6-2016

# Review: 'Neurobiology: A Functional Approach'

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Neurobiology: A Functional Approach.

*By Georg F. Striedter. Oxford and New York: Oxford University Press.* $122.95. xxix + 613 p.; ill.; index. ISBN: 978-0-19-539615-7. 2016.

The focus of this volume is on how nervous systems work and why they work as they do in the context of "the problems that brains help organisms solve" (p. xix). Accordingly, throughout this 16-chapter publication, the focus of the author is more on neural architecture and functioning at the circuitry and systems levels of analysis than on cellular and genetic factors. Actually, I found a nicely balanced and constantly interwoven discussion of all of these levels of analysis. The opening chapter is an overview of neuroanatomy and organization, neural circuitry, and functional architecture. In order, the following chapters cover neural computation and neural plasticity; embryonic development; the brain's responses to physical trauma, toxins, and pathogens; distal and proximal sensory systems and processing, and cognitive maps; muscles, glands, and vital bodily functions; posture and locomotion; spatial orientation and processing; stimulus identification; memory and memory dysfunctions; goal-directed actions; and species and gender brain differences. Although earlier chapters do provide a foundation for later material, I found that after the first three or four chapters, the remaining chapters by and large stand alone.

Of interest to both teachers and students, each chapter includes "'special topics boxes' that complement the central [functional orientation] narrative" (p. xxi). Topics and examples include: neurological disorders and therapies (e.g., spinal cord injury and recovery, locked-in syndrome, visual agnosia, posttraumatic stress disorder, and immune responses); experimental techniques and research (e.g., patch clamp recordings, neuroimaging techniques, and issues in animal research); evolutionary considerations (e.g., Hox genes, nature's neurotoxins, learning and memory in invertebrates (*Aplysia*), electroreception and other alien senses, sound localization in barn owls, and recording neural activity in awake animals); neurobiology in depth (e.g., hippocampal structure and functions, molecular biology of voltage-gated ion channels, sex drive and sexual conditioning, anesthesia, and the death penalty); and therapies (e.g., brain-computer interfaces, cochlear implants, treating Parkinson's disease, and delivering drugs to the brain).

Interspersed throughout each chapter are Brain Exercise questions such as: "Why are brains so good at what they do, despite being relatively slow and 'noisy' compared to computers?" (p. 67); "In what sense are human brains typical primate brains, and how are they unique?" (p. 520); and "How might you test whether walking in a cockroach involves a chain of sensorimotor reflexes or a central pattern generator?" (p. 320). Additionally, each chapter concludes with a relatively detailed summary of the major points covered in each section of that chapter. There is also a list of key terms as well as 20 to 30 recommended additional readings associated with each section of the chapter. Other than the classic readings in the history and research cited in every chapter, most references are relatively recent (within the past 10 years or so).

Supplemental visual materials available to students include: a three-dimensional Web-based atlas of Nissl- and fiber-stained sections, as well as a human brain MRI atlas. Supplemental visual resources for instructors include: a PowerPoint library of all illustrations, photographs, graphs, and tables; PowerPoint format lecture notes in editable form; and a computerized test bank of 750 multiple-choice questions.

This volume is highly recommended for introductory-level courses in neuroscience and comparative neuroscience for biology and premed students. It is clearly written, with an interesting mix of textual and visual materials. There are literally hundreds of illustrations, graphs, charts, and drawings for translating written into visual representations. The text closely tracks the current state of the literature, including controversies and what remains a mystery at this point. Perhaps most importantly, students will come away from this book with a clear understanding of the extent to which the current generation of research technologies and associated methodologies in current neuroscience define, restrict, and promote explanatory modeling.

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## CELL AND MOLECULAR BIOLOGY

Stem Cells in Development and Disease. *Current Topics in Developmental Biology, Volume 107.*

*Edited by Michael Rendl. Academic Press. Amsterdam and Boston (Massachusetts): Elsevier.* $210.00. xviii + 452 p. + 31 pl.; ill.; index. ISBN: 978-0-12-416022-4. 2014.

This is a well-conceived book that is comprised of a collection of articles that focus on stem cell behavior, function, and regulation. The volume should be of interest to all stem cell researchers, and most of the content is delivered from the perspective of the molecular control of stem cell renewal and differentiation. This book has a major focus on