of those who are familiar with earlier accounts. As G. G. Simpson says in his foreword, all will "applaud Leakey's decision to bring out the present strictly preliminary publication, and will admire the energy and devotion that have given us so prompt and useful a record of results up to 1962." Further volumes in the series are awaited with great interest.

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Mathematics

Special Functions and Their Applications. N. N. Lebedev. Translated from the revised Russian edition (Moscow, 1963) by Richard A. Silverman. Prentice-Hall, Englewood Cliffs, N.J., 1965. xii + 308 pp. Illus. $16.

This book may be strongly recommended either for reference purposes or as a textbook for use in a graduate course in special functions. The development is clear, readable, economical, and efficient. For reference purposes the book is surprisingly complete. The student will find himself learning a great deal of analysis with the minimum of trouble.

Considerable attention is given to applications of the special functions studied. A list of problems is given at the end of each chapter. Many asymptotic expansions of special functions are needed in the applications. The derivations given are unusually concise.

Chapter 1, "The gamma function," includes a derivation of the leading term of Sterling's formula. Chapter 2, "The probability integral and related functions," includes application to heat conduction and to the theory of transverse vibrations of an infinite rod. Chapter 3, "The exponential integral and related functions," includes an application to the electromagnetic radiation from a linear half-wave oscillator. Chapter 4, "Orthogonal polynomials," gives a general theory of orthogonal polynomials, including many specific results for Legendre polynomials, Hermite polynomials, and Laguerre polynomials. The latter are applied to the theory of image transmission of transients in a long transmission line.

Chapter 5 is, for this type of volume, a rather complete treatment of cylindrical functions, including Bessel functions and modified Bessel functions of both types and Hunkel functions, as well as one section on Airy functions. Chapter 6 gives some of the many applications of cylindrical functions, particularly applications to several Dirichlet problems.

Chapters 7 and 8 are concerned with spherical harmonics and their applications. Further properties of Legendre functions are developed. Dirichlet problems feature heavily in the applications. Laplace's equation is separated in spherical and spheroidal coordinates. It is also solved in toroidal and bipolar coordinates, a valuable feature of the book.

A good general theory of hypergeometric functions is given in chapter 9. In chapter 10 Laplace's equation is separated in parabolic cylindrical coordinates; the solutions are expressed in terms of Hermite functions. These are used in the Dirichlet problem for a parabolic cylinder, and in the quantum mechanical study of a harmonic oscillator.

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Missile and Space Technology

Space Science and Engineering. Ernst Stuhlinger and Gustav Mesmer, Eds. McGraw-Hill, New York, 1965. xxviii + 457 pp. Illus. $20.

This book is based on a series of lectures that cover space engineering science; the lectures were given to graduate-level students, during 1960 and 1961, at Washington University (St. Louis, Mo.) by staff members of the Marshall Space Flight Center (Huntsville, Ala.). It takes considerable courage to issue a survey textbook in a field that is enlarging and changing as rapidly as the field of space science and technology. Certainly the treatment of basic physics, astronomy, and chemistry in the various chapters is as sound and appropriate now as when the chapters were written. On the other hand, a number of statements that describe the space environment, the moon, and Mars, as well as some concerned with power, instrumentation, and propulsion technology, were very obviously written before reports on recent developments were available—the Ranger closeups of the moon or the Mariner views of the surface of Mars, and developments made during the past year on bombardment ion thrustors, for example. But this is inevitable in a field where knowledge is increasing at such a pace.

The book contains a voluminous amount of interesting information intended to give the physical scientist and engineer a peek at some of the many disciplines and areas involved. It is also worthwhile reading for those who are knowledgeable in the space program, because workers tend to specialize and not to diversify their interests among allied areas to the extent that they should.

I am most tempted to criticize the book on the basis of the selection and interconnection of the wide variety of specific topics and examples in the individual chapters. Although the detailed organization of the book appears to be an arbitrary potpourri of topics, personal contact with and respect for the Stuhlinger group at Huntsville force me to recognize at least two bases for such a feeling. First, a survey course cannot mention everything, much less provide discussion in depth. Second, every person who reviews a book of this type in his own field would have organized such a course differently and written a different book.

In summary, I certainly recommend this work to the scientific worker who is interested in a glimpse of the variety of scientific and technological disciplines and to the experienced worker who works in some area of the field.

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African Wildlife Today

Rhinos Belong to Everybody. Bernhard Grzimek. Translated from the German edition (Frankfurt, 1962) by Oliver Coburn. Hill and Wang, New York, 1965. 207 pp. Illus. $12.50.

In this fine book the well-known director of the Frankfurt Zoo, with his intimate understanding of wild animals in their African habitat, gives a clear picture of what to expect when one visits East Africa today. The book is outstanding, not only because of the quality of his vivid and superb photographs (of which more than 60 are in color), but because the text de-

scribes actual animal-man relationships and reveals problems of future wildlife management of this unique African animal heritage—for example, too many elephants in Murchison Falls National Park have resulted in basic damage to many trees there.

In Murchison Falls and in Queen Elizabeth Parks, both in Uganda, the tourist can watch wild animals in a leisurely and comfortable manner. As tourists glide around in a shady motorboat among the hippo, elephants and buffalo take their ease near the cool water, white-breasted sea eagles keep watch for fish from trees, and open-mouthed crocodiles lie along the banks. The explanations that accompany the pictures are not the usual captions, but are informative without wasting words—for example, when he mentions the white rhino, Grzimek refers to their rarity, where they still exist, and the fact that eight were recently released in Murchison Falls National Park.

The six chapters are written in popular style, and deal with such subjects as "What will become of the animals of the Congo" (this chapter cites problems that were faced with Congolese independence). Another deals with leopards, and still another with the problems of trying to save the game in the Ngorongoro Crater despite pressures of Masai cattle. This book will not only attract more visitors to the parts of Africa that are described, but should help to arouse worldwide interest in the urgent problems of conserving samples of the fast-vanishing African game species for the benefit of future mankind. The author has contributed in significant ways to strengthening several African national parks and, when requested, has advised governments on how to deal with some of their difficult management problems.

Let us urgently hope that recent plans for modifying the superb Murchison Falls National Park by constructing a power dam inside the park can be reconsidered and the dam located elsewhere so that the park can be maintained as it is described in this book. The message that the author conveys is a challenge to all concerned with endangered species, and is best stated in his own words: "If Africa's wild animals die out now this will be happening within one human generation with nothing at all left of them and nothing coming after them. We cannot unload the responsibility on the Africans. We Europeans and white man bear that responsibility; our descendants will not acquit us of it."

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Sourcebook for Nonspecialists

Sourcebook on the Space Sciences. Samuel Glasstone. Van Nostrand, Princeton, N.J., 1965. xviii + 937 pp. Illus. $9.75.

This book was written under the sponsorship of the National Aeronautics and Space Administration in support of its mandate to provide the widest practicable and appropriate dissemination of information concerning its activities and the results thereof. It deals with space science on a broad front and includes some other relevant material in addition, particularly material relating to spacecraft.

Mathematics has been used rather sparingly, as the presentation is aimed at readers with only an elementary knowledge of physics and chemistry. Further, there are no references, although the names of scientists are frequently mentioned in connection with their particular contributions. These circumstances will make the book somewhat less than satisfying to anyone with a serious interest in space science, but probably will not seriously disturb the audience for whom the book was intended. The book does include a good index.

The material covered includes the historical background of space science, orbits and trajectories, propulsion and power supplies, tracking and communication, satellite applications, the sun and solar system, the earth and moon, the other planets, the universe, and man in space. The chapter on the earth and its environment includes discussions of the upper atmosphere, the geomagnetic field, the radiation belts, and cosmic radiation. The subject matter is generally very well up to date. Only modest detail is included, because the extensive scope precludes anything more. Many workers in the field of space science will undoubtedly find points where they feel that the author's relative emphasis on different factors leaves something to be desired, but, on the whole, the emphasis on various aspects of the subject matter covered seems remarkably uniform. Another commendable feature is the lack of the sort of overlap that so often characterizes books to which groups of authors have contributed.

Errors must creep into any book that contains so many facts, but the number in this book appears to be modest—for example, we may note four successive figures that indicate the wrong sense of rotation for the sun, and the incorrect statement of the length of the year in sidereal days.

This book should prove useful to all those with even a modest background in science who are not well informed on the broad areas of space science and who wish to get a broad view of the subject.

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Selected Papers by F. A. Paneth

Chemistry and Beyond. A selection of papers from the writings of F. A. Paneth. Herbert Dingle and G. R. Martin, Eds. Interscience (Wiley), New York, 1965. xxii + 285 pp. Illus. $6.

Chemists with sufficient interest in the history of their science to do active research in it are rare but not unknown; those who combine philosophical insights with historical perception and who also rank near the top in their science can be counted on the fingers of one hand. Such a one was Professor F. A. Paneth, late of the University of Durham and the Max-Planck-Institut für Chemie in Mainz. This volume of his selected writings is the graceful tribute paid to his memory by his English friends.

The work is divided into four sections: History of Chemistry; Thomas Wright and Immanuel Kant; Meteorites; and Miscellaneous. Most of the articles deal with the historical aspects of their subjects and reveal Paneth's love of the historical way to explanation. He must have been a superb teacher, for these essays show the clarity with which he presented his subject matter and the richness of the historical setting in which he placed them. Yet, Paneth was not a historian of science but a chemist who used history as a teaching aid. He was not committed to re-creating what