(Smart). These initial eight chapters provide a coherent description and analysis of the major features of parental care in laboratory settings.

The final two chapters both point the way to the future and suggest some limitations on current work in the area. In both the authors seek to integrate laboratory with field studies of rodent parental behavior. Elwood discusses the distribution of paternal care within the order Rodentia. Difficulties in deciding whether behaviors exhibited by male rodents in laboratory settings occur in free-living animals, limitations on generalizations imposed by the very limited number of species that have been extensively studied in the laboratory, and the absence of modern fieldwork with three of the four species most commonly studied in laboratory situations combine to limit integration of the wealth of information available on reproduction in laboratory strains of rat, hamster, and gerbil with ecological and evolutionary concerns.

In a final chapter, Swanson relates laboratory studies of rodent reproduction to questions concerning population regulation in natural circumstances. Steady, coherent progress in understanding intrinsic mechanisms of population control in species such as *Mus musculus*, observed in both laboratory and field situations, clearly reveals the difficulties inherent in understanding the function of potential reproduction-limiting processes in those species that have not been studied under natural conditions. Clearly, as researchers studying reproductive behavior in the laboratory seek to expand their contribution to population ecology and sociobiology, they will have to both increase the range of species they study and select such species on the basis of criteria other than convenience for laboratory work.

Elwood's volume will be of considerable use to those seeking brief descriptive overviews of the literature on parental behavior in laboratory rodents. Unfortunately it covers much the same ground as D. J. Gubernick and P. J. Klopfer's *Parental Care in Mammals*. In general, Gubernick and Klopfer's collection is both richer in theory and more comprehensive in its review of the literature than the present volume. Experts in reproductive behavior may want both in their libraries; those with more casual interests will find the volume edited by Klopfer and Gubernick more rewarding.

BENNETT G. GALEF, JR.
Department of Psychology,
McMaster University,
Hamilton, Ontario L8S 4K1 Canada

Neurotransmitter Receptors

Molecular Pharmacology of Neurotransmitter Receptors. TOMIO SEGAWA, HENRY I. YAMAMURA, and KINYA KURIYAMA, Eds. Raven, New York, 1983. xvi. 304 pp., illus. $44. Advances in Biochemical Psychopharmacology, vol. 36.

The idea that neurotransmitter molecules must bind to specific receptor sites in order to produce their effect gained wide acceptance early in this century. However, until about 10 years ago these receptors were defined solely in a functional sense and their existence as actual entities was only inferred. This situation was dramatically altered with the advent of a radioligand binding technique that has led to the identification and partial characterization of receptor binding sites for most known and many putative neurotransmitters. In the past five years work in this field has focused on what has come to be called the "molecular pharmacology" of these receptors—that is, on the molecular mechanism through which agonist and antagonist interact with their receptor to modify cellular function. *Molecular Pharmacology of Neurotransmitter Receptors*, a compilation of 25 chapters with an introduction, provides a reasonable and representative assessment of the present status of research in this field. Nineteen chapters are reports of radioligand binding studies, which thus constitutes the major theme of the book. Eight chapters are concerned with the interactions of guanine nucleotides (such as guanosine 5′-triphosphate) with receptors for several neurotransmitters, including acetylcholine, norepinephrine, dopamine, serotonin, and the endorphins. As is emphasized, GTP interacts with a protein that permits the receptor to either activate or inhibit the enzyme adenylate cyclase. From binding studies, it is apparent that GTP can decrease the affinity of the receptor for agonists but not for antagonists. These findings have led to the hypothesis that a receptor can exist in two or more interconvertible states, which differ in their affinities for agonists. After reading the pertinent chapters one is struck by the similarity in the proposed models for each of the receptors and by the diversity in the approaches that have been taken. A major strength of the book is that it allows the reader to compare the advances that are being made with various receptors.

Nineteen of the chapters are written in the form of primary reports of research. Several of these chapters have been published in journals, albeit in slightly altered form. It is doubtful that some of the others would have withstood peer review. The remaining six chapters are written in the form of reviews, and they tend to be more informative and provide a better perspective of the field. In about a quarter of the chapters there are no references after 1980. Thus, for a rapidly moving field, the book is not as up to date as one would like.

In addition to accurately assessing the status of the field, the book points out the direction in which the field seems to be moving. In six of the chapters there is an attempt to correlate binding with various functions, such as contraction, adenylate cyclase activity, or behavior. Such studies are crucial in relating radioligand "binding sites" to physiological receptors, and more of them will be needed in the future. Other chapters relate initial progress in understanding the interactions of various receptor systems and in assessing the apparent heterogeneity of many neurotransmitter receptors. In general, the volume fulfills its stated intent to clarify some of the recently discovered receptor complexities. Eventually, an understanding of the molecular pharmacology of neurotransmitter receptors will require the solubilization and purification of each receptor and its reconstitution as a functional unit. But for now we must be content with results obtained from studies of intact membranes.

DAVID B. BYLUND
Department of Pharmacology,
University of Missouri School of Medicine, Colombia 65212

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