tween calculus and advanced calculus, between "intuitive" and "rigorous" mathematics.

The treatment is based on set theory; it includes rigorous proofs of theorems, and it maintains a high degree of precision in notation and in the statements of axioms, definitions, and theorems. The treatment is detailed and abstract; the entire book contains only five figures. There are 394 exercises; they are collected in sets at the ends of the seven chapters. The following chapter titles indicate the range of topics treated: "Elements of set theory," "The real number system," "Finite and infinite sets," "Sequences and convergence of real-valued sequences," "Sequential limit theory in the extended real number system," "Definition by induction," and "Functions of a real variable: Limits and continuity."

Chapter 1 contains a partial development of set theory; although somewhat deeper than most elementary treatments, the subject is not developed axiomatically. Chapter 1 includes also a treatment of ordered pair, relation, and function; a function is a special type of relation and thus a set of ordered pairs. Chapter 2 characterizes the real numbers, but it does not construct them; it is assumed that they exist already. Chapter 3 treats finite and infinite sets in general, and sets of real numbers in particular; it contains a proof of the Bolzano-Weierstrass theorem. Chapter titles describe the topics treated in the remaining chapters.

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Electron Spin Resonance

Electron Paramagnetic Resonance. S. A. Al'tshuler and B. M. Kozyrev. Translated from the Russian edition (Moscow, 1961) by Scripta Technica. Charles P. Poole, Jr., Ed. Academic Press, New York, 1964. x + 372 pp. Illus. $13.50.

Electron spin resonance has become highly sophisticated during its 20-year life span and a vast amount of literature has accumulated on the subject. This volume, a translation from the Russian edition, is an excellent compilation of early literature. Presentations of theoretical results by Al'tshuler and of experimental results by Kozyrev are well integrated and organized for easy reference. It is unfortunate, however, that the book was translated 3 years after it was first published in Russian and apparently 6 years after the manuscript was completed. As a result, the material must be taken in the context of electron spin resonance as it was 6 years ago. Some of the work has been superseded, and some of the concepts, particularly those related to organic free radicals and to masers, have advanced considerably beyond those presented here. For example, in the chapter on free radicals, the confusion of early 1958 between electron density and electron spin density is evident, and often the two densities are incorrectly used interchangeably. The student who uses this book as a guide to electron spin resonance must be cautious in some respects. He must realize that most of the unsolved problems evident throughout the book are no longer problems. In passing, it should be noted that the historical introduction to this volume finally gives Zavoisky his deserved credit for the discovery of the spin resonance phenomenon.

The subjects treated touch all phases of electron spin resonance. It is apparent, however, that most emphasis has been placed on those areas in which the authors have personal interest. For example, discussion of the theoretical developments in free radicals is not accorded the detailed presentation that is given crystal field ions. The discussion of crystal field spectra, relaxation phenomena, metals and semiconductors, and the early theories of nuclear polarization are exemplary. The literature references (1083), perhaps one of the most complete sets of references in electron spin resonance in print, are particularly useful. The complete reference is also cited in each chapter or table in which it is mentioned. This procedure provides rapid identification of the author and the publication without searching through the book for a reference made in earlier chapters. Another notable feature is the myriad of experimental results on transition and rare earth ions presented in easy-to-read tabular form.

There are remarkably few typographical errors (I have counted 11), particularly for a translation, and only rarely does peculiar grammatical usage result from too literal translation. A detailed table of contents is unfortunately offset by a too brief and virtually useless subject index. Also on the negative side are the tables of equations. Although these tables are complete and potentially extremely useful, they are poorly reproduced. Apparently the publisher reproduced them directly from the original Russian text, and in my copy blemishes and light impressions have obscured some of the vital symbols contained therein.

There are a number of mathematical equations presented as a statement of fact without derivation or reference. Perhaps derivation of these equations can be found in related references, but this is not always obvious. Some of these equations may be the result of private work of the authors and their derivation therefore unavailable to the scientific community.

Those minor deficiencies do not detract from the general excellence of this book, which I highly recommend as a review of the first 14 years of electron spin resonance.

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Science and Engineering

Non-Linear Wave Propagation. With applications to physics and magnetohydrodynamics. A. Jeffrey and T. Taniuti. Academic Press, New York, 1964. x + 369 pp. Illus. $12.

This book consists of two parts, the first of which will be of interest to most physicists and mathematicians who are concerned with the dynamics of continuous media; the second half will be of interest largely to specialists in magnetohydrodynamics. The first half gives a detailed treatment of the general theory of hyperbolic partial differential equations—in particular, of quasi-linear first order systems in several variables. The method of characteristics is developed, starting from first principles, and the conservation laws and generalized Rankine-Hugoniot relations are deduced. Shock waves are introduced as "weak" solutions (solutions that may be discontinuous on sets of zero measure), and an "evolutionary condition," involving only some very plausible restrictions on the manner of dependence of solutions on their initial data, is proposed as a selection principle for discriminating against unphysical weak solu-

tions. The methods are applied to several standard examples from the theory of nonlinear wave propagation, such as one-dimensional gas dynamics and electromagnetic wave propagation in an anisotropic dielectric.

The second half of the book is a systematic account of nonlinear wave propagation which is described by means of the so-called "Lundquist equations" of magnetohydrodynamics, primarily in situations where there is variation with only one spatial coordinate. This limitation to the Lundquist equations, of course, rules out most of the areas of greatest ignorance in the problem of nonlinear waves in conducting media. That is the price the authors are willing to pay for being able to write a book in which most of the loose ends can be neatly tied up before the end.

The greater part of the book is of a genre of scientific writing which is surely all too rare: honest mathematics applied to physical problems, but with formal rigor played down below the point at which it becomes unpalatable to a physicist. Except for some relatively minor criticisms (for example, the key section 1.7, "Rays and wave fronts," is perhaps too cryptic to be read without prior knowledge), it is difficult to find fault with this book. Those who are involved with plasmas in a more worldly sense may regret the aforementioned sacrifice of physical relevance in the choice of material for the second half of the work; but few will be able to deny being able to learn a great deal from it.

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Pacific Basin Geology

Marine Geology of the Pacific. H. W. Menard. McGraw-Hill, New York, 1964. xiv + 271 pp. Illus. $12.50.

More than a century ago Charles Darwin deduced that the central basin of the Pacific Ocean had deeply subsided, and that surrounding areas of the Pacific had risen. The relation of continents to ocean basins has been of fundamental concern to geologists ever since.

In the past two decades a vast amount of information concerning the Pacific Ocean has been acquired in the fields of bathymetry, seismic exploration, gravity, magnetism, heat flow, petrology, and volcanism. Much of this information comes from expeditions sponsored by the Scripps Institute of Oceanography. Some has been published in specialized journals; some has not been published at all. It is a real pleasure, therefore, to find a book that provides a synthesis of this information for the Pacific Ocean area.

Menard's chief concerns are the great structural features of the Pacific —the vast rises of more than continental dimensions, such as the East Pacific Rise, the island arcs and trenches, and the great fracture systems that cut the rises into blocks that apparently have moved independently. Convection currents in the deep mantle are favored as a mechanism to explain movements of the crustal blocks and downbuckling of the trenches.

The one known example of ancient or "fossil" rise is described in detail and named, appropriately, the Darwin Rise. It stretches from the Mariana Islands nearly to South America, and includes a large proportion of the atolls and guyots (drowned ancient islands) of the world. The history of the formation of this rise in Mesozoic time and of its subsidence through Cenozoic time has been inferred by studies of drilling on atolls, dredging on guyots, and geophysical and bathymetric surveys.

Menard's writing is generally clear, direct, and positive, but more critical review and editing could have eliminated repetitious parts and balanced the presentation. Many major interpretations are merely stated and referenced, whereas minor interpretations, especially in the chapters on pelagic sediments and turbidity currents, are derived in detail.

The text is copiously illustrated with 121 figures. Many are excellent, but, for clarity, a number should have been more carefully captioned. The excellent and large physiographic diagram of the northeastern Pacific which accompanies the volume should have been printed on better paper than that provided by the publisher. A bathymetric chart of the Pacific Ocean is provided by reproducing 14 overlapping, full-page figures. The careful reader will constantly refer to these, and he will have to turn from one to another to compare features.

The book is not a treatise. It will interest most geologists not because it provides the answers, but because it clarifies some of the principal problems and illustrates how information in various fields can be used. It would be an excellent textbook for a course in marine geology if used critically in conjunction with other sources. The author's habit of positive statement should stimulate students to turn to original reports, which are abundantly referenced throughout, and to compare alternative interpretations. The glossary of geographic names and locations is most useful, and the book is well indexed.

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New Books

Biological and Medical Sciences

Absorption from the Intestine. Gerald Wiseman. Academic Press, New York, 1964. 528 pp. Illus. $18.

Advances in Drug Research. vol. 1. N. J. Harper and Alma B. Simmonds, Eds. Academic Press, New York, 1964. 219 pp. Illus. $6.25. Four papers: "Penicillins and related structures" by F. P. Doyle and J. H. C. Nayler; "Physiological transport of drugs" by Lewis S. Schanker; "Antitussives" by F. P. Doyle and M. D. Mehta; and "Adrenergic neurone blocking agents" by F. C. Copp.

The Biosynthesis of Steroids, Terpenes, and Acetogenins. John H. Richards and James B. Hendrickson. Benjamin, New York, 1964. 428 pp. Illus. $18.50.

A Catalogue and Reclassification of the Indo-Australian Ichneumonidae. Henry Townes, Marjorie Townes, and Virendra K. Gupta. American Entomological Inst., Ann Arbor, Mich., 1961. 526 pp. $14.50.

The Cellular Functions of Membrane Transport. A symposium (Woods Hole, Mass.), September 1963. Joseph F. Hoffman, Ed. Prentice-Hall, Englewood Cliffs, N.J., 1964. 299 pp. Illus. $6.95. Fifteen papers on the following topics: General Aspects of Cellular Functions of Membrane Transport; Role of the Membrane in the Regulation of Conduction and Contraction; Role of the Membrane in the Regulation of Metabolic Processes; and Role of the Membrane in Secretory Phenomena.

The Cephalocarida: Comparative Skeletomusculature. Robert R. Hessler. Connecticut Acad. of Arts and Sciences, New Haven; Munksgaard, Copenhagen, 1964. 97 pp. Illus. Paper, $5.

Cerebral Localization and Organization. Georges Schaltenbrand and Clinton N. Woolsey, Eds. Univ. of Wisconsin Press, Madison, 1964. 176 pp. Illus. $7.50.

The Conditioning Therapies. The challenge in psychotherapy. Joseph Wolpe, Andrew Salter, and L. J. Reyna, Eds. Holt, Rinehart, and Winston, New York, 1964. 200 pp. Illus. $7.

Genetics for the Clinician. C. A.

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