the black-and-white photographs are unnumbered and no reference is made to them. This shortcoming, however, is partly compensated for by placement of each illustration at or close to the part of the text to which it relates. Some of the illustrations show prominent geologic features not mentioned in the captions—for example, the picture (p. 139) of shoreline cliffs. No reference is made in the caption to the beautiful development of sea arches and stacks that are shown in this photograph.

The illustrations for the chapter on groundwater are almost exclusively of cave interiors and deposits made by hot springs. A few photographs of karst topography, especially aerial views, would have contributed greater variety and made the coverage more nearly complete.

The arrangement of the 15 chapters is patterned pretty much after that of several well-known general geology texts. The first three chapters set the stage for the remainder of the book, which deals largely with the sculpting of the landscape by the various geological processes.

Chapter 1, "Getting acquainted with the earth," briefly introduces the obvious external and internal forces that shape the landscape. Chapter 2, "The earth in time and space," sets forth the relation of the earth to the galaxy and solar system and describes the interior of the earth. Chapter 3, "The rocks at the earth's surface," discusses the materials—igneous, sedimentary, and metamorphic rocks—on which the geologic processes act. The next 11 chapters run the gamut from weathering through wind action, streams, shore processes, glaciers, groundwater, mass movements, volcanism, and earthquakes to the making of mountains. In these chapters Mather frequently emphasizes the effect that geologic processes and features have on man. In a final chapter, "Man and the earth," he deals with the effect that man has on the earth—the impact of agriculture on erosion, alteration of the landscape by dams and reservoirs, reshaping the shore, reclaiming submerged land, and so on.

Chapter 5, "Where the winds blow," chapter 11, "Landslides, avalanches, and mudflows," chapter 12, "In the realm of Vulcan," and chapter 13, "When the earth trembles," will evoke strong interest because they provide vivid accounts of spectacular natural events.

At a time when many a great aqueduct brings water hundreds of miles over and through mountain ranges and across the plains to thirsty acres and cities, when tourism is one of the most important industries in many states and countries, and when we and other peoples are casting about for remaining bits of nature's handiwork to preserve and protect, an intelligent layman can hardly afford not to read this book.

And it is quite possible that a number of geologists, when they see the book, will say, "I wish that I had done something like this."

JAMES L. DYSON
Department of Geology, Lafayette College

Biochemistry and Disease

Biochemical Disorders in Human Disease. R. H. S. Thompson and E. J. King, Eds. Academic Press, New York, ed. 2, 1964. xx + 1066 pp. Illus. $22.

The first edition of this book (1957) filled a substantial need for an up-to-date work on those disease entities that exhibit significant biochemical aspects. Since then other books have appeared, particularly books that deal with inherited metabolic diseases. However, the explosive growth of knowledge in this field makes most welcome this second edition of *Biochemical Disorders in Human Disease*, edited by R. H. S. Thompson and the late E. J. King. It is gratifying to report that the excellent coverage of the subjects considered in the first edition has been maintained. In addition four new chapters have been introduced: (i) on the chemical anatomy of the human body (by R. Passmore and M. H. Draper); (ii) on the pancreas (by Henry T. Howat); (iii) on atherosclerosis (by G. S. Boyd); and (iv) on protein anomalies of the lymphoreticular system (by N. H. Martin). Our knowledge of this latter subject has been significantly enhanced by the application of modern physicochemical technics, and inclusion of the chapter is most appropriate.

Although a certain amount of material on fundamental biochemical concepts must be incorporated in a book so closely related to intermediary metabolism, there is the danger that material readily available in standard textbooks will nonetheless be included in presentations which should be confined largely to the biochemical applications to disease. In this second edition, it appears that only the essential and normal biochemical concepts are treated, with emphasis on those newly discovered pathways which have been elucidated in the last several years. There has also been an effort to confine the discussion of a given topic to the most recent advances. For example, in the chapter on nutritional disorders, a detailed account of the classical vitamin-deficiency diseases has been omitted in favor of the more timely topics, insofar as current research is concerned, of obesity and kwashiorkor and recent studies on starvation and appetite.

In each chapter, one gets the distinct impression that revision has been extensive and that the coverage of each topic is thorough and in accord with the modern literature. Repetitious coverage, so frequently an irritation in books to which several authors have contributed, is commendably rare. All of this has not been accomplished without increasing the size of the book (by roughly 200 pages). Nonetheless, it is a noteworthy achievement, and this work should serve as a most satisfying reference source for the reader who seeks an authoritative review and bibliography of any of the topics that are treated.

HAROLD A. HARPER
University of California Medical Center, San Francisco

Informal Lectures

Real Numbers. Stefan Drobot. Prentice-Hall, Englewood Cliffs, N.J., 1964. x + 102 pp. Illus. $3.95.

This book is based on a series of "rather informal talks on real numbers" given by Drobot to high school teachers attending summer institutes at the University of Notre Dame. The range of topics covered in less than 100 pages of text is indicated by the four chapter headings: "The concept of real numbers"; "Digital representations of real numbers"; "Approximations of real numbers by rationals"; and "Cardinality and measure."

The author has been remarkably successful in presenting a development of some of the most important aspects of the real numbers in a self-contained

account that requires no background beyond trigonometry and analytic geometry. While some demands may be put on the neophyte's mathematical maturity, the rewards to be gained are great. Among the topics included are: (i) development of the real numbers from the naturals; (ii) existence and uniqueness of decimal, Cantor, and continued-fraction expansions, with rationality tests; (iii) the Hurwitz-Borel theorem; (iv) Liouville's theorem on algebraic numbers; (v) Dirichlet's theorem on diophantine approximations; (vi) the theorem on uniform distribution; and (vii) an elegant introduction to cardinality.

Although the author's tone is informal, his proofs are well motivated and rigorous. More advanced readers will probably regret omissions forced by limitations of space, as I regretted the absence of a more thorough treatment of the integers and the rationals. The scope of the book is, however, remarkably broad. Unfortunately the book suffers from a large number of misprints which will force the less advanced reader to proceed with caution. For example, the displayed equation on page 6 should read $a_1 + a_2' = a_1' + a_2$, and the fraction $\frac{1}{4}^n$, on page 36, line 9, should be replaced by $2^3/4^n$.

In general, however, this book is well suited to serve as an introduction to the real numbers as well as to some of the ideas of analytic number theory. Used in this way it will undoubtedly stimulate many students to explore further the fascinations of the real number system.

D. W. MILLER
Department of Mathematics, University of Nebraska

The Pleistocene Epoch

The Deep and the Past. David B. Ericson and Goesta Wollin. Knopf, New York, 1964. xxiii + 292 pp. Illus. $6.95.

The Deep and the Past is intended as a popular account of 17 years of oceanographic research carried out at the Lamont Geological Observatory. The book circulates around the way to and the methods used to discover the "first complete record of the Pleistocene." Therefore, the validity of the use of the words "first" and "complete" must be discussed.

Deep-sea cores penetrating the whole Pleistocene were collected by Kullenberg in 1947. Dutch studies (Zagwijn) have resulted in a curve of the same epoch, which also is in agreement with that obtained from the Swedish cores. The record now offered by Ericson and Wollin deviates markedly from the others.

Foraminiferal analyses, which are their methods of tracing glacial and interglacial ages in the sequences, are complex methods, and the authors have apparently been misguided by them. Two examples will be offered.

The authors stress the necessity of discovering the interstadial in the Würm stage of core sequences (why not also within the Riss?). An interstadial is traced approximately 50,000 to 31,000 years ago by other students and with other methods, but it is not discernible by the way these authors "read" the cores. Therefore they suppose a period at 95,000 to 65,000 years ago as an interstadial and date the last glaciation to 340,000 to 115,000 years ago; it is more likely that Riss-Würm ended about 80,000 (± 7000) years ago, Riss about 100,000 years ago, and that Mindel-Riss falls at about 300,000 to 200,000 years ago.

The absence of the foraminifer *Globorotalia menardii* in some Atlantic cores at approximately 6 to 8 meters indicates, according to Ericson and Wollin, glacial condition (Riss). However, everything seems to suggest that the section was formed during the warmest period of the Pleistocene, which I have correlated with the Upper Mindel-Riss. Their method of tracing the climatic development is therefore questionable.

The authors refer to some potassium-argon datings. An additional one, Lippolt's dating volcanic ash to about 375,000 years, Uppermost Cromerian or Lower Mindelian in age, could have been quoted. This dating suggests an age of the Mindel glaciation of one third of that given by Ericson and Wollin.

One chapter is devoted to the discovery of a horizon with a faunal change and where the Discoasteridae had become extinct. This horizon is suggested as a new Plio-Pleistocene boundary. They believe that this change mirrors a sudden and drastic climatic deterioration. A different interpretation may also be possible.

On the basis of these considerations, Ericson and Wollin's climatic curve for the Pleistocene must be considered incorrect for most of the Pleistocene. Their time scale for ages greater than 200,000 is only a guess. The correlation with the conventional time-stratigraphic units is unlikely, except for the last 65,000 years. In two chapters they then apply this unlikely time scale to Pleistocene cultures, Mammalian succession, and human evolution.

Several other discussions and statements in the book are inconsistent, others are incorrect. But, owing to limited space, examples cannot be given.

ERIC OLAUSSON
Oceanographic Institute, Gothenburg, Sweden

Hydrology

Advances in Hydroscience. vol. 1. Ven Te Chow, Ed. Academic Press, New York, 1964. x + 442 pp. Illus. $15.

With this first volume of *Advances in Hydroscience*, Ven Te Chow, the editor, has initiated a much-needed new means for satisfactorily collecting and disseminating new knowledge resulting from scientific research on water. Volume 1 is a collection of timely articles prepared by authorities in the fields of sonar, hydroelasticity, the statistical hydrodynamics in porous media, hydroballistics, and the hydraulics of wells. The information, with emphasis on physical theories and mathematical analyses, will be most useful to advanced scientific workers.

The article "Sonar," by Bradford A. Becken, describes the field in relation to the gathering of scientific information from the ocean through the use of underwater acoustics. Recent scientific and engineering advances in signal enhancement, transducer design, and receiving-beam formation are illustrated.

In his article "Hydroelasticity," S. R. Heller, Jr., defines hydroelasticity and outlines its scope, largely by analogy to aeroelasticity, to denote its naval counterpart. Heller's article is concerned with differences between aeroelasticity and hydroelasticity, typical static and dynamic hydroelastic phenomena, control-surface flutter, and vortex-induced vibrations.

In "New contributions to hydroballistics," F. S. Burt points out that there is need for considerable improvement in the performance of all types of underwater weapons. Burt gives a brief review of the various aspects of