

The other brain: *From dementia to schizophrenia, how new discoveries about the brain are revolutionizing medicine and science*

Michael T. Heneka

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Book Review

The Other Brain: From Dementia to Schizophrenia, How New Discoveries about the Brain Are Revolutionizing Medicine and Science has opened the door to the so far underappreciated, but thrilling and constantly expanding, neuroscience field of glial cell function. R. Douglas Fields, a distinguished neuroscientist who is currently serving as the head of the Section on Nervous System Development and Plasticity at the National Institute of Child Health and Human Development and is an adjunct professor in the Neuroscience and Cognitive Science Program at the University of Maryland, provides an expert account of historical as well as current developments, having himself contributed several important original papers to the neuroscientific community on this topic. Giving a first-hand, behind-the-scenes view, Fields takes his readers from historical places and famous laboratories to his own bench, never forgetting that he may not be talking to the expert colleague but rather to the wider scientific community. Thus, this book is clearly written for a broad readership, from the glial cell researcher to the medically interested scientist. Rudolf Virchow baptized these brain cells glia — meaning glue in ancient Greek. Glia have been assumed to play housekeeping roles in stabilizing the brain's neurons, the presumed generators of information and cognition. Overlooked as bystanders to the real game, the critical roles of glial cells for exactly these functions [...]

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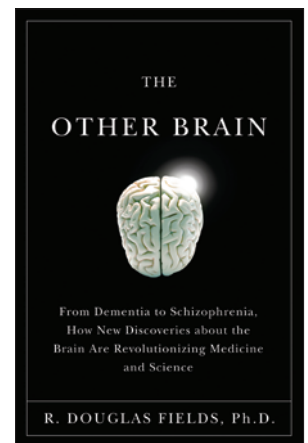
From dementia to schizophrenia, how new discoveries about the brain are revolutionizing medicine and science

R. Douglas Fields

Simon and Schuster. New York, New York, USA. 2009.
384 pp. \$27.00. ISBN: 978-0-743-29141-5 (hardcover).

Reviewed by Michael T. Heneka

Klinische Neurowissenschaften, Klinik und Poliklinik für Neurologie, Bonn, Germany.
E-mail: michael.heneka@ukb.uni-bonn.de



The *Other Brain: From Dementia to Schizophrenia, How New Discoveries about the Brain Are Revolutionizing Medicine and Science* has opened the door to the so far underappreciated, but thrilling and constantly expanding, neuroscience field of glial cell function.

R. Douglas Fields, a distinguished neuroscientist who is currently serving as the head of the Section on Nervous System Development and Plasticity at the National Institute of Child Health and Human Development and is an adjunct professor in the Neuroscience and Cognitive Science Program at the University of Maryland, provides an expert account of historical as well as current developments, having himself contributed several important original papers to the neuroscientific community on this topic. Giving a first-hand, behind-the-scenes view, Fields takes his readers from historical places and famous laboratories to his own bench, never forgetting that he may not be talking to the expert colleague but rather to the wider scientific community. Thus, this book is clearly written for a broad readership, from the glial cell researcher to the medically interested scientist.

Rudolf Virchow baptized these brain cells *glia* – meaning *glue* in ancient Greek. Glia have been assumed to play housekeeping roles in stabilizing the brain's neurons, the presumed generators of information and cognition. Overlooked as bystanders to the real game, the critical roles of glial cells for exactly these functions are now beginning to be discovered. In his book, Fields puts glial cells right in the center of brain function, suggesting that these cells play pivotal roles for synapse control, immune system responses, and wiring and rewiring the brain as well as for recovery from and progression of disease.

The book is divided into three parts entitled *Discovering the Other Brain*, *Glia in Health and Disease*, and *Glia in Thought and Memory*. In the first part, Fields introduces the reader to the very basics of glial cell anatomy and biology, writing in an exciting style enriched with anecdotes and historical facts, which bring life to the process of the discovery and characterization of glial cells over the past couple of decades. Here, Fields's swift writing and use of metaphors makes the understanding of even complex processes, such as the involvement of glial cells in synapse regulation – also known as the tripartite synapse concept – easy, never trivial, but indeed interesting.

Surprises wait on every other page of this book. Fields introduces us to Fridtjof Nansen – the glial (not the Arctic) explorer. Nansen was, according to Fields, the first to suggest the importance of glia for cognition, having found that their numbers increase from lower to higher forms of animals. Fields heralds him as a grandsire in his book.

In the second part, after a more general introduction, several chapters cover the role of glia in human neurological disorders, including brain cancer, spinal cord injury, infection, and neurodegenerative disease. There are also chapters covering the role of glia in pain or addiction. Each of these chapters is a self-contained essay, making reading quite convenient. Fields addresses the destructive action of glial cells that have lost their fine regulation of cell division (resulting in brain neoplasms) and the divergent role of microglia in fighting as well as promoting brain cancer; he also discusses selected new therapeutic avenues. Likewise, the author describes the more nefarious functions of glia: how glial cells can interfere with the growth of

axons after spinal cord trauma or, as a further example, the important action of glia in neurodegeneration. Here again the Janus face-like action of glia becomes apparent: while glia harboring mutant SOD1 may contribute to motor neuron cell death in familial amyotrophic lateral sclerosis, the same cells may, under other circumstances, protect neurons by serving as important source of neurotrophic factors.

Following this, Fields once again turns toward the way glial cells process information in a nonelectric manner and modulate synapse function through neurotransmitter uptake and release, ultimately influencing brain function and thus human behavior even during pregnancy or sleep. Fields then also argues how exactly these mechanisms may be equally important to memory formation and consolidation.

Finally, the book comes along with a set of rare photographs, mostly of historical value, notes, a glossary and a bibliography that serves as an aid for further reading.

After having thoroughly enjoyed reading this book, I believe that most of its readers will find the scientific enthusiasm with which Fields has written his book highly contagious. Readers who are neuroscientists may even consider taking a closer look at these cells when performing their next experiments. Even though the complexity of neuronal mechanisms may be underestimated by the author, this is not the main focus. There are numerous examples of books describing the discovery and importance of neurons in detail, yet the uniqueness of this book is two-fold: it pinpoints the current stage at which glia-related neuroscience stands, at the beginning of new discoveries, and it familiarizes the general medical reader with the importance of glia.