

however, that most biologists are now aware that the proliferation of books is an almost casual response to the unmanageable inflation of channels of traditional communication. The average book neither deifies scholarship nor especially berates it. Against such a background this book will pass as an interesting account of some mitotic problems, as these problems are conceived by some workers in the field.

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"Life" Science Library

Mathematics. David Bergamini and the editors of *Life*. Time, Inc., New York, 1963. 200 pp. Illus. \$3.95.

To enjoy this book is easy. To evaluate its contribution to the public understanding of mathematics is more difficult.

Attempting the latter made me recall a conversation at the high table in Proctor Hall at Princeton in the mid-1930's. Einstein and Dean Eisenhart were discussing the books by Jeans and Eddington that gave popular accounts of the then fashionable cosmological theories. The Dean asked Einstein if he did not think such books were useful, and Einstein replied that he did but that he had misgivings lest the readers mistake the speculative fringe of scientific investigation for the great body of firmly established knowledge. This richly illustrated and handsome first volume in the new series, *Life Science Library*, does not, I think, risk this particular danger.

That the story progresses, in the first 30 pages, through counting methods from hand signals to digital computers does imply great brevity and some superficiality in the treatment, so I fear some readers may have reinforced their impression of mathematics as an impenetrable mystery. Hopefully, the rich detail woven into the visually delightful presentation will lead many to read other books, perhaps chosen from among the 36 listed in the bibliography.

"The shapely thinking of the ancient Greeks," which disposes of ancient geometry in a dozen pages, is followed abruptly by photographs of 11 men now working as mathematicians in the United States. Of these deservedly distinguished 11 only one, Eilenberg,

would be regarded as working in the heartland of current research in pure mathematics; the others spread as far afield as Godel (mathematical logic at the level of philosophy) and Szebehely (space mechanics). This points up a partial and necessary failure of the book: the solid center of today's mathematics depends so heavily on symbolism and is so far removed from sensual reality that it cannot be described in nontechnical language or illustrated visually. It also underscores the folly of regarding research in mathematics as dominant over the practice of mathematics.

The format is one in which historical development leads to contemporary topics within each chapter of the four which describe algebra, analytic geometry, calculus, and probability. The work of Gauss, Riemann, and Einstein provides an exciting chapter, which is followed by "Mathematics today: Deeds, doubts, dreams." A 4-page appendix gives an inadequate description of the changes that are being made in mathematical education. There is an index.

My favorite quotation is on page 169: "Like the hordes and horses of some fabulous khan, today's mathematicians have ridden off in all directions at once, conquering faster than they can send messages home."

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Earth Sciences

The Earth Sciences. Arthur N. Strahler. Harper and Row, New York, 1963. xiv + 681 pp. Illus. \$9.95.

Elements of Geology. James H. Zumberge. Wiley, New York, ed. 2, 1963. xii + 342 pp. Illus. \$6.50.

Strahler's book is directed to geology teachers. In the preface, the author states that "the teaching of the full spectrum of the earth sciences should be recognized as the responsibility of each geology department within the larger fold of the natural sciences. Too long has the conventional two-semester sequence of physical and historical geology dominated our offerings; around us an explosive growth of new scientific knowledge of the atmosphere and oceans, the earth's interior, and the solar system have largely been ignored in the introductory offering." Thus,

Strahler believes that the earth sciences should be introduced as a unified whole, rather than as a more detailed treatment of geologic principles that pertain only to the crust of the earth.

The distribution of major topics in Strahler's book reflects his views: About 27 percent of the book is devoted to the earth as a planet, including the earth's orbit, time, illumination, tides, the solar system, and the earth's gravitational and magnetic fields. Nearly 25 percent is devoted to the atmosphere and the oceans, including physical meteorology, physical oceanography, and climatology. Over 40 percent is devoted to topics that pertain to physical geology, including rocks and minerals, the earth's interior, the oceanic and continental crusts, ground water, stream systems, erosion, landscape evolution, and weathering and soil. About 2 percent is devoted to the methods of historical geology, and the remainder of the book consists of appendices illustrating principles of maps. It is suggested that professional geologists may find Strahler's book an excellent reference source for basic information on those aspects of the earth sciences missing in their own backgrounds.

Strahler's book is well written and contains an abundance of clear and forceful illustrations. The line drawings are exceptionally well done, although most of them appeared in the author's book, *Physical Geography*, which was published in 1960.

Zumberge's book is intended as a text for a one-semester introductory course in which physical and historical geology are combined. It is addressed to beginning students of science. Its scope is more or less traditional. About 60 percent of the book is devoted to topics pertinent to physical geology, including the earth's setting in the universe and in the solar system, rocks and minerals, the earth's interior, weathering and soil, ground water, and wind, rivers, and waves as agents of erosion and deposition. The remaining 40 percent is devoted to historical geology, which is approached period by period. The book is also well written and is accompanied by judiciously chosen photographs and by line drawings of exceptional clarity and simplicity. One might question the merit of a period-by-period approach in historical geology in a book whose emphasis is on principles. It might have been more appropriate to dwell on the methods by which historical geology is