Book Reviews

Dynamics of Behavior. Robert S. Woodworth. Holt, New York, 1958. x + 403 pp. Illus. $5.

"The main contention of this book—seemingly a perfectly obvious and innocent view—is that behavior consists of active give and take between the organism and the objective environment. This interrelationship may be called dealing with the environment."

This short passage, in Woodworth's clear style, is the keystone of a systematic structure of psychology built through many years and presented now in fairly complete form. The statement does seem "obvious and innocent," but it tells a good deal.

In writing a general psychological theory some authors choose a "tight" system with few independent principles and many specific deductions. Others favor a more flexible scheme, with principles which are very general and have little specific implication. The first approach risks being wrong, the second, being vague. C. L. Hull, of whom Woodworth often makes telling criticisms, chose the first plan. Woodworth himself, more empirically inclined, takes the latter. The broad statement quoted tells us that behavior will not cease when the biological needs are satisfied, for there are many interactions with the environment which are primary and not derived from needs. The facts arrayed to support this are powerful. Yet the proposition does not attempt to say what objects will be "dealt with" or to state the manner of the dealing. These matters would remain, presumably, as unsystematized observed facts.

"Objects" is an important word in the statement. These lasting collections of physical properties and relations, rather than simple stimuli, are the whence and whither of behavior. Therefore there needs to be, Woodworth contends, an encoded representation of these built up in the organism, a "perception" of the environment. The most important sort of learning, if not all of it, is the learning of places, distances, and other sorts of relation, rather than the connecting of movements with stimuli.

One may also read the book as a survey and discerning critique of experimentation—much of it very recent, some of it classic, and some older but little known. This will surely cause the book to be widely studied, and the theoretical interpretation will as surely make it widely discussed. It could hardly be otherwise with a book by R. S. Woodworth.

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Mass Spectroscopy. Henry E. Duckworth. Cambridge University Press, New York, 1958. xvi + 206 pp. Illus. $6.50.

This newest addition to the *Cambridge Monographs on Physics* is a rapid scan over the spectrum of instrumental principles and physical applications of mass spectroscopy. It is not a "do-it-yourself" handbook, and it does not provide a detailed discussion of instrumental and vacuum techniques and chemical applications. Duckworth's book is more a *Reader's Digest*-type summary, in which the brevity and restriction of subject matter reflect the evolution of the mass spectrometer from the demimonde of development to the social whirl of everyday research.

The first half of the book covers ionic focusing, production and detection of positive ions, and the various kinds of mass spectroscopes, from simple direction focusing to double focusing, time-of-flight, and cyclotron resonance instruments. The treatment is authoritative, factual, and succinct, with the emphasis on actual numerical data on performance and design parameters. A general acquaintance with orthodox instrumentation and electronics is assumed, and derivations of equations are generally omitted; granted these premises, what is left is a highly condensed and well-organized summary of essential facts and references.

The remainder of the book is devoted to isotopic abundance and atomic mass determination, applications to nuclear physics, ionization and dissociation of molecules, and applications to geology. Some 25 pages are given to geological studies on radiogenic and stable isotope variations, but only the briefest survey of these rapidly expanding fields was possible in that space. [The citation of Nier's standard carbon isotope ratio (page 168) should give limestone, rather than sandstone, as the material analyzed.] A table of isotopic abundances and atomic masses, and 16 pages of references, conclude the book.

The discussion of atomic masses is of special interest because of the increasing awareness that O^{16} and $O^{(16+17+18)}$ are hardly suitable mass standards in this day and age. The author shows considerable restraint, for a mass spectroscopist, in his discussion of the mass scales, but he does indicate the importance of adopting C^{12} as a universal mass standard, emphasizing the general agreement on the C^{12} mass spectrometric mass and its unmatched utility as a standard for atomic masses. The discussion of this subject could and should have been amplified considerably; reticence on a controversial subject is unbecoming to an authority. The recent discovery by Mattauch that the discrepancies between mass spectroscopic and nuclear reaction mass data generally disappear if any standard other than O^{16} is chosen adds considerable fuel to the C^{12} fire. It does seem that chemists might be sufficiently involved in physics these days to give up their sentimental attachment to the analytical balance; and, who knows—if we can abolish the double standard for atomic weights we may even hope to get the United States on the metric system some day.

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Cunningham's Manual of Practical Anatomy. vol. I. General introduction. Upper limb, lower limb. Revised by James Couper Brash. Oxford University Press, New York, ed. 12, 1957. xii + 2394 pp. Illus. $6.

Since the 1890's the various editions of *Cunningham's Manual* have led innumerable students through countless dissections. The present 12th edition, the fourth by the same author in the last 20 years or so, attests to the conservative character of the manual. Only volume 1 is as yet available; a few new illustrations, a few new x-rays, and an adaptation to the recently modified terminology of the Paris revision (1955) represent the major changes from the preceding editions.

The text is as simple and direct as ever, the illustrations are clear and diagrammatic, the dissection procedure and precautions are nearly foolproof, and the

scope covers the essentials necessary for medicine and surgery. Practitioners reviewing their anatomy, and students, should find the book as usable as it has always been.

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A History of Mathematics. From antiquity to the beginning of the nineteenth century. J. F. Scott. Taylor & Francis, London, 1958. xiii + 266 pp. Illus. + plates. 63s.

A one-volume history of mathematics cannot be exhaustive, and in the selection of his material the author is likely to betray his predilections. Scott evidently prefers algebra and analysis to geometry, for over half a dozen pages are assigned to Bhaskara—more than the length of the entire chapter on the "Beginnings of modern geometry." There is evident as well a penchant for the enumeration of details of notation and methods, as over against an analysis of the growth of ideas; this explains, perhaps, an occasional lapse in historical-mindedness. For example, the assertion (page 115) that during the first half of the 17th century "there appeared an entirely new creation, namely the study of probability," is belied by the earlier statement (page 92) that in Cardan's *De ludo aleae* "the beginnings of the theory of probability are plainly discernible." Again, Scott accepts (page 129) Lord Moulton's claim that "the invention of logarithms came on the world as a bolt from the blue," despite the history of prosthaphaeretic methods and of relations between geometric and arithmetic progressions. And unconcern for continuity of tradition is aggravated by an unconventional arrangement in which chronological order sometimes is rudely violated. Thus "Mathematics in the Orient" *follows* the account of Hindu and Arabic trigonometry and the Latin medieval period.

The reader with a sense of proportion will be prepared for some inaccuracies in such a work as this. Scott attributes first to Plato (page 20), later to Brahmagupta and Mahavira (page 74), a routine method for Pythagorean triads which is but a special case of a device used earlier by the Babylonians, and he describes Heron's algorithm for square roots (page 42) with no indication that it had been known before in Mesopotamia. The undervaluation of pre-Hellenic mathematics may be an outcome of a handicap under which the author seems to have worked—a heavy dependence upon older secondary sources, such as Cantor rather than Neugebauer on the origin of sexagesimal numeration and Child rather than Hofmann on the calculus priority controversy. There is, on the other hand, a laudable reference, especially for British mathematicians, to important primary sources.

The author's reputation was established years ago through his *Mathematical Work of John Wallis* (1938) and his *Work of René Descartes* (1952), and the present volume is entitled to a comparable place of honor on library shelves. Every here and there Scott affords us commendable new emphases, such as the prominence given to the nongeometrical portions of Euclid's *Elements* and to ancient trigonometry. Noteworthy also are sections on the theory of numbers (including the summary of Gauss's *Disquisitiones Arithmeticae*) and on Newton's use of the binomial theorem for fractional exponents. It will be a crotchety reader indeed who fails to find a quota of sections to his fancy, and the physical appearance of the volume should appeal to the meticulous booklover.

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Adventures in Medical Education. A personal narrative of the great advances in American medicine. G. Canby Robinson. Published for the Commonwealth Fund by Harvard University Press, Cambridge, 1957. xii + 338 pp. Plates. $5.

In the course of a long and distinguished career as a medical educator and administrator, G. Canby Robinson has actively participated in many of the fundamental changes that have revolutionized American medical schools, and along with them medical research and practice, during the present century. Robinson entered the Johns Hopkins Medical School as a student in 1899, six years after it opened, when that school, and a few others, were spearheading the reform to come. In 1910, the year that Abraham Flexner published his shattering analysis of American medical schools, Robinson joined the first staff of the Rockefeller Institute Hospital. Three years later he became a member of the faculty of Washington University Medical School in St. Louis, during the period of its reorganization. In 1920 he became dean of the School of Medicine at Vanderbilt University, where he directed the reorganization of that school, and in 1927 he accepted a post as head of the New York Hospital–Cornell Medical College center, which was also to undergo reorganization. Here, however, Robinson ran into difficulties, which he attributes primarily to the financial crisis caused by the depression and to inadequate organizational integration between the hospital and the college, compounded by the selfishness and antagonism of some of the faculty. Virtually forced to retire in 1934, Robinson returned to Baltimore for work on the social aspects of medicine and, subsequently, on the organization of the wartime blood donor service. However useful this work, the later phases of his career inevitably form an anticlimax.

It is clear from this brief recital that Robinson has had an unusually full opportunity to study medical education in all its aspects. He has undoubtedly been motivated by the highest ideals. His observations therefore deserve attention. He stresses, for example, the importance of opportunities for full-time clinical teaching and research—a view that needs frequent restatement in the face of continuing opposition—and his book further illustrates this point by citing the number of men from the Rockefeller Institute and Johns Hopkins—pioneers in full-time clinical teaching and research—who were involved in the reorganization and reform of other medical schools after 1910.

Nevertheless, I must confess to some disappointment in the book. Robinson's style of writing, while clear, lacks vigor, and, more important, too much has been left unsaid. Robinson was involved in two really significant controversies in his career, one at Vanderbilt and one at Cornell, yet neither is adequately described or explained. The conflicts and therefore the drama in Robinson's career have largely been omitted. What remains is an incomplete account of an important career—an account less human and less interesting than it might have been, but useful nevertheless to medical historians and educators for the comments on men and events and for what it reveals of Robinson's own personality. Perhaps the kindly spirit that has prompted him to minimize the conflicts in this autobiography helps to explain his failures as well as his successes.

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Nature Is Your Guide. How to find your way on land and sea by observing nature. Harold Gatty. Dutton, New York, 1958. 287 pp. Illus. $4.95.

It is a shattering experience for an individual or group of individuals to be lost in the out-of-doors with no assurance of what to do to remedy the situation. The purpose of this book is to help the traveler who may be concerned