Book Reviews

Art, Lore, and Visual Aids

Mathematics in the Making. Lancelot Hogben. Doubleday, Garden City, N.Y., 1961. 320 pp. Illus. $9.95.

The name Hogben was known chiefly in connection with zoology until, in 1936, its bearer demonstrated conclusively that books about mathematics can break into the lists of "best sellers." The phenomenal success of *Mathematics for the Million* prompted the subsequent appearance of *Science for the Citizen* and *The Wonderful World of Mathematics*; and now we have, in much the same tradition, *Mathematics in the Making*. The motive again is to "elicit intelligent understanding" on the part of the nonspecialist, and once more the exposition is built on a historical matrix. The present work is characterized by a lavish use of illustrative material, with over 400 illustrations, of which more than 100 are in color. The application of contrasts in red and black, used in connection with figurate numbers and problems in probability, remind one of the author's *Chance and Choice by Cardpack and Chessboard* (2 volumes, 1950–1955), but in his latest book Hogben goes further in calling upon visual aids to support the narrative.

The foreword refers to the present work as a "co-operative undertaking," and there are spots in which one has the feeling that the art editor triumphed at the expense of the expositor. Some of the colored reproductions have but little ostensible relevance to the account—for example, the section of the Ford engine (page 243) or the handsome full-page drawing (page 231) of Watt's engine of 1788—and there are places where striking diagrams appear better calculated to please the eye than to aid the mind. Graphical devices used in connection with analytical geometry and calculus come close to the point of diminishing returns; the colorful Chinese patterns intended to teach the properties of determinants may be visual hurdles to understanding, rather than aids. Nevertheless, the art work is so well done that purchase on this account is justified; and if the literate purchaser is tempted to go beyond the pictures and to follow some of the printed word, much of the purpose of the book will have been achieved.

Mathematics in the Making is not a history of mathematics, despite the fact that it contains much history. Where historical development fails to take the same direction as the exposition, the latter assumes the upper hand. Historians will be less upset by such cavalier adaptation of their discipline than by the occasional failure of the author to indicate where evidence stops and conjecture takes over. Mathematicians, too, will find cause for some displeasure in that their subject has been presented from the point of view of the consumer rather than of the devotee. Eschewing modern tendencies to equate mathematics with abstract deductive thinking, Hogben proceeds from the position (page 9) that "Mathematics is the technique of *discovering* and *conveying* in the most *economical* way possible *useful* rules of *reliable* reasoning about *calculation, measurement* and *shape*." Overmuch concerned with the measurational aspect of the subject, he tends to admire Egyptian accomplishments at the expense of the Babylonian, mistakenly believing that the Nilotic equivalent for π (about $3\frac{1}{6}$) was better than the Mesopotamian. (Neugebauer recently has found that $3\frac{1}{8}$ was used on occasion instead of the more common value of 3.) Thinking again of mathematics as calculation, Hogben would rate the invention of logarithms above the discovery of the solution of the cubic equation. (Here he erroneously attributes the first solutions of the cubic and quartic to Tartaglia and Vieta, rather than to Del Ferro and Ferrari, respectively.) Similar judgments are expressed in connection with Greek mathematics. The author is distressed (page 121) that "The Alexandrians never surpassed—or even caught up with—the Chaldean temple culture in the art of computation"; and he is not much impressed by the work in Diophantine equations because (page 123) "they have no pay-off in the domain of measurement." About the celebrated Greek definition of proportion he writes pejoratively (page 100), "The notion of a ratio need not be to us, as to the Greeks, a nightmare." Perhaps this explains why he could make the meaningless statement (page 91) "We can neither multiply exactly, nor divide exactly, a number such as $\sqrt{5}$ by a number such as $\sqrt{3}$." Is it any wonder that he finds it difficult to understand (page 91) "why later generations of commentators have bestowed so much veneration on the formal definition of equiproportionality attributed to Eudoxus and expanded at great length by Euclid in Books V and X of the *Elements*?" Hogben admires instead those portions of the *Elements* which he feels are relevant to modern needs involving mensuration.

The layman who wishes to find out quickly and easily why mathematics is so useful will be charmed by the author's facile style and by the publisher's artistry. Here he will find no precise definitions, no tedious proofs, no dull exercises. One who wishes to go further and to learn what mathematics is really about should be reminded once more that, visual aids notwithstanding, to the achievement of this austere goal there is no royal road.

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One Theory

Introduction to the Study of Animal Populations. H. G. Andrewartha. University of Chicago Press, Chicago, Ill., 1961. xvii + 281 pp. Illus. $5.

During the past few decades there was a vast increase in the theoretical and practical investigations of animal populations, and it is not too surprising that interpretation of the very complex interactions which occur in nature led to considerable controversy. It is helpful to the student, therefore, to have a compact presentation of one of the main theories of natural control.

The book, based on a largely quanti-