

Describing the brain

Cell Biology of the Brain. By W. E. Watson. Pp. xi+527. (Chapman and Hall: London, August 1976.) (Distributed in the USA by Halsted: New York.) £15.

THERE have been previous attempts to describe the brain in the language of cell biology, but few have been as crammed with information or as well written as the present monograph. The author has not been intimidated by this heroic task, and has produced an eminently readable and useful volume. The first six chapters give a broad outline of the cellular properties of the brain, its origin from epithelial tissue, the differentiated properties of neurones, current understanding of membranes and their function, and a fairly extensive review of modern knowledge of the 'chemical transducer' mechanisms by which neurones respond to chemical signals.

This includes a description of recent biochemical techniques for the study of receptor sites by the ligand binding approach, the coupling of receptors to cyclic nucleotide mechanisms and more general biochemical changes in neurones associated with activity. In this section there is little emphasis on the neurone as a carrier of electrical signals, nor is there any description of the presynaptic machinery associated with the production, storage and release of neurotransmitters—a deliberate omission since the author rightly points out that these topics are already dealt with extensively elsewhere. But this perhaps leaves some major gaps in coverage for student readers.

The largest chapters, and the most valuable in my estimation, were the remaining four, which deal with the topics of plasticity in the nervous system, responses to injury, neurotrophism and genetics. These are topics which encompass some of the most fundamental problems of neurobiology, and the author is an expert in this area. He gives an excellent review, taking examples from a broad spectrum of vertebrate and invertebrate studies. In dealing with this large area the author deliberately, and probably wisely, avoids the even larger topic of developmental neurobiology, but his deliberate omission of any discussion of the nerve growth factor seemed to me a curious decision.

The book is undoubtedly well referenced. Indeed some might consider that the 3,247 citations in the bibliography (which occupies almost 200 of the 527 pages) were enough for six

volumes of this size. I would personally have preferred to have seen fewer references and more illustrations. Overall, however, there is no doubt that the book is an unusual and valuable source of information on topics that are not well reviewed elsewhere.

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Neuromuscular junction

Neuromuscular Junction. (Handbook of Experimental Pharmacology. New Series, Vol. 42.) Edited by Eleanor Zaimis. Pp. xvii+746. (Springer: Berlin and New York, 1976.) DM 280; \$91.90.

THIS latest volume in this well-known series of reviews and monographs, which all pharmacologists turn to for information when everything else fails, lives fully up to the standards of its predecessors. Each of its chapters amounts to a substantial review article and like others in the series, the book as a whole is full of detail, with each chapter accompanied by an exceptionally complete and valuable bibliography.

The neuromuscular junction is, without any doubt, the most intensively studied synapse of all; it is also a highly atypical synapse, being a simple one-to-one connection between a nerve fibre and a muscle fibre. In life it serves simply as a relay (and a highly reliable relay at that, very rarely affected by disease) and has none of the integrative properties that characterise most other synaptic connections. To some investigators studies of the neuromuscular junction are justified mainly by the implications that the results hold for other more complex synapses. Not to all, though, for at a recent scientific meeting an eminent investigator, asked whether the neuromuscular junction helped to explain brain function, replied that all he could be sure of was that the brain was indispensable in understanding the neuromuscular junction.

This book certainly does not lend much encouragement to the view that the neuromuscular junction is a good model for other synapses. The admirable article by MacIntosh and Collier on the metabolism of acetylcholine makes a point of comparing the results of work on the neuromuscular junction, where electrophysiological

techniques have generally proved much more valuable than biochemical techniques, with work on the brain, where the reverse is true. The differences between the two are a good deal more obvious than the similarities, and the authors comment gloomily: "The extent of these peculiarities of individual tissues... may seem depressing to investigators who would like to think that their results have a general significance and should help to explain all analogous phenomena". Particularly valuable in this article is the balanced discussion of the present status of the vesicle hypothesis. The evidence, which is complicated and often conflicting, is presented with an economy and a clarity which is all too rare in scientific writing.

The following chapter, by Ginsborg and Jenkinson, equally well-written, surveys the mechanism of impulse transmission mainly from an electrophysiological point of view; it, too, succeeds in distilling an immense amount of information into a concise and coherent account. What emerges most clearly from these two chapters is the considerable uncertainty that still exists about the mechanism of acetylcholine release and the difficulty in relating the results of electrophysiological experiments to biochemical events within the nerve terminal. These two chapters, together with the preceding one on morphology by Bowden and Duchon, form the first half of the book and complement each other extremely well.

The rest of the book is concerned mainly with neuromuscular blocking drugs and anticholinesterases. The contentious areas here are the mechanisms of action of depolarising blocking agents and of anticholinesterases, well-scarred battlegrounds on which relatively little new evidence has appeared in recent years. I would have preferred to see less discussion of these topics and fuller accounts of the recent biochemical advances in isolating and characterising acetylcholine receptors. Studies based on these advances have already led to a reappraisal of the nature of the defect in myasthenia gravis and show great promise of leading to a much better understanding of the process underlying synaptogenesis and denervation effects; yet they receive only fleeting comment. The book will, however, be invaluable as a work of reference. The only danger is that it may attract even more experimenters to assault this unoffending synapse.

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