

But other observations are arresting. A molecular biologist, who had studied at Caltech with Max Delbrück and turned down offers at Caltech, MIT, and Bell Labs to stay in Germany in 1960, offers that perhaps too many Germans learned their postwar science abroad and have never broken away to follow their own German paths. An organic chemist suggests that today's funding allows for enormous institutes that are inherently unmanageable but perhaps as characteristic for our age as cathedrals were for another.

The essays that bracket this collection are of particular interest. The introduction by the physicist Heinz Maier-Leibnitz, past president of the DFG, shows how much the format owes to his own personality. His tone is distinctly humanistic. He emphasizes how one can see what made so many of these authors successful researchers, how many of them refer to their own teachers (as he has often referred to his tutelage under James Franck in Göttingen before 1933), and how often they are caught between what they want to do and what they feel they are constrained to do in the daily administration of their institutes or laboratories. It is clear that to him research is more vision than logic and science administration is more like tending a garden than running a machine. Each researcher needs a different kind of nurturing appropriate to his personality and the standards of his discipline.

The concluding essays by the editor of the volume, Christoph Schneider (head of the planning staff of the DFG), and the current DFG president, the geologist Eugen Seibold, try to come to some conclusions based on the memoranda. They focus on the importance of transmission not only of information but also of style, values, and a sense of community from one generation of researchers to the next. They then note the contrast between favorable research conditions described by those outside the universities and relatively poor conditions lamented by those in them and point out that for many researchers teaching the younger generation is perceived as a secondary activity. Yet they do not confront the conflict between the importance of value transmission and the desire of excellent researchers to relegate teaching to the background. Instead of just expanding research opportunities directly, it would seem that some effort to make teaching more rewarding and less harried would be called for.

Schneider and Seibold carefully draw attention to the appearance of the word

"elite" in the essays of numerous authors. It is claimed that financial support for individual researchers, the capabilities of specific universities, and personal recognition are all areas in which egalitarian pressures have worked against first-rate research. The thrust of their comments is in effect to revert to the tradition begun by Wilhelm von Humboldt at the opening of the 19th century: pick a proven scholar full of curiosity, determination, and a sense of direction, support him, and let him follow his head. This is not a suggestion likely to find resonance among those on the left who have been fighting for nearly two decades to constrain the liberty of those in older positions of authority. Whether the conservatives currently leading the government are inclined to restore some of that liberty remains to be seen.

Finally, the book concludes with a concern for the relationship between the individual and the broader research community. Interdisciplinary contact is desirable, exchange of ideas between Max Planck Society researchers and university teachers is encouraged, and participation in international forums is essential. Yet, Seibold holds, in the final analysis it is the individual who discovers something new and who then communicates it to the young: the personal interactive process is the heart of research, and to further it is the greatest challenge to the cumbersome machinery of science policy and administration in West Germany today. Seibold has begun to lobby for the creation of more permanent positions for young researchers. At the annual meeting of the DFG just held in June, his call for action to replace endless discussion was underscored by support from Federal Chancellor Helmut Kohl and various education officials.

Yet for all the openness this compilation of internal memoranda displays, there seem to me three problems skirted in the essays that would have to be confronted to improve the quality of West German research. The first is illustrated by the fact that, of 97 memoranda representing as many different fields, only one is by a woman. It is not clear how a return to older attitudes would change this ratio and tap the potential of the female German population. The second is that in an attempt to balance the claims of all interested parties an equilibrium has been reached, leading to a widespread sense of futility. This is not a phenomenon peculiar to the Germans, of course, but it involves some awkward questions in a country where strong leadership is still suspect. The third problem

is that too few observers seem to notice that the level of science in West Germany today is not compared to that of West Germany prior to 1933. It is compared instead to a Germany that now includes both East Germany and major portions of Poland. It is clear that many West Germans are still not reconciled to the fact that the Federal Republic cannot be expected to measure up to that which all of erstwhile Germany could accomplish. This false comparison demonstrates a burden of the past that has yet to be overcome and that is not only the source of much of the disenchantment surrounding West German science today but also a barrier to the creation of a new research tradition truly characteristic of the Bundesrepublik.

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## Reproductive Behavior

**Parental Behaviour of Rodents.** R. W. ELWOOD, Ed. Wiley-Interscience, New York, 1983. x, 296 pp., illus. \$49.95.

It is appropriate in this 50th anniversary year of the publication of Wiesner and Sheard's germinal monograph, *Maternal Behaviour in the Rat*, to review a half-century of progress in the laboratory study of parental behavior in rodents. The intervening years have witnessed both increased sophistication in the observation and description of the components of parental behavior and more detailed and technically innovative analyses of the hormonal and stimulus control of the interaction of parents and young. In consequence, there is deeper understanding of all the phenomena discussed in Wiesner and Sheard's pioneering work, as well as a range of new facts about and approaches to the study of rodent reproduction.

Elwood's volume, comprising 10 chapters by 11 authors, provides largely descriptive reviews of many of the actively studied aspects of reproductive behavior in laboratory rodents: development of maternal behavior (Mayer, Priestnall), effects of hormones and pup stimulation on the onset and maintenance of maternal behavior (Rosenblatt and Siegel), analysis of communication between adults and infants (Elwood and McCauley, Porter), maternal aggression (Ostermeyer), suckling and the physiology of lactation (Drewett), and the role of maternal nutrition in pup development

(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.

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## 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 al-

tered 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.

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## Books Received

**Aging of the Brain.** Papers from a meeting, Mantova, Italy, Mar. 1982. David Samuel, Sergio Algeri, Samuel Gershon, V. E. Grimm, and Gino Toffano, Eds. Raven, New York, 1983, xx, 390 pp., illus. \$42. *Aging*, vol. 22.

**Air Pollution Modeling and Its Application II.** Proceedings of a meeting, Menlo Park, Calif., Aug. 1981. C. De Wispelaere, Ed. Plenum, New York, 1983. xii, 874 pp., illus. \$95. NATO—Challenges of Modern Society, vol. 3.

**American Psychology since World War II.** A Profile of the Discipline. Albert R. Gilgen. Greenwood, Westport, Conn., 1982. xiv, 274 pp. \$29.95.

**City Landscape.** A Contribution to the Council of Europe's European Campaign for Urban Renaissance. Papers from a conference, Bath, England, Mar. 1981. A. B. Grove and R. W. Cresswell, Eds. Butterworths, Boston, 1983. xii, 196 pp., illus. \$69.95.

**Clinical Uses of Essential Fatty Acids.** Proceedings of a symposium, London, Nov. 1981. David F. Horrobin, Ed. Eden Press, St. Albans, Vt., 1983. viii, 214 pp. \$35.

**Coal Structure.** Robert A. Meyers, Ed. Academic Press, New York, 1982. xiv, 340 pp., illus. \$49.50.

**Computed Tomography in Radiation Therapy.** Papers from a symposium, Arlington, Va., Sept. 1981. C. Clifton Ling, Charles C. Rogers, and Robert J. Morton, Eds. Raven, New York, 1983. xvi, 268 pp., illus. \$45.

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