

ter, however, finds it necessary to try to supply this. Similarly, "receptive field," "lateral inhibition," and "ritualized displays" are undefined at introduction but get at least indirect explication from subsequent use. On p. 92 the reader is assumed to know what an axon hillock and a node of Ranvier are, which means that what is said about them will not be news. The book thus seems uncertain of its audience. In any case it is better suited to British students, for whom it was designed, than to American students, for whom it will leave too much unsaid.

The book is selective rather than comprehensive in its pursuit of the broad synthesis. It says virtually nothing about learning and memory and their physiological substrates, developmental aspects of communication behavior, and whether communication is for informing or manipulating. Most of the invertebrate phyla, including Protozoa, Coelenterata, and Annelida, are ignored; indeed, the impression given is that arthropods speak for all invertebrates. The book cannot be counted on for precision or relied on for accuracy: sensory adaptation and habituation are represented as being the same thing; gulls are treated as though what is true of one species holds for others as well, when such is not the case; information theory is credited to work done for the Post Office. The writing is poor in places. For example, the sense given to "Sollwert" is scrambled, in spite of verbatim use of Hinde's words (sans quotation marks, p. 78); and I am made to appear to say that aggressive interactions "wish to be avoided" (p. 165). The innovation of using "copulate" as a transitive verb ("females fly in and are copulated" — p. 142) might appeal to poets.

The book is ahead of other animal behavior textbooks in giving accounts of how conduction of sound pressure between birds' ears serves directional discrimination; how axon geometry affects neural conduction; and how non-spiking neurons may modulate action potentials. Otherwise, it is poor value compared to alternatives that deal more fully and less patchily with neurophysiology, communication, or both.

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CHEMICAL SIGNALS: VERTEBRATES AND AQUATIC INVERTEBRATES. *Proceedings of the Symposium on Chemical Signals, held at State University of New York College of Environmental Science and Forestry, Syracuse, New York, May 30–June 2, 1979.*

Edited by Diетland Müller-Schwarze and Robert M. Silverstein. Plenum Press, New York. 39.50. x + 445 p.; ill.; author and subject indexes. 1980.

The major sections of this book are: field studies (6 papers); reproductive behavior (5 papers); learning (3 papers); vomeronasal organ (4 papers); chemistry (3 papers); and abstracts (8). The grouping of papers on similar topics and a two-page preface by the editors are the only elements serving to relate the papers to one another and to set them in the context of other research; they have in common only the fact that they all deal with some sort of chemical signal. Few readers will be interested in all of them.

The "aquatic invertebrates" referred to in the title are dealt with in one paper (on abalones) and two abstracts (on other invertebrates). Most of the papers are in fact on mammals, with those on rodents far surpassing the number devoted to any other order. However, papers on red foxes, deer, vicuna, tamarins, and camels add diversity.

Many of the authors have published on similar topics in the past and this volume will serve to bring those doing research in the area of chemical signals or seeking information on one of the specific topics covered "up to date" on recent research.

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PHOTORECEPTION AND SENSORY TRANSDUCTION IN ANEURAL ORGANISMS. *Lectures presented at the NATO Advanced Study Institute held in Versilia, Italy, September 3–14, 1979. NATO Advanced Study Institutes Series, Series A: Life Sciences, Volume 33.*

Edited by Francesco Lenzi and Giuliano Colombetti. Plenum Press, New York. \$45.00 ix + 422 p.; ill.; index. 1980.

This collection of 22 lectures covers recent advances in the photobiology of a small number of well-studied organisms: *Halobacterium*, *Chlamydomonas*, *Volvox*, *Euglena*, *Phormidium*, *Stentor*, *Phycomyces*, and a few others. The authors include many leaders in the field. The scope of the contributions ranges from the level of the behavior of whole organisms down to biophysical and molecular details, with three chapters providing background in physical optics, photochemistry, and thermodynamics. Although the authors discuss their own work to some extent, the papers are intended as short discussions of current research in the various areas. They are not comprehensive and make no attempt to cover the literature, being short, informal didactic pieces suitable for someone wishing to enter the field. They are quite informal—in one essay *Chlamydomonas* is usually referred to as "chlamy"—and mostly of very high quality. With the exception of a chapter entitled "Basic Concepts in Bionergetics"—actually a rather general discussion of attempts to apply irreversible thermody-