

proach. Each of us must weigh the demands of individual conscience and social commitment as best he can. Rapoport's book has the virtue of raising this eternal issue for the citizen and scientist in a new era of human experience. Unfortunately, his own passion has prevented him from examining the problem with the care it deserves. Yet, if Rapoport has opened up a dialogue on these matters, and I hope he has, this provocative if frequently disappointing book will have served an important purpose.

Experimental Archeology

The Experimental Earthwork on Overton Down, Wiltshire, 1960. P. A. Jewell, Ed. British Association for the Advancement of Science, London, 1963. 108 pp. Illus. \$4.50.

With the development of more precise analytical methods in archeology during the past few years, it has become increasingly important for the archeologist to know in some detail about the changes and disturbances that have occurred in archeological sites as the result of weathering and other natural causes. This volume reports an ambitious and comprehensive experiment by a committee of Section H (Anthropology) of the British Association for the Advancement of Science, in which a simulated prehistoric earthwork was built under precise controls, with observation of changes to be made by periodic excavation at intervals of 2, 4, 8, 16, 32, and 100 years after its construction. Archeologists of the future will have reason to thank the committee for this 100-year experiment which will yield precise data on weathering phenomena.

One aspect of weathering of great importance in archeology is internal disturbance and mixing of archeological deposits, with consequent confusion about the true relationships of the layers and objects found. With the current interest in statistical analysis of archeological collections, the question of disturbance is a vital one in evaluating the samples (of potsherds, shells, or whatever) taken for statistical study. The dispersal or movement of buried objects is little understood, although it is apparent that rodents, plant roots, freezing and thawing, and even earthworms, can transport buried objects

from their original location in the ground. The experimental earthwork will provide precise data on such movements of buried materials.

Aside from the detailed care in construction of the earthwork itself, a number of material objects were buried in exact locations to check the weathering action. These included six types of textiles, leather, burned and unburned wood, cooked and uncooked animal bones, human bone of known blood group, and cremated human bone. Also buried was a series of numbered potsherds.

A by-product of the experiment was the collection of data on the amount of work possible with ancient implements as well as modern ones. Since estimates of the man-hours required to construct ancient monuments vary tremendously, experimental data of this kind have considerable interest. The worker with modern hand tools averaged 3.58 cubic feet of earth per man hour, the worker with primitive tools 3 cubic feet per man hour.

The answers to be provided by the experimental earthwork should provide valuable correction factors in many archeological interpretations.

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Clinical Medicine

The Biochemistry of Clinical Medicine. William S. Hoffman. Yearbook Medical Publishers. Chicago, ed. 3, 1964. xii + 802 pp. Illus. \$12.50.

The task of keeping abreast of the increasing torrent of developments in clinical medicine—developments that are now primarily biochemical in nature—has increasingly led to multiple-author texts. Hoffman has, however, valiantly put out again in his one-man book (with the exception of a chapter on gastric and pancreatic secretion by A. Littman) to cover the waterfront of medicine. The effort is eased and the goal narrowed by the author's avowed didactic approach, which also minimizes chemical reactions and formulas and which is directed toward helping "the physician who has no more than the usual training in chemistry and physiologic sciences to understand and apply the available information for diagnosis, prognosis and treat-

ment." The metabolism and role of the various tissue and dietary constituents and the anatomy and function of various organs in health and disease are discussed with particular reference to biochemical changes and the application and results of various diagnostic procedures. The author's background in clinical chemistry and medicine contributes to a solid achievement of the stated goals.

In a book of this scope and type, inaccuracies, outdated material, and omissions are inevitable; and the recommendations for treating certain disease states will meet with some disagreement. However, practicing physicians, residents, internes, and medical students, will find this volume a very useful and readable reference source.

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Research in Entomology

Radiation, Radioactivity, and Insects. R. D. O'Brien and L. S. Wolfe. Academic Press, New York, 1964. xv + 211 pp. Illus. Paper, \$3.45; cloth, \$5.95.

This volume, with its improbable title, was prepared under the auspices of the American Institute of Biological Sciences for the U.S. Atomic Energy Commission. The authors, R. D. O'Brien and L. S. Wolfe, set out to provide an introduction for "entomologists and other biologists who want to know the way in which research with radiation and radioisotopes has advanced our understanding of insects . . . [and for] those knowledgeable in work with irradiation and radioisotopes who would like a comprehensive account of what has been done with insects." To accomplish this dual objective, they begin with a chapter on elementary entomology and continue with chapters entitled "Nongenetic effects of radiation," "Tagging" (marking individuals so that they can be recognized when captured later), "Insect control by irradiation" (a way to control pests of stored grain products and timber, and a way of sterilizing males for field release so that they will satiate but not fecundate females), "Biochemistry," and "Physiology" as well as chapters on light responses and the use of tracers in studies of in-

secticides (penetration, metabolic degradation, and the like).

After reading through this small book, I find it difficult to do more than compliment the authors who undertook such a prodigious assignment within so few pages. I do wonder whether the book can be profitably used by one who is *only* an entomologist or a radiologist, but there is no question that it will be valuable to either, provided he already has an introductory appreciation of the other field. I profited from reading the book but was unable to avoid noting sentences like the following, "The principle is simple" (p. 102). There is nothing in this sentence which indicates that the *art* of the game is tricky and laborious. I also wonder about the wisdom of including a section on vision, despite its being within the scope of the title. But these and any other points I might raise about this volume reflect primarily slight differences in point of view. The authors obviously know whereof they speak, and the volume should be really useful to a significant fraction of each of the two audiences to which it is addressed. It is to be recommended.

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Space Physiology

Physiological Problems in Space Exploration. James D. Hardy, Ed. Thomas, Springfield, Ill., 1964. x + 333 pp. Illus. \$12.50.

This book is a refreshing change from the plethora of hastily compiled almanacs on the space explosion. James Hardy has produced a valuable text and reference work on space physiology; it is composed of nine monographs by Hardy and six of his colleagues at the Naval Aviation Medical Acceleration Laboratory, the Aerospace Crew Equipment Laboratory, and the University of Pennsylvania Medical School.

Hardy himself is an authority on the biophysics of heat radiation and on acceleration. The monographs on temperature, acceleration, and weightlessness, which he prepared for this book, are models of lucid, scientific exposition, competently illustrated with pertinent tables, graphs, diagrams, and photographs. The formulas and equa-

tions for temperature and acceleration, relating to space flight and environment problems of survival and protection, are understandable to both medical and engineering students. He sets a high standard for the other authors.

Clark, an authority on acceleration, must have felt trepidations at undertaking a review of high energy radiations. But his well-organized, scholarly presentation gains more from his insight into the implications of the space environment than it loses from being outside his primary field of research. He teaches others by having taught himself from a well-selected bibliography of 55 references. In contrast, Brobeck, in the chapter on food requirements in space, assumes that his readers will be well-versed in the subject and thereby relieves himself of the need to elucidate. From the standpoint of a "space gourmet," he expresses intuitive opinions, interesting and provocative, but not substantiated by factual data. He refers prefactorily to a bibliography of 30 unnumbered entries, leaving the reader to make his own review.

Another chapter that needs more homework is the one on sensory and perceptual problems in space flight, by Brown. Surely, the 51 references cited by Brown could have provided a few tables, graphs, or diagrams. Paradoxically, Halberg, in his monograph on physiological rhythms, almost goes into semaphore to convey information via graphs and diagrams. He points out an insidious variable in biological experiments: how diurnal and seasonal physiological rhythms modulate tolerance to other stresses. Hormone experiments are significantly modified by the time of day hormones are administered. The adaptations of astronauts to 18 sunrises and sunsets daily over a period of weeks in orbit should be interesting. Chambers expertly reviews 124 references on isolation and disorientation. He compares data from space and high altitude balloon flights made by the United States and the U.S.S.R. with data from ground simulators with respect to sensory perceptions and adaptations. Labyrinthine anatomy could have been more neatly presented in diagrams than in words. The consequence of this reluctance to illustrate is a cumbersome cataloging of visual details not unlike the effort involved in making a bed by using a walking stick rather than the hands.

Taking nothing for granted, Hendler

reviews basic respiratory physiology and relates it to survival requirements in space flight; he then provides a critique of space cabin simulators in which human volunteers are exposed to the gamut of breathing atmospheres and pressures feasible for space flight. Hendler matches Hardy in clarity and effectiveness of exposition. The reader can forgive him for not putting his 50 references in alphabetical order, while wishing that Hardy had listed a few more than 7 or 8 references for each of his chapters.

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Brain and Behavior

Unfinished Tasks in the Behavioral Sciences. Arnold Abrams, Harry H. Garner, and James E. P. Toman, Eds. Williams and Wilkins, Baltimore, 1964. xviii + 264 pp. Illus. \$10.

This book contains 23 papers dealing with brain and behavior in animals and man. In the first half of the book, experts on anatomy, physiology, and pharmacology describe the present status of their brain research and project it into the future, while in the second half the psychologists and psychiatrists perform similarly with respect to their spheres of competence. In the introduction Percival Bailey surveys the territory to be covered, and at midpoint Seymour Kety provides an appropriate bridge to connect the two halves of the book. A very short index comes at the end.

Although many of the papers are so brief as to be almost trivial abstracts, others represent contributions of some importance. Eccles, Grundfest, Killam, and Woolsey each take pains to summarize their current views of brain mechanisms, and Woolsey presents an extended description of the medial geniculate projection to the cortex, which has not been published elsewhere. Similarly, Harry Harlow goes into detail on the behavior of infant monkeys following social deprivation, Gardner Murphy states his hopes for a "science of individuality," and Roy Grinker discusses hypothesis testing in psychoanalysis. The range of topics covered is obviously appropriate for the purposes of the symposium that brought