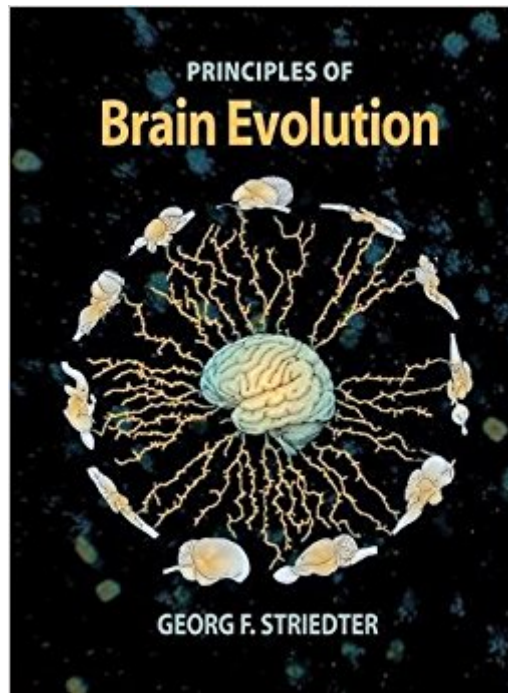




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# Principles Of Brain Evolution



## Synopsis

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.

## Book Information

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## Customer Reviews

"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*

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.

This is an excellent introduction to the field of vertebrate brain evolution for someone without much of a background in neuroscience or evolutionary science. The author critically reviews what is

known about brain evolution from the perspective of trying to enunciate underlying "laws" governing how the vertebrate brain evolves. He is careful to point out the limitations of this approach, but nonetheless makes a reasonably good case for the existence of some overarching principles which can be used to guide progress in this still emerging field. These include "big is well-connected" and "late is large". The author proposes that much of brain evolution is driven by absolute as opposed to relative brain size, and that absolute brain size has not received the attention it deserves in this regard. The book is well-organized and the author's arguments are cogent, well-supported, properly qualified, and easy to follow, with numerous excellent figures and diagrams. The author is extremely well versed in the primary literature and is not afraid to point out what is not known or poorly understood, and where further research is needed. The reader finishes with a good sense of the current state of the field and the directions it may be heading. After reading this book I came away with a better understanding of how the human brain differs from the brains of other vertebrates, how it developed, and how it endows us with our human abilities and liabilities. Five stars.

As a neuroradiologist in training, I purchased this book to get an overview of the evolutionary history of the brain. I am almost finished reading the book, and I've found it an excellent overview of brain evolution. The author is clearly an established neuroscientist who has followed and contributed to the field for years, and this is his overview. He uses examples throughout, and as is true in all good scientific writing, almost every other sentence has a reference to the original paper or book that introduced the fact or principle. As the title implies, the author integrates the facts into principles, which gives the reader a framework and approach to use when thinking about the topic. The writing style is very accessible. I highly recommend this book if you are interested in getting up to date with regard to what the scientific community has learned about brain evolution, and the principles implied.

Prof. Georg F. Striedter has done a superb and comprehensive job of summarizing an incredibly complex subject (brain evolution). One can detect his enthusiasm for and delight in his subject matter, qualities that make this serious work enjoyable to read. His writing is exceptionally clear and, for the most part, accessible to the non-expert. The only thing that would have been helpful to have in addition would have been a glossary of some of the technical terms (though with Wikipedia and a good dictionary, this is not a serious problem). The bibliography and the index are detailed and thorough. I highly recommend this book.

An intelligent and compelling study by Prof. George Striedter "Principles of Brain Evolution" offers a reader an inspiring expedition through the main landmarks and principles of brain evolution and development. Full of fascinating insights and turbulent ideas, this volume may serve also as an excellent guide through the concepts and hypothesis of the brain's natural history, which raised and fell under the test of questing minds along centuries.

Want to know about Brain Evolution? I thought so. You can't go wrong. This is the best. wants me to write more words for something that only takes a few, so: for real, if you're taking a class on the subject, want to understand the subtleties of just how fish brains are different from monkey brains: Buy this book!

This is a very good introduction to evolutionary neuroscience, even for the non-expert, but a basic neuroscience knowledge is required. The author writes very well - his prose is clear and surprisingly funny sometimes, and the book is well structured, with many colored drawings, diagrams and graphs. Instead of going through rather specific neuroanatomical details, the author focuses more on explaining general principles that guide brain evolution, giving all the evidence that support or contradict the proposed hypothesis or rules. As can be seen from the table of contents, he expends more time with the mammalian and human brain, which is understandable considering there is more interest and data on them. As suggested by other reviews, a glossary would be very useful, specially for people (like me) who are from a non-biological background. Another good addition would be a chapter focusing on what's special about avian brains, which seem to have developed an interesting structure capable of higher thought (DVR), that is equivalent to our neocortex. These two issues, however, do not detract from the quality of the book. It may be a bit pricey, but it is worth every penny invested. If anyone wants to learn about brain evolution, this is an excellent way to start.

Author writes well and keeps specialized jargon to a minimum. However, you should know that the subject involves much speculation. I learn more from 5 minutes reading, say, a physics textbook than an hour reading about brain evolution. This isn't the author's fault but it is what it is. (Note this should not be interpreted as a creationist critique: I accept Darwinian evolution)

this is a very good overview of a very interesting field. I highly recommend this book

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