



Principles of Brain Evolution

By Georg F. Striedter

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Brain evolution is a complex weave of species similarities and differences, bound by diverse rules or principles. This book is a detailed examination of these principles, using data from a wide array of vertebrates but minimizing technical details and terminology. It is written for advanced undergraduates, graduate students, and more senior scientists who already know something about "the brain," but want a deeper understanding of how diverse brains evolved.

The book opens with a brief history of evolutionary neuroscience, then introduces the various groups of vertebrates and their major brain regions. The core of the text explores: what aspects of brain organization are conserved across the vertebrates; how brains and bodies changed in size as vertebrates evolved; how individual brain regions tend to increase or decrease in size; how regions can become structurally more (or less) complex; and how neuronal circuitry evolves. A central theme emerges from these chapters--that evolutionary changes in brain size tend to correlate with many other aspects of brain structure and function, including the proportional size of individual brain regions, their complexity, and their neuronal connections. To explain these correlations, the book delves into rules of brain development and asks how changes in brain structure impact function and behavior. The two penultimate chapters demonstrate the application of these rules, focusing on how mammal brains diverged from other brains and how *Homo sapiens* evolved a very large and "special" brain.

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Editorial Review

Review

"This text will surely supersede its stated goal, to pique the interest in brain evolution of advanced undergraduate and graduate students. From the very beginning, with the fascinating example of Bumpus' sparrows of 1898, we know this book will be more witty and lively than most on this topic. Throughout the remaining text, Striedter succeeds repeatedly by explicating the main principles of brain evolution without encyclopedic or dry detail. As a result of this new text, we can certainly anticipate that young students of evolutionary neuroscience will be enticed to address questions that currently lack much empirical data."

--David C. Airey, *Genes, Brain and Behavior*

"This volume offers an enduring and succinct summary of the vast archive of morphological data that reveals the wondrous diversity of brains."

--Robert W. Doty, *The Quarterly Review of Biology*

"Georg Striedter has produced a wonderful book that discusses current understandings of brain evolution. Overall, this is a volume that most neuroscientists will enjoy reading, and some of them, myself included, will find it useful as a textbook for graduate students and advanced undergraduates."

--Jon H. Kaas, *Nature Neuroscience*

"In *Principles of Brain Evolution*, Striedter accomplishes several important goals: he conveys the many aspects of brain structure and function that are conserved across species; he illustrates in a clear manner why species differences are real and should not be dismissed; he explores the complex issue as to how conservation and divergence--noted at various levels of neural organization--relate to one another; and finally, he hypothesizes as to how the rules of brain development have consequences for how the brains evolve. Astonishingly, Striedter accomplishes these goals in some 360 pages of text! I highly recommend this book."

--C. A. Morgan, III, M.D., M.A., *Yale Journal of Biology and Medicine*

About the Author

Georg Striedter is Associate Professor in the Department of Neurobiology and Behavior at the University of California, Irvine. He received his undergraduate training at Cornell University and obtained a Ph.D. from the University of California, San Diego in 1990. Most of his early research focused on the evolution of various functionally interesting pathways in fish brains. He then went on to study avian brains as a postdoctoral researcher at the California Institute of Technology. Specifically, he studied how and why parrot brains are specialized for imitating sounds. Dr. Striedter continued this work as a faculty member at UC Irvine and broadened it to include questions about how avian brains differ from those of other vertebrates

in terms of structure, function and development. In 1998, he received the C. J. Herrick Award for his contributions to comparative neuroanatomy.

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