tive role of the early sensory environment in determining the stimulus objects that will evoke responses in later life is contrasted with the relative environment-independence of many motor patterns. The material here is also handled well. Marler himself has made distinguished contributions to the study of bird song development, and there is no better example than this of the complex range of genetic and environmental influences that contribute to the behavior of the adult animal.

The organization of this book is very different from that of many other texts on behavior. Topics (for example, the response of young game birds to an overhead predator) which are more usually dealt with as a single item here receive mention under several headings with different emphasis. There is inevitably some repetitiveness, but there are also advantages when one uses the book as a work of reference, which it undoubtedly will become. For subsequent editions I would appeal for a much fuller subject index, less species-oriented, in order to make this facility usable to the maximum.

In conclusion, I consider that this book has a great deal to offer both undergraduate and postgraduate students and is also an invaluable sourcebook for research workers. The authors are to be congratulated on a distinguished addition to the literature of behavior.

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Manual of Medical Virology

Diagnostic des Maladies à Virus. R. SOHIER. Éditions Médicales Flammarion, Paris, 2nd ed., 1967. 971 pp., illus. $32.

The reviewer is moved to wonder why the first edition of this encyclopedic reference book has escaped notice in the English medical literature. One can only attempt to amend the oversight by describing the handbook, which is a genuine enrichment of the literature of techniques that have proved valuable in the diagnosis of infections caused by viruses. The author is a well-known French virologist who, in collaboration with seven eminent colleagues, analyzes critically and describes in detail every step of the methods presently in use in human medical virology. After a brief discussion of the characteristics and classification of the viruses, the general procedures for the collection of suitable specimens and staining smears, the various methods of propagation and isolation in the embryonated egg, the choice and composition of tissue cultures, and the reactive cytology are painstakingly detailed. Under the headings enteric, respiratory, dermotropic, neurotropic, or hepatotropic, the systematic steps for accurate identification of viruses are described, then summarized in highly informative tables. The chapter on the use of indicator hosts suitable for isolation of viral material discusses not only the choice of animals and their humane housing and care, but also the importance of their physical condition and the various effective routes of infection. For example, a table on page 200 lists the best size and length of hypodermic needle for inoculating different species of animals by various routes. Certain methods, such as the safe infection of mice by the nasal route or of the embryonated egg, are illustrated by useful sketches. Equally complete and informative are the descriptions of immunological methods in vivo and in vitro, including the fluorescent antibody technique. An appendix is devoted to the conservation of viruses by lyophilization. In a special section comprising more than 620 pages the etiologic diagnoses of viral infections of the respiratory or enteric tract with and without cutaneous eruptions, as well as infections caused by arboviruses and, in special chapters, yellow fever, dengue, rabies, and other diseases, are discussed systematically according to epidemiology, clinical manifestations, pathogenesis, selection of specimens for examination, isolation and differentiation of the viral agent, and serodiagnosis. The presentation is remarkably clear and didactically very skillful, and the detailed tabulations assist in quick orientation. Those dealing with the arboviruses deserve particular consideration and study. Twenty-two plates illustrate diagnostically significant cellular and tissue alterations in light and fluorescent microscopic photographs. Each of the 13 chapters concludes with an extensive bibliography covering the relevant international literature to 1963. In this, the second edition, the chapters on Bedsonia, measles, and arbovirus have been brought up to date. Continued rejuvenation is provided for by the sturdy loose-leaf-binder format which permits the replacement of obsolescent material with newer pages of text or revised prescriptions or formulas for improved tissue cultures. With its detailed 40-page alphabetical index and table of contents this unique handbook is recommended to the linguistically equipped, both as a reliable reference work on biomedical methodology for the clinical pathologist and virologist and as an introduction and guide for the general biologist interested in the experimental procedures of virology.

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Sensory Functions

Animal Sonar Systems. Biology and Bionics. NATO Advanced Study Institute Symposium, Frascati, Italy, September–October 1966. R. G. BUSNEL, Ed. Laboratoire de Physiologie Acoustique, Jouy-en-Josas, France, 1967. 2 vols., 1233 pp., illus. Paper, 35 F.

The list of contributors to this volume reads like a Who's Who of animal sonar, and the topics discussed range from the expected echolocation in bats and porpoises through "facial vision" in the blind to the tracking of odorous targets by snakes and dogs. Almost anything you want to know about animal sonar, from the mode of transmission to the structure of the received echoes, is to be found in the two volumes, but will take a bit of searching—there is no index. Most of the book is written in English, but a few of the papers and some of the discussions are in French. Many of the formal papers are followed by informal discussion, much of it informative and provocative.

The book is divided into 11 sections, each comprising several papers. The first, consisting apparently of contributed papers, ranges rather widely and includes such topics as synthesizing the waveforms of bats' pulses, obstacle avoidance in bats and men, and the role of spatial memory. The remaining sections are entitled: Discrimination and Identification by the Animal's Sonar, General Features of Orientation Sounds and the Performances Achieved by the Animal's Sonar, Resistance to Interfering Signals, In-

teraction of Other Sensory Systems with the Sonar System, Sonar in the Blind, Social Communication Content in the Pulse Outside the Echolocation, Neural Processing Involved in Sonar, Theories of Sonar Systems and Their Application to Biological Organisms, and Experiments To Conduct To Obtain Comparative Results. There is a final section of discussion and conclusions.

Like most symposium volumes this one includes much from earlier literature, but it also contains a wealth of new material and much more "cross-fertilization" than has been apparent in the past. Engineers and psychologists are beginning to talk to each other. Even the old material is brought into perspective; and having it readily available with the new in a single book is a great convenience to the reader. This is a book that anyone interested in the field will be happy to have, and the organizers of the symposium and the editor are to be congratulated on a successful accomplishment.

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Ancient Civilizations

Handbook of Middle American Indians. Vol. 4, Archeological Frontiers and External Connections. GORDON F. EKHOLM and GORDON R. WILLEY, Eds. University of Texas Press, Austin, 1967. 375 pp., illus. $15.

One of those publishing efforts to which the term "monumental" may justly be applied is the 11-volume *Handbook of Middle American Indians.* As a previous reviewer commented in *Science*, there can be no doubt that "the completed handbook will be a major scholarly contribution and an indispensable reference work." Since each of the volumes is focused on a particular theme, each may be individually reviewed, although it can be fully appreciated only in its context as part of the series. The present volume consists of 15 essays, all by leading scholars and all concerned with the external and marginal connections of the native civilizations of Middle America, here meaning the Aztecs, the Mayas, and their predecessors. The vigor and creativity of these civilizations are evident in the archeological record of peoples who lived a very great distance from Middle America, and it is these long-distance contacts and influences that are the concern of this volume. The essays may be divided into four groups, their distribution reflecting our knowledge of the various regions: six articles are concerned with influences on the "northern periphery" ranging from Baja California across to the eastern United States; five articles deal with Central America and the Caribbean; two deal with the Andean area; and two consider trans-Pacific influences.

Except for the more controversial discussion of possible trans-Pacific influences, the contributions are designed to be up-to-date summaries of archeological knowledge for specific regions. Some of them incorporate a great deal of information based on recent excavation programs (notably the article of C. C. DiPeso on the northern Sierra); most are summaries of already-published material, but are highly useful because of the diffuseness of the body of literature on which they are based. The summaries were for the most part prepared some time ago, and like all summaries tend to be somewhat out of date by the time they appear in print. How out of date can be appraised from the excellent 29-page bibliography included in the volume: there are 59 references dated 1960, with a sharp fall-off to only three dated 1965. Most of the articles were completed about 1962 and have been given little updating.

Illustrations for the articles range from none at all to carefully prepared summary illustrations of artifact types. Most of the illustrations were not prepared for this volume but have been reproduced from other works. The principal shortcoming of the volume lies in the inadequacy of the illustrations; there is no illustration of innumerable artifact types referred to in the text, and the reader is forced to go to the original sources if he wants to know what many of the archeological finds look like.

Much of what is said has been published elsewhere, and with some exceptions the articles are more summary than synthesis. This does not, however, diminish the tremendous utility of the volume, which spans a far-flung and difficult literature and compactly presents the experts' point of view. On a number of significant topics, future researchers will find it an excellent beginning point.

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Histamine

Handbook of Experimental Pharmacology. Vol. 18, Histamine and Anti-Histaminics. Part 1, Histamine, Its Chemistry, Metabolism and Physiological and Pharmacological Actions. MAURICIO ROCHA E SILVA, Ed. Springer-Verlag, New York, 1966. 1027 pp., illus. $46.

The editor of the present compendium invited each of the 36 contributing authors, among whom are many of the world's leading histamine researchers, to present his own research and point of view as well as review his topic exhaustively and with its history in mind. These efforts have produced a readable and important encyclopedia.

The historical approach is particularly useful in explaining the diverse roles of histamine in living tissues, for this chemical has played an important part in the development of modern pharmacology. In an introduction Sir Henry Dale points out that "in the early 20th century, a newly progressive pharmacology . . . needed to be alert for evidence of the occurrence in normal animal tissues of substances (such as histamine) having activities which would make them likely contributors to the genesis of such symptoms as would call for medicinal treatment." Dale reviews the early work showing the similarity of the pharmacological effects of histamine to allergic phenomena, the subsequent demonstration of histamine release in anaphylaxis, and the development of antihistaminics.

The editor's instructions to the authors have resulted in an exhaustive compilation of information from a variety of disciplines and individuals spread over many years and countries. The integration of this information will provide a heuristic challenge for the reader, and presentation of individual viewpoints illuminates the multitude of theories and controversies over the physiological roles of histamine.

The opening chapter of the book covers the chemistry of histamine, its isolation from tissues, biological and chemical measurement, and occurrence in a variety of tissues. The chapter ends with a section wherein Riley and West detail their important work in establishing that most of the histamine in mammals is localized in mast cells. In these studies Riley and West integrated the data of many years of research on distribution of histamine in