Jonathan M. Silver, M.D.
Book Review Editor

Biological Psychology: An Introduction to Behavioral, Cognitive, and Clinical Neuroscience, Third Edition

By Mark R. Rosenzweig, S. Marc Breedlove, and Arnold L. Leiman
Sunderland, Massachusetts, Sinauer Associates, 2001, 651 pages, ISBN 0-87893-709-9

Samuel T. Gontkovsky, Psy.D.

Dr. Gontkovsky presently is Clinical Neuropsychologist at the Methodist Rehabilitation Center, Jackson, Mississippi.

The multidisciplinary nature of biological psychology as a field provides a unique forum for the interaction and collaboration of professionals unparalleled in other areas of clinical and scientific study. Indeed, the scope of biological psychology transcends all levels of organismic development, from the molecular level to the cellular level, the systemic level, and the social level. Contributing to the advancement of this discipline, from both a theoretical and an empirical perspective, is a diverse representation of investigators trained in the areas of anatomy, anthropology, behavioral medicine, biochemistry, clinical neuropsychology, endocrinology, genetics, molecular biology, paleontology, psychiatry, and psychophysiology to name but a few. Working together, these professionals study the structural and functional aspects of behavior across species, explore the developmental processes of biology and behavior across the life span, and utilize findings to formulate practical applications that promote human health.

The comprehensive nature of the field and the diversity of professionals encompassed by the arch of its umbrella pose a particular challenge, however, in the drafting of a textbook that not only can be appreciated, but easily understood, by the representative populace of biological psychologists as well as the students desiring to acquire an understanding of this area of study. The third edition of *Biological Psychology* serves as an excellent source for bridging the gap between the multitudes of specialties that constitute this discipline. The text consists of 18 chapters divided into five primary sections. A short introductory chapter, which provides a basic overview of the field, is followed by a section focusing on the biological foundations for behavior. Chapters in this section, which provide the requisite foundation for understanding the remainder of the text, introduce readers to organisms at cellular level, discussing the primary topics of functional neuroanatomy, neurophysiology, psychopharmacology, and hormones.

Subsequently, the authors move to a presentation of evolutionary and developmental aspects of the nervous system. Comparative methods are discussed sufficiently to allow for an appreciation for the manner in which studying the various invertebrate species (e.g., aplysia), with relatively simple neural networks, has lead to a more thorough understanding of the enormously intricate nervous systems housed by the vertebrate species (e.g., human). Furthermore, emphasis is placed upon the notion that neural networks are shaped not only by intrinsic factors, such as chromosomal aberrations, but also by extrinsic factors, including environmental experience.

The focus of section three is that of sensation and movement. Chapters review the concepts of somatosensory, auditory, visual, vestibular, olfactory, and gustatory perception as well as motor control and plasticity. While ample attention is given in this section to the anatomical and physiological mechanisms involved in perception and movement, the authors remain sensitive to the role of learning in these behaviors and the manner in which environmental elements influence such systems. Regulation of behavior is presented in section four. Primary topics discussed include sex, homeostasis, and biological rhythms. In this section, as in section three, the authors provide an evolutionary, developmental, and comparative perspective of the issues and overview not only the normal but also the possible abnormal variants (e.g., congenital adrenal hyperplasia, anorexia nervosa, and somnambulism) of these processes.

Emotions and psychopathology comprise the heart of section five. An overview of competing theories (e.g., James-Lange and Cannon-Bard) regarding the link between subjective psychological phenomena and the activity of the visceral organs controlled by the autonomic nervous system initially is presented followed by the role of facial expressions in the communication of emotional states. An excellent discussion is provided concerning the utilization of relatively new functional neuroimaging techniques to investigate

specific regions of the brain that are particularly active during various emotional states. Special attention also is given to the neural circuitry underlying violence and aggression as well as to the relationship between stress and immunosuppression. The major psychiatric disorders are reviewed from both a social and a biological perspective.

The text concludes with a section devoted to cognitive neuroscience, with particular emphasis on the biological perspectives and neural mechanisms of learning and memory. With citations ranging from classic reports of early pioneers, such as that of Ramón y Cajal[1] suggesting that during the processes of development and learning neuronal extensions of axons and dendrites occur to develop new connections within the brain, to that of more contemporary investigators, including the findings of Shors, Miesegaes, Beylin, Zhoa, Rydel, and Gould[2] suggesting that neurogenesis in the hippocampus may be required for trace conditioning of the eye-blink response, the authors bring together in a comprehensive yet concise fashion more than 100 years of research in this area.

In addition to an inclusive glossary of terms, the work includes an afterword discussing the plasticity of the ever-changing brain as well as a nice appendix providing a basic overview of molecular biology. Throughout, the text is richly illustrated with drawings, photographs, figures, and tables that complement the written text. With the exception of a few minor shortcomings concerning the topic of psychopharmacology (Chapter 4), the text is integrative and inclusive, providing the requisite information necessary for a methodical understanding of the field.

From a didactic perspective, the text is ideal for an advanced doctoral level course in the area. The book is probably far too complex, however, for utilization at the undergraduate level, and arguably, incorporates details from various fields that may be beyond the digestive comprehension of some graduate students who lack sufficient background in these areas of study. Although the authors provide an introductory overview at the beginning of each chapter, a relatively rapid progression from basic concepts to more complex issues takes place. A CD-ROM, entitled *Learning Biological Psychology*, is provided with the text that provides for students multiple study questions, animated tutorials, videos, and interactive testing to enhance learning and retention. Individuals with a basic, yet solid, foundation in biology, chemistry, and psychosocial behavior, however, should be capable of grasping the vast majority of presented material.

References

1. Ramón y Cajal S: La fine structure des cebtres nerveus. Proceedings of the Royal Society of London. Series B: Biological Sciences 1894; 55:444–468
2. Shors TJ, Miesegaes G, Beylin A, et al.: Neurogenesis in the adult is involved in the formation of trace memories. Nature 2001; 410:372–376