Activity-Dependent Learning

The Neural and Molecular Bases of Learning. J.-P. CHANGEUX and M. KONISHI, Eds. Wiley-Interscience, New York, 1987. xiv, 559 pp., illus. $110. Life Sciences Research Reports, 38. From a workshop, Berlin, F.R.G., Dec. 1985.

Mechanisms of learning and memory have preoccupied neurobiology for decades, since before neurobiology was recognized as a distinct discipline, and the Hebb synapse will be 40 next year. What has changed over the decades is not so much the basic issues as the way we look at them, and this is changing very rapidly. *The Neural and Molecular Bases of Learning* is timely because it is devoted to some of the currently popular ways of viewing the problem. The book places the traditional questions about learning and memory in the context of control of gene expression, second messenger systems, activity-dependent developmental changes, and neuronal network properties.

Reflecting the organizational principles of the Dahlem Workshop on which it is based, the book consists of four group reports on assigned topics along with the position papers that served as the basis for each group's deliberations. Three of four group reports stress the role of neuronal activity in learning and memory (although the exact meaning of "activity" differs from group to group).

The first group report ("Activity-dependent regulation of gene expression") is the most molecular one. It examines examples of how cellular activity can alter gene expression and focuses mainly on the way in which a particular cell's activity pattern can alter which genes that cell expresses. For example, the type of myosin muscle cells express depends on how frequently the muscle is instructed by motoneurons to contract. Although the types of activity effects discussed in this section are interesting, probably more relevant to learning is the phenomenon of transsynaptic control of gene expression, a rich topic, unfortunately mostly neglected in this volume, that includes more than a cell's "activity."

The second group report ("Activity-dependent regulation of synaptic transmission and its relationship to learning") covers the phenomena of long-term potentiation and long-term depression and includes several cellular analyses of invertebrate learning and a description of synaptic plasticity in the cerebellum and cerebral neocortex. The third report ("Activity-dependent modification of functional circuitry as a possible basis for learning") deals with possible structural changes underlying learning and the potential relationship between memory mecha-

nisms and activity-dependent processes in development (for example, in the formation of ocular dominance columns).

The final section ("On neuronal assemblies and memories") mixes some network theories with experimental observations on collections of neurons, both invertebrate and vertebrate.

The quality of the contributions is a little uneven, and some of the sections are no longer quite up-to-date in the faster-moving areas of study. Nevertheless, this book is useful because it provides a focused summary of some recent research directions in learning and memory.

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Books Received

Chemical Weapon Free Zones? Ralf Trapp, Ed. Oxford University Press, New York, 1987. xii, 211 pp. Paper, $32. Stockholm International Peace Research Institute Chemical and Biological Warfare Studies, no. 7.

The Chemistry of Acid Rain. Sources and Atmospheric Processes. Russell W. Johnson *et al.*, Eds. American Chemical Society, Washington, DC, 1987. xii, 337 pp., illus. $59.95. ACS Symposium Series, vol. 349. Based on a symposium, New York, April 1986.

Chemistry of High-Temperature Superconductors. David L. Nelson, M. Stanley Whittingham, and Thomas F. George, Eds. American Chemical Society, Washington, DC, 1987. xii, 329 pp., illus. $64.95. ACS Symposium Series, vol. 351. Based on a symposium, New Orleans, LA, Aug.–Sept. 1987.

Color and the Computer. H. John Durrett, Ed. Academic Press, Orlando, FL, 1987. xii, 299 pp., illus., + plates. $59.50.

Community Ecology. Pattern and Process. Jiro Kikkawa and Derek J. Anderson, Eds. Blackwell Scientific, Palo Alto, CA, 1986. xii, 432 pp., illus. $50; paper, $35.

Comparative Behavior of African Monkeys. Evan L. Zucker, Ed. Liss, New York, 1987. xii, 239 pp., illus. $49.50. Monographs in Primatology, vol. 10.

Dr. Luis Ugueto. Ingeniero, Astronomo y Professor. Alberto E. Olivares. Academia de Ciencias Físicas, Matemáticas y Naturales, Caracas, 1986. 309 pp., illus. Paper, $10.

Electroanalytical Measurements in Flowing Liquids. K. Štulík and V. Pacáková. Horwood, Chichester, U.K., and Wiley, New York, 1987. 290 pp., illus. $77.95. Ellis Horwood Series in Analytical Chemistry.

The Electronic Structure and Chemistry of Solids. P. A. Cox. Oxford University Press, New York, 1987. xii, 259 pp., illus. $55; paper, $24.95.

Elements of Statistics for the Life and Social Sciences. Braxton M. Alfred. Springer-Verlag, New York, 1987. xiv, 190 pp., illus. $36. Springer Texts in Statistics.

The Encyclopedia of Aging. George L. Maddox, Ed. Springer, New York, 1987. xxviii, 893 pp., illus. $96.

Encyclopedia of Indian Natural History. Centenary Publication of the Bombay Natural History Society, 1883–1983. R. E. Hawkins, Ed. Published on behalf of the Bombay Natural History Society by Oxford University Press, New York, 1987. xvi, 620 pp., illus., + plates. $49.95.

Encyclopedia of Neuroscience. George Adelman, Ed. Birkhäuser Boston, Cambridge, MA, 1987. Two volumes. lxvi, 1308 pp., illus., + appendix and index. $125.

Highlights on Endocrinology. Claus Christiansen and Bente Juel Riis, Eds. First European Congress of Endocrinology, Copenhagen, 1987. 436 pp., illus. DKr 750. From a congress, Copenhagen, June 1987.

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