

motor behaviours, apparently of striatal origin, have been demonstrated, and the availability of the U.S. Environmental Protection Agency to assist in the assessment of risks from neurotoxins.

The numerous papers contain new evidence, descriptions of procedures as well as theories which will influence future behavioural neuroscience research and are authored by a number of researchers who are foremost in their respective fields. The book provides ready access to the various approaches to research on neurobehavioural plasticity.

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NEUROGLIA. 1995. Edited by H. Kettenmann and B.R. Ransom. Published by Oxford University Press, New York. 1079 pages. C\$278.95.

With the exception of my Webster's dictionary, Neuroglia has become the heaviest book on my bookshelf. It is well bound and the matte-finish paper is of high quality. The book is dedicated to "those who believed in glial cells during the long, dark period when the neuron concept dominated brain science." The book has 108 contributors who are evenly derived from Western European countries and North America. The editors have done an excellent job in selecting experts in all fields of glial research to write chapters. The down side is variability in style. While all chapters I looked at in detail (approximately half) were well written, some of the English style is excessively formal and difficult to read. The book contains many black-and-white photos which generally are very good although a few lack good contrast and some, reproduced from other sources, are not well focused. There are many diagrams; most are professionally done but some appear very amateur and difficult to read. Reflecting the time to print such a book, all chapters had 1993 references, and some had 1994 references, but I only came across one 1995 reference which was "in press".

The 69 chapters are logically organized into 12 major groupings (Morphology, Lineage, Physiology, Receptors, Mechanisms of cell-to-cell communication, Molecular and biomechanical mechanisms, Myelin, Membrane structure and cytoskeletal proteins, Glia as part of the immune system, Neuron-glia cell interactions, Role of glia in injury and regeneration, Glia and disease) and, with a few exceptions, all have a useful half page summary at the end. There is frequent overlap in subject material written from different perspectives. For example chapters dedicated to microglia appear in the morphology, lineage, immune, and injury sections. As a compensation the editors seem to have allowed authors rather free rein to express a particular opinion. In Chapter 10 by Fedoroff, the author promotes his own and not widely supported view that microglia are derived primarily from CNS precursor cells rather than marrow stem cells. Therefore, I found it worthwhile to consult several authors chapters to appreciate what the "accepted knowledge" is.

The chapters I focused on for this review were ones I thought might be relevant to the predominantly clinical audience of the Canadian Journal of Neurological Sciences. The morphology chapters concerning oligodendrocytes, Schwann cells, and microglia are excellent, as are chapters 7 and 8 which address basic issues of cell lineage. These would be valuable reading for

neuropathologists and others interested in microscopic anatomy of the nervous system. Chapters 37-40 concerning myelin, would be useful reading for neurologists interested in demyelination/remyelination. Chapters 55-60 concerning injury and regeneration relate more to experimental aspects of brain injury than to practical issues relevant to clinical neurosciences. The Disease section includes nine chapters concerning edema, hepatic encephalopathy, ischemia, disorders of myelination, viral infection, and gliomas. In some cases, for example the chapters on epilepsy, MPTP-induced Parkinsonism, and Alzheimer's disease, the discussion focusing on glial cells is quite artificial.

Overall, I would suggest that this is an excellent reference book that should be purchased by all major libraries. Clinicians should be aware of its existence but I would advise against purchase. In no way does this book take the role of a more balanced pathology or pathophysiology text. I would suggest that the book be considered for purchase by those actively engaged in research pertaining broadly to glial cells. A quick reading has already opened my eyes to some previously unappreciated aspects of these (perhaps) ignored cells.

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BRAIN REPAIR. 1995. By Donald G. Stein, Simòn Brailowsky and Bruno Will. Published by Oxford University Press Canada. 156 pages. \$C35.00.

Brain injury has tremendous impact on everyone but is poorly understood. One of the greatest obstacles to providing hope to those suffering from brain injury is the belief, held by scientists and the public, that the brain cannot repair itself and that damage is permanent. This book describes how incredibly resilient the brain is with fascinating anecdotes from laboratories around the world. Although *Brain Repair* has been written for lay readers by simplifying many complex concepts and avoiding as much technical jargon as possible, neuroscience researchers and practitioners would also benefit from, and enjoy reading this well-written report of what is currently being done in the field of head injury.

The authors begin by taking us on a historical journey of neuroscience from prehistoric trepanation, through Gall and Spurzheim's phrenology and the practice of lobotomies, to the latest observations of today's neuroscientists pointing out how far we have come in the last decade at understanding how the brain functions. The second chapter, *Looking into the living brain*, highlights some of the latest imaging techniques, such as CAT and PET scans, EEGs and MRI, that are used to measure tiny changes in metabolism, blood flow and electrical activity of brain cells in living beings without having to operate and remove tissue for biopsy. Chapters 3, *Neurons at work* and 4, *The injured brain*, prepare the reader for discussions of brain repair in Chapter 5, *Regeneration repair, and reorganization*, by clearly and succinctly describing neurophysiology and neuropathophysiology. Chapter 5 comprehensively deals with the major forms of brain injury including stroke, Alzheimer's disease and Parkinson's disease. *Factors in the brain that enhance growth and repair*, Chapter 6, describes the how NGF and NCAMs promote neuronal growth and sprouting. The authors are careful to emphasize, however, that, in spite of the tremendous industrial efforts

to develop growth factors as a brain injury panacea, more growth is not necessarily beneficial and the outcome measures in such experiments should instead be behavioural improvements. Chapter 7, *Age and recovery: Is there a difference between brain damage that occurs early and late in life?*, addresses how the age of a victim of brain injury affects their clinical outcome. Although, in general, early brain damage is less likely to produce severe problems later in life, perhaps due to the high levels of trophic factors circulating in the juvenile brain, injuries inflicted very early on may actually be worse than the same damage occurring just a few days later suggesting that the brain may respond differently to injury at different stages of development. Another issue addressed in Chapter 7 is how the extent of recovery depends on the time course of the injury. Recovery from a progressive lesion will be greater than that of an acute lesion of the same size. Chapter 8, *Brain transplants as therapy for brain injuries?*, discusses the pros and cons of using brain transplants as therapy for brain injury citing attempts to treat Parkinson's disease patients with fetal grafts, adrenal gland extracts and stably transfected cell lines. Although the success of many of these studies is measured by the extent of growth of the grafts, as mentioned in Chapter 6, more is not necessarily better. In fact, some grafts grow so well they invade and damage the healthy host brain tissue. In *The pharmacology of brain injury repair*, Chapter 9, the authors touch on the efforts by many researchers to produce neurotransmitter agonists and antagonists but add the cautionary note that no effective treatments are currently available and that the success of any compound will depend not only on obvious things, like the safety and bioavailability of the drug, but on the nature of the brain

injury, the sex of the patient as well as nutritional and metabolic factors. Chapter 10, *Environment, brain function, and brain repair*, discusses an issue which is all too often overlooked by administrators trying to cut health care costs; an environment conducive to recovery. Often, recovery is expected to occur in a sterile and impersonal environment. One study cited reported an enhanced recovery by patients in a "room with a view" relative to patients who occupied a room with a window facing a brick wall. Lastly, the epilogue gives the reader a taste of things to come suggesting that the key to providing safe and effective treatment to victims of brain injury is to unlock and promote the brain's inherent ability to heal itself. The authors state the necessity for a treatment which combines both psychological and chemical therapies and conclude with a positive prognosis for the future of research in the field of head injury.

*Brain Repair* is well-written and flows from chapter to chapter with a consistency one would expect from a single author. Without detracting from the ease with which the text flows, the authors reference the text well in efforts to encourage the interested reader to seek out the original work. I highly recommend this book to neuroscientists, practitioners and lay readers alike. It has something to offer all of these readers. It will rekindle excitement in neuroscientists, from the minds of practitioners and policy makers, it will shake loose conventional doctrines of a brain which is unable to repair itself, and for the lay reader it promises to entertain and enlighten with a fascinating account of the latest advances being made in research, technology and treatment of brain damage.

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