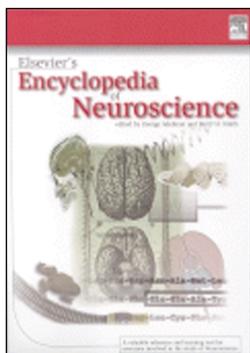


The neurosciences from A to Z



Elsevier's *Encyclopedia of Neuroscience*, 2nd edition

edited by G. Adelman and B. H. Smith
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Reviewed by *Richard B. Ivry*

The neurosciences are vast. With the endless proliferation of new journals, it is nearly impossible to keep up with the latest findings in our own specializations, let alone in the field as a whole. Some journals provide overviews of the latest breakthroughs in their news and comments sections. However, these tidbits tend to be narrow in scope, helping only to sort out the details of insights that are contained in the scientific reports. Our desks are cluttered with piles of unread journals, articles, reviews and preprints that promise to educate us on topics that are peripheral to the focus of our research programs, but we perpetually postpone our reading of this literature. Those who are pack rats eventually consign unread material to the dark recesses of our filing cabinets; the realists fill up a recycling bin or two on a periodic basis. We resort to a hodgepodge of methods to bolster our general knowledge, making do with the weekly colloquia, the expertise of our colleagues, and the occasional reading of *Current Opinion* volumes or *Scientific American* pieces. Hardly a systematic approach for the establishment and maintenance of expertise.

With this in mind, the invitation to review an encyclopedia of neuroscience was appealing. Here was a chance to try out a new approach for filling in the gaps, or more truthfully, the crevasses in my grasp of the field. If one thinks of formal learning as the refinement of skills initially taught during primary and secondary school, then why not return to the most elementary of

sources—the encyclopedia. I recall my first scientific paper, a report on corn. Based on my suburban experience, I knew little about this topic other than that it was a vegetable that became sweeter as the summer became longer. I found information about the history, geographic distribution, growing cycle, preferred climate, and many uses of *Zea mays* in the imposing family *Britannica*. And once cracked, there was a seductive pleasure in continuing down the disconnected path to learn about the Corn Islands of the Caribbean, martyred Pope Cornelius, and the cornea. The world was much less of a mystery.

Perhaps Elsevier's *Encyclopedia of Neuroscience*, edited by George Adelman and Barry Smith, would prove to be similarly satisfying. First impressions were certainly promising. The enlarged and revised second edition of this two-volume set is quite hefty, totaling over 2,000 pages. Coverage is broad and many of the approximately 750 entries are authored by some of the most renowned investigators in the neurosciences community. Zach Hall reviews the neuromuscular junction, Rodolfo Llinas covers the electrophysiology of the inferior olive, Michael Posner discusses selective attention, and Stanley Prusiner brings us up to date on prions. The full range of the neurosciences is well represented, with a reasonable distribution of entries spanning the major subdivisions of developmental, molecular, cellular, systems, cognitive and clinical neurosciences. It is unlikely that any other single anthology would contain entries on topics as diverse as "neuropeptide precursors," "laughter" and "Prader-Willi syndrome." Topics that are of great interest have been allocated multiple entries; glial cell entries

include "line-derived neurotrophic factor," "functions," "morphology," "in insects" and "pathology." A set of entries such as "Aplysia: tool in neuroscience research," and "phrenology" deal with major methodological and intellectual advances (and some dead ends) that have marked the progress of the field over the past century. An appendix provides a concise biography of contributors to neuroscience, with the interesting constraint that it is limited to the years 300 B.C. to 1960. It isn't clear if this range was designed to pay tribute to the pioneers of the field or reflected a diplomatic decision on the part of the editors to avoid the snake pit they envisioned as contemporaries search to see if they have made this latest Who's Who list.

It was impossible to read this volume from cover to cover, and so I adopted a twofold strategy to review this encyclopedia. The first approach mimicked the child's first foray into the world of encyclopedias—I read a cluster of alphabetized entries, beginning with the letter 'A.' *A priori*, it seemed reasonable that this would provide a sample of the world of neurosciences, although in the end, it became clear that such an approach was biased towards topics of clinical interest (apraxia, agnosia, ataxia). Then I chose to read three other types of entries: those that I was very familiar with, those that were unfamiliar, and those that piqued my interest. By comparing notes with a couple of cellular biologists on some of these topics, we could evaluate the comprehensiveness and clarity of the entries for readers with vastly different backgrounds.

The breadth of the material mandates a delicate balancing act in which the authors must review their topics in a concise yet accessible manner. Some of the entries certainly achieve this goal. For someone with little background in neuropharmacology, the entries on antipsychotic drugs and antidepressants make for a solid primer. The authors provide the historical background for each class of drugs, identify the targeted populations, and outline the hypotheses concerning the mechanisms of action, all within a couple of pages of text. All of the entries are also accompanied by a list of further readings, which are usually review articles.

Many of the entries, however, are unlikely to be understandable to someone unfamiliar with the topic. For

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example, most of the molecular biology topics will be very difficult for a reader who has not been immersed in this area. In many cases, authors plunge into a technical description of the chain of events associated with a particular molecular or chemical process without defining basic concepts. A naive reader would be forced to compile a list of terms and then resort to dedicated detective work to track down these topics in other entries. At finer levels of detail, the likelihood that such entries are included in the volume diminishes, and the search is unsuccessful.

These failures of accessibility underscore the encyclopedia's major shortcoming. Although the editors should be lauded for their efforts in identifying a comprehensive list of topics, they have failed to establish a level of uniformity across the entries. The amount of space for each topic is not evenly allocated—why are four pages devoted to “acetylcholine receptors, nicotinic” and just a little over one page provided for “striate cortex?” Why does “ataxia” warrant three times as much space as “agnosia?” The longer entries are generally more satisfying, so perhaps one solution would be to expand the encyclopedia

into 10 volumes. However, given the current size, there is no justification for the depth of coverage given to certain topics. It seems as if such decisions were made by the authors.

Second, there is a striking inconsistency in the internal organization of the entries. Some of the pieces include useful headings and subheadings, while others consist of monolithic text. Lack of consistency in the figures is also troubling. About half the entries are accompanied by figures, and their inclusion seems to be idiosyncratic rather than a reflection of editorial decisions regarding the efficient use of space. Furthermore, the clarity of many entries is compromised by the absence of figures, a shortcoming that is unacceptable given the ubiquitous use of visual aids in our field. Finally, there is inconsistency in referencing styles. Some authors use conventional journal format with a citation following each relevant point; others do not provide any references within the text. Cross-referencing is minimal. Perhaps it is not essential given the alphabetical organization, but then why include cross-references in a few entries? One thing that is consistent, however, is the lack of any references to

material published after 1995. Obviously, there was a publication lag of about four years.

What audience will be served by this volume? Most of the entries are clearly too technical for the lay audience, even the scientifically educated population. It is unlikely that researchers in the neurosciences will turn to the *Encyclopedia of Neurosciences*. For topics in their own area of specialization, the entries provide a coherent summary, but are unlikely to provide novel insight. For topics outside their specialization, the entries are often too brief. Graduate students may find the encyclopedia useful for gaining entry to a new area and would be able to use the list of further readings as a guide to more developed reviews. One possible use would be for professors who need a resource to track down answers for inquisitive students. For example, after lecturing on Alzheimer's disease in the context of memory disorders, a student may ask about a new drug treatment that a grandparent has recently been given. The encyclopedia might provide an efficient resource here (“Alzheimer's disease, pharmacological therapy”).

The *Encyclopedia of Neurosciences* will likely end up in many university libraries, but as with most encyclopedias, it is not likely that it will be used. When was the last time you took the time to go to the library to use an encyclopedia? A much more common strategy nowadays is to turn to one of the internet search engines. Indeed, the encyclopedia as a genre has undergone a radical transformation in recent years, with most sales coming from CD-ROM versions that have web links. Although the *Encyclopedia of Neurosciences* is available on CD-ROM, only a few entries provide information regarding relevant internet sites. On the other hand, the current state of the web does not seem sufficient to offer a viable alternative as an all-purpose reference source. When I conducted an informal web search of selected neuroscience topics, I failed to get hits that matched the sophistication of subjects in this encyclopedia. Until such sites exist, the *Encyclopedia of Neurosciences* may be the only option for those desiring a comprehensive reference source.

Relative development of major brain divisions in representative vertebrate species. Green, yellow, and red indicate the extent of the cerebellum, optic tectum, and cerebral hemispheres, respectively. Brains are not drawn to scale. Reprinted from the entry “Evolution of vertebrate brains” by R. Glenn Northcutt in the *Encyclopedia of Neuroscience*, page 690, with permission from Elsevier Science.

