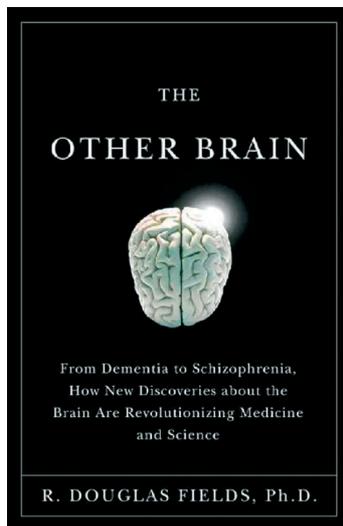


Report**□ The story of glia**

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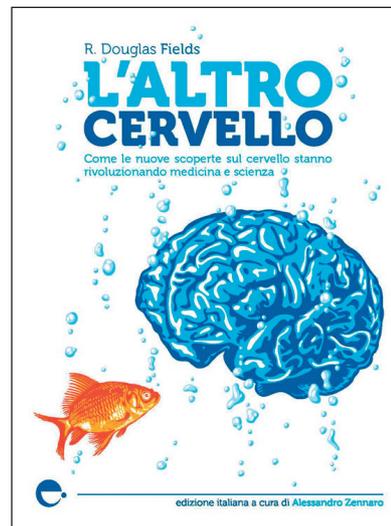
R. DOUGLAS FIELDS
THE OTHER BRAIN
From Dementia to Schizophrenia,
How New Discoveries about the Brain
Are Revolutionizing Medicine and Science



Simon & Schuster, New York, USA
 2009, pages 384
 ISBN 978-0-7432-9141-5, \$ 16.00
 ISBN 978-1-4391-6043-5 (ebook), \$ 11.66
 Language: English

A few months ago, during an international conference, en-route from one presentation to another, I overheard a bookseller at one of the usual bookstands that litter the lobby trying to sell a congress-goer a book, The

R. DOUGLAS FIELDS
L'ALTRO CERVELLO
Come le nuove scoperte sul cervello
stanno rivoluzionando medicina e scienza



Espress Edizioni, Italy
 2012, pages 368
 ISBN 978-88-9741-210-6, euro 25,00
 ISBN 978-88-9741-264-9 (ebook), euro 9,90
 Language: Italian (*Editor: A. Zennaro*)

Other Brain by R. Douglas Fields. His description of the volume piqued my interest and, as I seize every opportunity to get hold of reading material not readily available in Italy, I picked up a copy myself. I browsed

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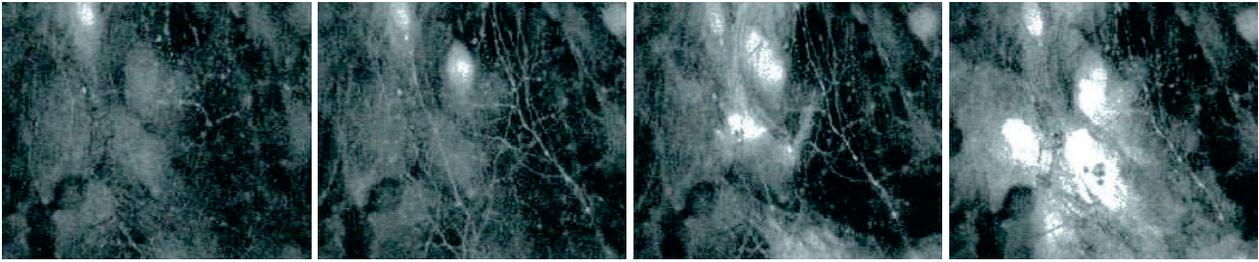


Figure 1. The evidence of activation of the Ca^{2+} channels in the progressive sequence of images (Figure 45 from the English version).

through it, and from the very first page, I knew that this fascinating book was ripe for translation into Italian as a work of popular science. Serendipitously, it was at this time that the fledgling publishing house Espresso Edizioni was recruiting its Scientific Board and defining its first publishing schedule, which represented the ideal opportunity for me to propose such a project.

For centuries, science has considered the glial cells as little more than padding. Naturally, their functions in the support, nourishment and protection of neurons have long been known, but it is only very recently that neuroscientists have begun to consider the glia, the predominant cells in our brains, as something more than simple ‘housekeepers’ of the central nervous system. More than a century after their discovery, we have discovered that they can communicate with each other, which enables them to detect and control neuronal electrical activity, transmit signals over long distances, and play important, perhaps decisive, roles in many neurological and psychiatric diseases.

Often in science, discoveries occur unexpectedly and out of the blue, which seems to be the case of that regarding the physiology of glial cells. In “*The Other Brain*”, which I had the honour of translating for Espresso Edizioni of Turin, Douglas R. Fields says that Marian Diamond from University of California, Los Angeles (UCLA), when comparing sections of Einstein’s brain with those of another 11 men in the ’80s, found surprisingly few differences, except for connections between glial cells and neurons in different areas, especially in left parietal inferior cortex, in which the finding reached statistical significance. This discovery, however, provoked a flood of criticism and complaints, mainly related to the age of the control group, sparking a lively scientific debate, raising many questions, and inspiring a large body of research. At that point, most neuroscientists considered the glial cells a mystery. Although they were known to be

extraordinarily useful in providing support for the neurons and their axonal projections, not to mention protecting the central nervous system from injury and infection, being devoid of synapses, the idea that they could communicate with each other and with the rest of the nervous tissue was perplexing to say the least. However, with advances in the calcium imaging techniques^(1,2), the veil started to lift a little. These techniques revealed that calcium (Ca^{2+}) channels provide an important conduit for glial cell information transfer. In this pathway, intracellular signals cause the release of glutamate and, through it, the glia seem to be able to modulate the excitability of neuronal and synaptic transmission. In this respect, calcium imaging has revealed that glial cells are remarkably similar to neurons: they respond to transmitters and integrate electric pulses, displaying a system of remote signalling that allows the release of transmitters, albeit much more slowly than in neural cells.

Not confining himself merely to retracing the history of these neuroscientific discoveries and discussing the delay in understanding the role and function of glial cells, R. Douglas Fields, with refreshingly easy-to-understand language, goes on to outline the potential implications of this discovery in health and disease, with particularly reference to psychiatric disorders such as schizophrenia, bipolar disorder, depression, autism, conduct disorders and obsessive-compulsive disorders. With a style befitting a novelist, the Author delves into the specific mechanisms of genetic coding and the implications of neurotransmitters, and draws even the uninitiated in with entertaining historical anecdotes and a rich satirical approach that makes this book a very enjoyable read. Not only is this book suitable for the popular science market, it also served to fill several gaps in my professional knowledge, and I’m sure that many colleagues in the field would similarly benefit from this almost systematic review of the academic literature.

The volume consists of three parts: Part I, entitled “*The Discovery of the Brain*”, in which three compelling chapters narrate the very beginnings of research into the central nervous system, going on to explore the latest research into glial cells; Part II, “*The Glial Cells in Health and Disease*”, which discusses the implications of these findings regarding the nature and operation of communication in the white matter in several neurological and psychiatric disorders; and Part III, “*The Glial Cells in Thought and Memory*”, dedicated to the future development of scientific research on the subject, particularly with respect to cognitive neuroscience.

In my opinion it is the second part of the book that may be considered the weakest from a scientific standpoint. Even though the implications of the discoveries on the neuroglia in neurodegenerative diseases and trauma laid out are convincing, their role in psychopathology is, in fact, far less well established. In these chapters the Author appears to embrace a biological perspective, understandable in light of the target audience, but far from satisfactory from a professional perspective, as certain simplifications appear unwarranted and there is a notable absence of literature references that run the risk of contrasting with the conclusions of the Author. For example, while the neural correlates are incontrovertible, and macro-structural, the role of neural and bio-chemical networks in the aetiology and maintenance of some psychopathological disorders (schizophrenia spectrum disorders, Attention Deficit Disorder with Hyper-

activity (ADDH) and autism spectrum disorders, to name but a few) are also consolidated, and there is no mention of this, or what effect they may have on neurulation and the conditioning of neuronal plasticity, for example relative to synaptic pruning. Furthermore, although 456 pages may seem a lot for a popular science book, when it comes to such an extensive and fascinating topic, there is a risk of oversimplification, and, I, as a specialist, find the Author’s descriptions of the psychopathological implications of the findings on glial cells somewhat limited, leaning too heavily on genetic determinism, which is reductive to say the least⁽³⁾. Therefore, although this book is a highly entertaining and fascinating read, the non-specialist reader should not get the idea that understanding the physiological and pathological functions of glial cells will lead us to definitively resolve any psychopathological problem that afflicts the human mind - this, unfortunately, is not the case.

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