

Many Faces of the Synapse

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Excitatory Amino Acids and Synaptic Transmission. H. V. WHEAL and A. M. THOMSON, Eds. 2nd ed. Academic Press, San Diego, 1997. xvi, 388 pp., illus., + plates. \$75, ISBN 0-12-746031-4.

Synapses, the specialized connections between neurons, mediate communication from cell to cell in the brain. One class of synapse releases the neurotransmitter glutamate, which causes the next cell in line to become more active. These points of excitation are widespread in the brain and fundamental to brain function. Not surprisingly then, studies of neurotransmission by glutamate at just about any level of analysis—from molecular and biophysical to integrative—have broad implications. *Excitatory Amino Acids and Synaptic Transmission*, edited by Howard Wheal and Alex Thomson, takes up the challenge of presenting an extensive overview of this field and, now in a second edition, well reflects its excitement and its rapid changes.

Some subjects discussed in the first edition, such as epilepsy models, have been removed, while others have been given greater emphasis. Whereas the first edition dealt more with glutamate receptors on the postsynaptic cells, the second contains several chapters that emphasize presynaptic aspects of synaptic transmission—including a new chapter by Stanley in which the word “glutamate” is virtually absent! In this chapter, as well as in one by Nicholls, a summary of biochemical and molecular aspects of transmitter release is provided that should be useful to any neuroscientist. The chapter by Thomson and Deuchars has also been revised to emphasize the statistical analysis of transmitter release, particularly as it applies to frequency-dependent changes in synaptic strength.

Nevertheless, readers will discover a wide variety of glutamate receptor-related topics, from design issues in fabrication of agonists

and antagonists (Krogsgaard-Larsen *et al.*) and receptor distribution (Young *et al.*) to changes in receptor properties during long-term potentiation (LTP) and long-term depression (LTD) (Malenka). Ionotropic glutamate receptors sensitive to *N*-methyl-D-aspartate (NMDA) receive practical treatment by Johnson *et al.* and Cull-Candy *et al.*, both of whom focus on the biophysics and measurement of channel permeation.

The first edition, assembled before the cloning of the first functional glutamate receptor, was devoid of molecular biology. Two

chapters now address this issue, albeit with vintage 1995 information. Lambolez *et al.* discuss single-cell reverse transcription and polymerase chain reaction analysis of the subunit composition of receptors sensitive to AMPA (α -amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid) and of NMDA receptors, including the potential functional implications of specific receptor isoforms. Mayer *et al.* also describe biophysical characteristics of various cloned AMPA and kainate receptors. One hopes that future editions will contain greater perspective on the relation between expression of particular molecular species of glutamate receptor and the dynamic properties of glutamatergic synapses.

Although publications of this nature often fail in their mission because the chapters are merely poorly linked advertisements for work from the authors' own laboratories, many chapters in this book are genuine, well-written reviews of the field. As examples, Massey and Maguire provide a welcome explanation of the complex role of glutamate and glutamate receptors in retinal circuitry, while Saugstad *et al.* succinctly and critically review the modulation of ion channels by activation of metabotropic glutamate receptors. Unique aspects of the book, retained from the previous edition, are a glossary of terms used throughout the volume as well as an extensive (and handy) list of receptor agonists, antagonists, and modulators.

The second edition is every bit as useful as the first, and, although slightly shorter in length, it is lower in price. This book is appealing most of all because it succeeds in painting a detailed

picture of glutamatergic synapses from nearly every available aspect: transmitters, receptors, release mechanisms, modulation, and integration.

A companion volume, *Excitatory Amino Acids—Clinical Results with Antagonists* (P. L. Herrling, Ed.), will be of interest to a more specialized audience. This supplement describes the current state of clinical trials of glutamate receptor antagonists, primarily the NMDA receptor antagonists. Some readers will be surprised by the preface, which asserts that dysfunction of glutamate synapses is the “likely cause” of conditions such as emesis and schizophrenia. However, few in the field of glutamate transmission should doubt that their diverse efforts to understand how these synapses work will someday have their biggest impact in the clinic.

Browsings

Carl Sagan's Universe. Yervant Terzian and Elizabeth Bilson, Eds. Cambridge University Press, New York, 1997. xiv, 282 pp., illus., + plates. \$39.95, ISBN 0-521-57286-x; paper, \$22.95, ISBN 0-521-57603-2. From a symposium, Ithaca, New York, October 1994.

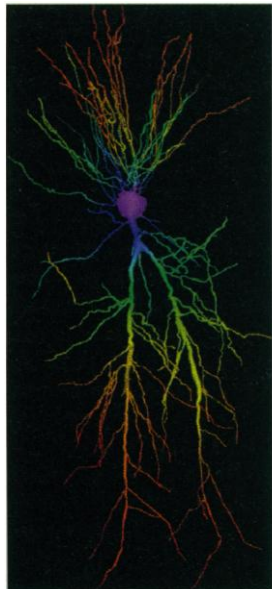
A 60th-birthday celebration for the late popularizer-astronomer, whose interests as represented here included planetary exploration (discussed by Wesley Huntress, Edward Stone, Roald Sagdeev, and Bruce Murray), “life in the cosmos” (six authors, including David Morrison, Frank Drake, and Kip Thorne), science education (James Randi, Philip Morrison, and four others), and the environment and public policy (Richard L. Garwin and five others).

Hormones and Signaling. Vol. 1. Bert W. O'Malley, Ed. Academic Press, San Diego, 1997. xvi, 364 pp., illus. \$69.95, ISBN 0-12-312411-5.

A collection of 10 papers on topics in molecular endocrinology ranging from glucocorticoids and oxysterols in lymphoid apoptosis (E. B. Thompson) to nuclear orphan receptors (P. J. Willey and D. J. Mangelsdorf), inaugurating a series intended “to critically evaluate the field of regulatory biology and select the very best of the ongoing work for presentation.”

NASA/TREK. Popular Science and Sex in America. Constance Penley. Verso, New York, 1997. vi, 169 pp. + plates. \$50 or C\$80, ISBN 0-86091-405-4; paper, \$14 or C\$25, ISBN 0-86091-617-0.

A professor of film studies and women's studies examines the relations between how NASA represents itself to the public and the world of science fiction, from the original 1960s television show to feminist writings of the “slash” genre.



Simulated stimulation. Response of a neuron to a simulated input is lowest at the terminal branches (orange) and highest at the cell body (pink).

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