He does not seem to know that the formula can be generalized to the case of B having rank r, which is Woodbury's formula.

It is perhaps not fair to criticize a book for what it does not contain. Nevertheless, *Matrix Calculus* is evidence of a considerable degree of erudition on the part of the author—repeatedly one sees an attempt to trace a method to its source and there are historical remarks, such as those on page 127, about the systems that arise in geodesic surveys—and it seems fair to expect some uniformity in depth. But the uniformity is not there.

To give some other examples: On page 144 is summarized a discussion of convergence of iterative methods of the single-step ("Seidel") and of the total-step types. The author calls those types II and I, respectively. He states Reich's theorem by saying, "For a real symmetrical A, Seidel's process converges if, and only if, A is definite." Actually, the theorem states, "For a real symmetrical nonsingular A with positive diagonal, Seidel's process converges if, and only if, A is definite."

A few lines below it is stated as a theorem that "For definite matrices, iteration I may diverge." This should hardly be dignified with the label "theorem." In fact, the author has all the information necessary to establish the very simple necessary and sufficient condition for convergence of iteration I when the matrix is symmetrical with positive diagonal.

In short, the book should be on the shelf of every numerical analyst, but let him read with caution!

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Nuclear Power Engineering. Henry C. Schwenk and Robert H. Shannon. McGraw-Hill, New York, 1957. xvi + 319 pp. Illus. $6.50.

Nuclear Power Engineering is a well-written book, obviously intended for the practical man. It is based on articles which appeared serially in the magazine *Power* over the past several years. A college-level knowledge of mathematics, chemistry, or physics is not a prerequisite for an understanding of the material presented. The book, as such, should have a rather limited appeal for anyone having a direct interest in the science or engineering of nuclear reactors for power. It should have an appeal for those whose interests are more peripheral or are in power engineering as derived from nuclear sources.

The introductory chapters cover, in simple, straightforward language, the general subjects of atomic particles, radioactivity, conversion of mass to energy, nuclear reactors, the behavior of neutrons and neutron fission, and the control of chain reactions. Later chapters cover descriptions of nuclear reactors, reactor materials and systems, and reactor design problems. Other chapters describe each of the reactors now being constructed as part of the Atomic Energy Commission's 5-year reactor development program. A useful 18-page glossary of terms used in the nuclear power field is appended.

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